Tables of the Distribution of Courses

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Departmental Course Descriptions

Departmental Course Descriptions

Preparatory Year

Departmental Course Descriptions

Table No. (1)
Preparatory Year

Course Code	Course Name	First Semester			Second Semester			Total Marks
		Hrs. Week	Max Marks	Exam Period	Hrs Week	Max Marks	Exam Period	

Departmental Course Descriptions

		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
PHM0001	Engineering Mathematics (1)	4	2	110	40	--	3	4	2	110	40	--	3	300
PHM0002	Engineering Physics (1)	4	2	90	30	30	3	4	2	90	30	30	3	300
MEP0001	Mechanics (1)	2	2	70	30	--	3	2	2	70	30	--	3	200
MDP0001	Engineering Drawing & Projection	2	3	--	50	--	--	1	4	150	50	--	4	250
PHM0103	Engineering Chemistry	3	2	75	25	25	-	-	-	-	-	-	-	125
ECS0101	Computer Technology	2	2	60	20	20	3	-	-	-	-	-	-	100
MDP0202	Production Technology	-	-	-	-	-	-	2	3	75	25	25	3	125
HUM0201	Technical English Language	-	-	-	-	-	-	2	1	45	15	--	2	60
HUM0202	Engineering History	-	-	-	-	-	-	1	-	30	10	-	2	40
		17	13					16	14					
	Total Hours/Week	30						30		Total Marks				1500

Departmental Course Descriptions

Departmental Course Descriptions

Mechanical Engineering Department

Departmental Course Descriptions

Table No. (2)
Mechanical Engineering Department
First year

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
PHM1004	Engineering Mathematics (2)	3	2	90	35	--	3	3	2	90	35	--	3	250

Departmental Course Descriptions

MDP1003	Machine Drawing	2	4	--	40	--	--	1	4	100	35	--	3	175
MDP1104	Metallurgy	3	2	75	30	20	3	--	--	--	--	--	--	125
MDP1105	Production Engineering (1)	3	2	75	30	20	3	--	--	--	--	--	--	125
CES1147	Theory of Structures	2	2	70	30	--	3	--	--	--	--	--	--	100
EPM1132	Electrical & Electronic Engineering	3	2	90	30	30	3	--		--	--	--	--	150
MDP1206	Materials Engineering & Testing	--	--	-- --	-- --	--	--	3	2	120	40	40	3	200
MEP1202	Mechanics (2)	--	--	--	--	--	--	2	2	70	30	--	3	100
MEP1203	Thermodynamics (1)	--	--	--	--	--	--	2	2	60	20	20	3	100
PHM1205	Engineering Physics (2)	--	--	-- --	-- --	--	--	2	2	60	20	20	3	100
HUM1206	Technical Report Writing	--	--	--	--	--	--	2	1	50	25	--	2	75
		16	14					15	15					
	Total Hours/Week	30						30		Total Marks				1500

Departmental Course Descriptions

Table No. (3)
Mechanical Engineering Department
Second year

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
MDP2107	Theory of Machines	3	2	100	50	--	3	--	--	--	--	--	--	150
MDP2008	Machine Design	3	2	--	40	--	--	3	2	120	40	--	4	200
EPM2133	Electrical Engineering	2	2	70	30	--	3	--	--	--	--	--	--	100

Departmental Course Descriptions

MDP2109	Stress Analysis	2	2	70	30	--	3	--	--	--	--	--	--	100
MEP2104	Thermodynamics (2)	3	2	100	30	20	3	--	--	--	--	--	--	150
MEP2005	Fluid Mechanics	3	2	60	20	20	3	3	2	60	20	20	3	200
HUM2109	Industrial Safety	1	1	30	10	10	2	--	--	--	--	--	--	50
MDP2210	Production Engineering (2)	--	--	--	--	--	--	2	2	60	20	20	3	100
MEP2206	Heat & Mass Transfer	--	--	--	--	--	--	3	2	100	25	25	3	150
MXP22xx	Elective Course (1)	--	--	--	--	--	--	2	1	70	30	--	3	100
MEP2208	Measurements	--	--	--	--	--	--	3	2	75	25	25	3	125
HUM2213	Engineering Economy	--	--	--	--	--	--	2	1	50	25	--	2	75
		17	13					18	12					
	Total Hours/Week	30						30		Total Marks				1500

Menu for Elective courses (1)

- **MEP2207 New and Renewable Energy**
- **MDP2211 Introduction to Mechatronics**
- **MDP2242 Engineering Materials (Advanced)**

Departmental Course Descriptions

Departmental Course Descriptions

a- Mechanical Power Engineering

Departmental Course Descriptions

Table No. (4)

Mechanical Engineering Department

Third year Mechanical Power

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
MDP3121	Mechanical Design	3	3	100	50	--	3	--	--	--	--	--	--	150
MEP3109	Hydraulic Machines	4	2	90	30	30	3	--	--	--	--	--	--	150
MEP3110	Automatic Control	3	2	90	35	--	3	--	--	--	--	--	--	125
MEP3111	Thermal Power Stations (1)	3	2	75	25	25	3	--	--	--	--	--	--	125
MEP3112	Theory of Combustion	3	2	75	25	25	3	--	--	--	--	--	--	125
xxx31xx	Elective Course (2)	2	1	50	25	--	3	--	--	--	--	--	--	75
HUM3220	Management and Marketing	--	--	--	--	--	--	2	1	50	25	--	3	75
EPM3234	Electrical Power Engineering	--	--	--	--	--	--	2	2	60	20	20	3	100
MDP3222	Theory of Vibration	--	--	--	--	--	--	4	2	100	50	--	3	150
MEP3214	Internal Combustion Engines (1)	--	--	--	--	--	--	3	2	75	25	25	3	125
MEP3215	Gas Dynamics	--	--	--	--	--	--	3	2	75	25	25	3	125
xxx32xx	Elective Course (3)	--	--	--	--	--	--	2	2	70	30	--	3	100

Departmental Course Descriptions

HUM3221	Environmental Studies	--	--	--	--	--	--	2	1	50	25	--	2	75
		18	12					18	12					
	Total Hours/Week	30						30		Total Marks				1500

Menu for Elective courses (2)

- **ECS3148 Information Systems**
- **MEP3113 CAD of Mechanical Power Engineering**
- **MDP3148 Introduction in Quality Systems**

Menu for Elective courses (3)

- **MEP3216 Thermal Energy Systems**
- **MDP3223 Mechatronics (1)**
- **MDP3224 Material handling**

Table No. (5)

Mechanical Engineering Department

Fourth year Mechanical Power

Departmental Course Descriptions

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
MEP4120	Piplines and Networks	2	2	60	20	20	3	--	--	--	--	--	--	100
MEP4121	Turbomachinery	3	2	75	25	25	3	--	--	--	--	--	--	125
MEP4022	Thermal Power Stations (2)	3	2	75	25	25	3	3	2	75	25	25	3	250
MEP4023	Refrigeration & Air Conditioning	3	2	75	25	25	3	3	2	75	25	25	3	250
MEP4024	Project	--	4	--	50	--	--	--	4	--	50	100	--	200
MEP4125	Hydraulic Power Systems	2	2	70	30	--	3	--	--	--	--	--	--	100
MxP41xx	Elective Course (4)	2	1	70	30	--	3	--	--	--	--	--	--	100
MDP4225	Industrial Organization	--	--	--	--	--	--	2	2	70	30	--	2	100
MEP4227	Internal Combustion Engines (2)	--	--	--	--	--	--	3	2	75	25	25	3	125
MEP422x	Elective Course (5)	--	--	--	--	--	--	2	2	70	30	--	3	100
HUM4223	Environmental Impact of Projects	--	--	--	--	--	--	2	1	35	15	--	2	50
		15	15					15	15					
	Total Hours/Week	30						30		Total Marks				1500

Menu for Elective courses (4)

Menu for Elective courses (5)

Departmental Course Descriptions

- **MEP4126 Pneumatic Systems**
- **MDP4141 Project Feasibility Studies**
- **MEP4228 Maintenance of Mech. Power Systems**
- **MEP4229 PLC control of Power Systems**

Departmental Course Descriptions

b- Production Engineering and Design

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Departmental Course Descriptions

Table No. (6)

Mechanical Engineering Department

Third year Mechanical – Production

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
MDP3012	Machine Design	3	3	100	50	--	4	3	3	100	50	--	4	300
MDP3113	Measuring Instruments	3	3	90	30	30	3	--	--	--	--	--	--	150
MEP3119	Power plants	3	2	75	25	25	3	--	--	--	--	--	--	125
MDP3114	Automatic Control	2	2	70	30	--	3	--	--	--	--	--	--	100
MDP3115	Theory & Technology of Metal Forming	3	3	90	30	30	3	--	--	--	--	--	--	150
HUM3114	Legislations & Contracts	2	1	50	25	--	2	--	--	--	--	--	--	75
MDP3216	Theory & Technology of Metal Cutting	--	--	--	--	--	--	3	2	75	25	25	3	125
MDP3217	Theory of VibrationS	--	--	--	--	--	--	2	2	70	30	--	3	100
MDP3218	Machines of Metal Cutting & Forming	--	--	--	--	--	--	4	3	125	25	25	3	175
MDP32xx	Elective Course (2)	--	--	--	--	--	--	3	2	75	25	25	3	125
HUM3220	Management & Marketing	--	--	--	--	--	--	2	1	50	25	--	2	75

Departmental Course Descriptions

		16	14		17	13	
	Total Hours/Week	30			30	Total Marks	1500

Elective course(2)

MDP3219 Material Handling
MDP3220 Mechatronics (1)

Departmental Course Descriptions

Table No. (7)

Mechanical Engineering Department

Fourth year Mechanical-Production

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
MDP4027	Project	--	4	--	50	--	--	--	4	--	50	100	--	200
MDP4128	Quality Control	2	2	70	30	--	3	--	--	--	--	--	--	100
MDP4129	Machines Tool Design	3	2	90	35	--	3	--	--	--	--	--	--	125
MEP4130	Hydraulic Power Systems	3	2	90	35	--	3	--	--	--	--	--	--	125
MDP413x	Elective Course (3)	2	2	60	20	20	3	--	--	--	--	--	--	100
MDP4133	Measurements	2	2	60	20	20	3	--	--	--	--	--	--	100
MDP4134	Industrial Organization	2	2	70	30	--	3	--	--	--	--	--	--	100
MDP4235	Tool Design & Applications	--	--	--	--	--	--	4	2	90	30	30	3	150
MDP4236	Numerical Control Machines	--	--	--	--	--	--	3	3	100	25	25	3	150
MDP423x	Elective Course (4)	--	--	--	--	--	--	4	3	125	25	25	3	175
MDP4240	Project Management& Marketing	--	--	--	--	--	--	2	2	70	30	--	2	100
HUM4223	Environmental Impact	--	--	--	--	--	--	2	1	50	25	--	2	75

Departmental Course Descriptions

	of Projects													
		14	16					15	15					
	Total Hours/Week	30						30			Total Marks			1500

Elective course(3)

MDP4130 Computer Applications in Industry
MDP4131 Environmental Engineering
MDP4132 Introduction to Tribology

Elective course(4)

MDP4237 Non-distractive tests
MDP4238 Mechatronics (2)
MDP4239 Facilities Planning

Departmental Course Descriptions

Electrical Engineering Department

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Departmental Course Descriptions

Table No .(8)
Electrical Engineering Department
First Year

Course Code	Course Name	First Semester			Second Semester			Total Marks
		Hrs.	Max Marks	Exam	Hrs	Max Marks	Exam	

Departmental Course Descriptions

		Week					Period	Week					Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
PHM1006	Engineering Mathematics (2)	4	2	100	50	--	3	4	2	100	50	--	3	300
ECE1001	Electrical Circuits	3	2	90	35	--	3	3	2	90	35	--	3	250
ECS1002	Computers Programming	2	2	60	20	20	3	3	2	85	20	20	3	225
PHM1107	Engineering Physics (2)	4	2	90	30	30	3	--	--	--	--	--	--	150
MDP1126	Electrical Materials Technology	2	2	60	20	20	3	--	--	--	--	--	--	100
CES1146	Civil Engineering	2	1	50	25	--	3	--	--	--	--	--	--	75
HUM1104	Technical Report Writing	1	1	40	10	--	2	--	--	--	--	--	--	50
EPM1201	Electrical Measurements & Measuring Instruments	--	--	--	--	--	--	2	4	90	30	30	3	150
ECE1202	Electronic Engineering	--	--	--	--	--	--	4	2	100	50	--	3	150
HUM1205	Engineering Economy	--	--	--	--	--	--	2	-	40	10	--	2	50
		18	12					18	12					
	Total Hours/Week	30						30				Total Marks		1500

Departmental Course Descriptions

Departmental Course Descriptions

Table No .(9)

Electrical Engineering Department

Second Year

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
PHM2009	Engineering Mathematics (3)	3	2	90	35	--	3	3	2	90	35	--	3	250
EPM2002	Electric Tests (1)	--	4	60	20	20	3	--	3	40	15	20	3	175
MEP2018	Mechanical Power Engineering	2	2	70	30	--	3	2	1	50	25	--	3	175
EPM2103	Electromagnetic Fields	3	2	90	35	--	3	--	--	--	--	--	--	125
ECE2103	Electronic Circuits (1)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECS2103	Logic Circuits	3	2	85	20	20	3	--	--	--	--	--	--	125
HUM2109	Industrial Safety	1	1	30	10	10	2	--	--	--	--	--	--	50
EPM2204	Energy Conversion	--	--	--	--	--	--	3	2	90	35	--	3	125
ECE2204	Signal Processing	--	--	--	--	--	--	3	2	90	35	--	3	125
ECS2204	Computer Organization (1)	--	--	--	--	--	--	3	2	90	35	--	3	125
ECS2205	Systems Dynamics & Control Components	--	--	--	--	--	--	2	2	70	30	--	3	100
		15	15					16	14					

Departmental Course Descriptions

	Total Hours/Week	**30**		**30**	**Total Marks**	**1500**

Departmental Course Descriptions

a- Electrical Power and Machines

Departmental Course Descriptions

Table No .(10)

Electrical Engineering Department

Third Year (Power & Machines)

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
EPM3005	Electric Tests (2)	--	4	60	20	20	3	--	4	60	20	20	3	200
EPM3106	Electric Machines (1)	3	2	90	35	--	3	--	--	--	--	--	--	125
EPM3107	High Voltage Engineering	3	2	90	35	--	3	--	--	--	--	--	--	125
EPM3108	Power Electronics (1)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECS3136	Automatic Control	3	2	90	35	--	3	--	--	--	--	--	--	125
HUM3115	Management &Marketing	2	--	40	10	--	2	--	--	--	--	--	--	50
PHM3110	Engineering Mathematics (4)	2	2	70	30	--	3	--	--	--	--	--	--	100
EPM3209	Electrical Machines (2)	--	--	--	--	--	--	4	2	100	50	--	3	150
EPM3210	Transmission & Distribution of Electrical Energy	--	--	--	--	--	--	3	2	90	35	--	3	125
EPM3211	Power System Analysis (1)	--	--	--	--	--	--	3	2	90	35	--	3	125
ECE3232	Data Communication Systems	--	--	--	--	--	--	3	2	90	35	--	3	125
EXX32XX	Elective Course (1)	--	--	--	--	--	--	3	2	90	35	--	3	125
		16	14					16	14					

Departmental Course Descriptions

	Total Hours/Week	30		30	Total Marks	1500

Menu For Elective Course(1)

EPM3212 Utilization of Electrical Energy
EPM3213 Power System Protection
ECS3237 Microprocessor & Applications in Power Systems

Departmental Course Descriptions

Table No .(11)

Electrical Engineering Department

Fourth Year (Power & Machines)

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
EPM4014	Electrical Tests (3)	--	4	60	20	20	3	--	4	60	20	20	3	200
EPM4015	Project	--	2	--	50	--	--	--	6	--	50	100	--	200
EPM4116	Electrical Machines (3)	4	2	100	50	--	3	--	--	--	--	--	--	150
EPM4117	Electric Power System Analysis (2)	4	2	100	50	--	3	--	--	--	--	--	--	150
EPM41XX	Elective Course (2)	3	2	90	35	--	3	--	--	--	--	--	--	125
EPM41XX	Elective Course (3)	3	2	90	35	--	3	--	--	--	--	--	--	125
HUM4128	Network Security	2	-	40	10	--	2	--	--	--	--	--	--	50
EPM4224	Electric Machines (4)	--	--	--	--	--	--	3	2	90	35	--	3	125
EPM4225	Power Electronics (2)	--	--	--	--	--	--	3	2	90	35	--	3	125
EPM4226	Protection & Switchgear in Electrical Power Systems	--	--	--	--	--	--	3	2	90	35	--	3	125
EXX42XX	Elective Course (4)	--	--	--	--	--	--	3	2	90	35	--	3	125
		16	14					12	18					
	Total Hours/Week	30						30		Total Marks				1500

Departmental Course Descriptions

Menu For Elective Course (2)

EPM4118 Planning of Electrical Networks
EPM4119 Over-Voltages in Power Systems
EPM4120 Electric Drives

Menu For Elective Course (3)

EPM4121 Theory of Electrical Machines
EPM4122 High Voltage Applications
EPM4123 Advanced Control of Power Systems

Menu For Elective Course (4)

EPM4227 Special Electrical Machines
EPM4228 Applications in Protection & Switchgear Systems
ECS4238 Computer Applications in Electric Power Engineering

Departmental Course Descriptions

b- Electronics and Electrical Communications

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Departmental Course Descriptions

Table No .(12)

Electrical Engineering Department

Third Year (Electronics & Electrical Communication)

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
ECE3005	Communication Systems (1)	3	2	85	40	--	3	3	2	85	40	_	3	250
ECE3006	Electronic Measurements & Testing (1)	2	3	85	20	20	3	2	3	85	20	20	3	250
ECE3107	Electronic Devices	4	2	100	50	--	3	--	--	--	--	--	--	150
ECS3139	Microprocessors & Applications	3	2	90	35	--	3	--	--	--	--	--	--	125
EPM3130	Electromagnetic Waves	3	2	90	35	--	3	--	--	--	--	--	--	125
PHM3111	Engineering Mathematics (4)	2	2	70	30	--	3	--	--	--	--	--	--	100
ECE3208	Optical Electronics	-	-	-	-	--	-	4	2	100	50	--	3	150
ECE3209	Electronic Circuits (2)	--	--	--	--	--	--	4	2	100	50	--	3	150
ECE321x	Elective Course(1)	--	--	--	--	--	--	4	2	100	50	--	3	150
HUM3218	Project	--	--	--	--	--	--	2	-	40	10	--	2	50

Departmental Course Descriptions

	Management													
		18	12					19	11					
	Total Hours/Week	30						30		Total Marks				1500

Menu For Elective Course (1)

ECE3210 Digital Circuits
ECE 3211 Digital Signal Processing
ECE3212 Applications of Electromagnetics

Table No .(13)
Electrical Engineering Department
Fourth Year (Electronics & Electrical Communication)

Departmental Course Descriptions

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
ECE4013	Electronic Measurements & Testing (2)	--	3	40	20	15	3	--	4	60	20	20	3	175
ECE4014	Project	--	2	--	50	--	--	--	6	--	50	100	--	200
ECE4115	Microwave Electronic Engineering	3	2	90	35	--	3	--	--	--	--	--	--	125
ECE4116	Communication Systems (2)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECE4117	Integrated Circuits	3	2	90	35	--	3	--	--	--	--	--	--	125
ECE41xx	Elective Course (2)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECE412xx	Elective Course (3)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECE4224	Telecommunication Networks	--	--	--	--	--	--	3	2	90	35	--	3	125
ECE4225	Antennas	--	--	--	--	--	--	3	2	90	35	--	3	125
ECE422x	Elective Course (4)	--	--	--	--	--	--	2	2	70	30	--	3	100
ECE42xx	Elective Course (5)	--	--	--	--	--	--	2	2	70	30	--	3	100
HUM4224	Network Security	--	--	--	--	--	--	2	-	40	10	--	2	50
		15	15					12	18					
	Total Hours/Week	30						30				Total Marks		1500

Departmental Course Descriptions

Menu For Elective Course (2)
ECE 4118 Electronics for Instrumentation
ECE4119 Satellite Communications
ECE4120 Integrated Circuits Technology

Menu For Elective Course (3)
ECE 4121 Optical Communication Systems
ECE4122 Application Specific Integrated Circuits communication Systems (ASICCS)
ECE4123 Integrated Circuits Applications

Menu For Elective Course (4)
ECE 4226 Mobile communications
ECE4227 Selected Topics in communication Systems
ECE4228 Analog integrated circuit Design

Menu For Elective Course (5)
ECE 4229 Selected Topics in Electronics
ECE4230 Information Theory
ECE4231 Selected Topics in Microwave Engineering

Departmental Course Descriptions

c- Computers and Systems

Departmental Course Descriptions

Table No .(14)

Electrical Engineering Department

Third Year (Computers & Systems)

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
ECS3006	Electrical Testing (2)	--	4	60	20	20	3	--	4	60	20	20	3	200
ECS3107	Programming with Data Structures & algorithms	4	2	100	50	--	3	--	--	--	--	--	--	150
ECS3108	Computer Organization (2)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECS3109	Software Engineering	2	2	70	30	--	3	--	--	--	--	--	--	100
ECS3110	Control Systems (1)	3	2	90	35	--	3	--	--	--	--	--	--	125
HUM3116	Project Management	2	--	40	10	--	2	--	--	--	--	--	--	50
PHM3112	Engineering Mathematics (4)	2	2	70	30	--	3	--	--	--	--	--	--	100
ECS3211	Microprocessor Based Systems	--	--	--	--	--	--	4	2	100	50	--	3	150
ECS3212	Operating Systems	--	--	--	--	--	--	4	2	100	50	--	3	150
ECE3233	Data Communication Systems	--	--	--	--	--	--	2	2	70	30	--	3	100
ECS3213	Control Systems (2)	--	--	--	--	--	--	3	2	90	35	--	3	125

Departmental Course Descriptions

ECS3214	Compiler Techniques	--	--	--	--	--	--	3	2	90	35	--	3	125
		16	14					16	14					
	Total Hours/Week	30						30		Total Marks				1500

Departmental Course Descriptions

Table No .(15)

Electrical Engineering Department

Fourth Year (Computers & Systems)

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
ECS4015	Electrical Testing (3)	--	4	60	20	20	3	--	4	60	20	20	3	200
ECS4016	Project	--	2	--	50	--	--	--	6	--	50	100	--	200
ECS4117	Database Systems	3	2	90	35	--	3	--	--	--	--	--	--	125
ECS4118	Systems Software	2	2	60	20	20	2	--	--	--	--	--	--	100
ECS4119	Computer Networks	3	2	90	35	--	3	--	--	--	--	--	--	125
ECS412x	Elective Course (1)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECS412x	Elective Course (2)	3	2	90	35	--	3	--	--	--	--	--	--	125
ECS4227	Computer Controlled Systems	--	--	--	--	--	--	3	2	90	35	--	3	125
ECS4228	Artificial Intelligence	--	--	--	--	--	--	3	2	90	35	--	3	125
Exx42xx	Elective Course (3)	--	--	--	--	--	--	2	2	70	30	--	3	100
ECS42xx	Elective Course (4)	--	--	--	--	--	--	2	2	70	30	--	3	100
HUM4224	Network Security	--	--	--	--	--	--	2	-	40	10	--	2	50
		14	16					12	18					
	Total Hours/Week	30						30		Total Marks				1500

Departmental Course Descriptions

Menu For Elective Course (1)

ECS4120 Computer Security
ECS4121 Biomedical Engineering
ECS4122 Industrial Control
ECS4123 Expert Systems

Menu For Elective Course (2)

ECS4124 Local Area Networks
ECS4125 Pattern Recognition & Image Processing
ECS 4126 Robot Systems

Menu For Elective Course (3

EPM4229 Power Electronic
ECS4229 Distributed Computer Systems
ECS4230 Neural Networks
ECS4231 Modeling & Simulation

Menu For Elective Course (4)

ECS4232 Selected Topics in Computer Engineering
ECS4233 Selected Topics in Systems Engineering
ECS4234 Real Time Systems
ECS4235 Intelligent Control Systems

Departmental Course Descriptions

Architectural Engineering Department

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Departmental Course Descriptions

Table No. (16)
Architectural Engineering Department
First Year

Course Code	Course Name	First Semester			Second Semester			Total Marks
		Hrs.	Max Marks	Exam	Hrs	Max Marks	Exam	

Departmental Course Descriptions

		Week					Period	Week					Period	
		Lec	Ex Lab	Final Exam	Year Work	Oral		Lec	Ex Lab	Final Exam	Year Work	Oral		
ARC1001	Architectural Design Fundamentals	6	2	40	120	40	4	6	2	40	120	40	4	400
ARC1002	Building Construction	3	2	75	50	25	4	4	2	75	50	25	4	300
ARC1103	Visual Studies & Theory of Colors	2	2	40	60	-	3	-	-	-	-	-	-	100
CES1142	Surveying	2	2	60	15	25	3	-	-	-	-	-	-	100
ARC1004	Computer in Architecture	2	2	-	25	25	-	2	2	-	25	25	-	100
HUM1107	History of Architecture (1)	3	-	70	30	-	3	-	-	-	-	-	-	100
ARC1105	Theories of Architecture (1)	2	-	70	30	-	3	-	-	-	-	-	-	100
ARC1206	Shade - Shadow and Perspective	-	-	-	-	-	-	2	2	40	60	-	4	100
ARC1207	Environment Control in Buildings	-	-	-	-	-	-	2	-	35	15	-	2	50
HUM1208	History of Architecture (2)	-	-	-	-	-	-	4	-	70	30	-	3	100
CES1241	Structural Engineering (1) (Properties and Testing of Materials)	-	-	-	-	-	-	1	1	35	15	-	2	50
		20	10					21	9					

Departmental Course Descriptions

	Total Hours/Week	30		30	Total Marks	1500

Departmental Course Descriptions

Table No. (17)
Architectural Engineering Department
Second Year

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Ex Lab	Final Exam	Year Work	Oral		Lec	Ex Lab	Final Exam	Year Work	Oral		
ARC2008	Architectural Design (1)	6	2	40	120	40	6	6	2	40	120	40	6	400
ARC2009	Execution Design (1)	4	2	30	100	20	4	4	2	30	100	20	4	300
ARC2110	Theories of Architecture (2)	4	-	70	30	-	3	-	-	-	-	-	-	100
CES2043	Theory of structures	2	2	35	15	-	3	2	2	55	20	-	3	125
ECS2134 ARC2111	Technical Systems in Buildings (1) a)Acoustics b)Lighting	3 3	- -	35 35	15 15	- -	4	- -	- -	- -	-	-	-	100
CES2144	Soil Mechanics and Foundation	2	-	50	25	-	2	-	-	-	-	-	-	75
ARC2212	Landscape	-	-	-	-	-	-	2	1	50	35	15	3	100
ARC2213 MDP2249	Technical Systems in Buildings-2 a)Sanitary Installations b)Mechanical	- -	- -	- -	- -	- -	-	2 2	- -	35 35	15 15	- -	4	100

Departmental Course Descriptions

	Installations													
HUM2211	**History of Islamic Architecture**		**-**	**-**	**-**	**-**	**-**	**2**	**-**	**70**	**30**	**-**	**3**	**100**
HUM2212	**History of City & Site Planning**		**-**	**-**	**-**	**-**	**-**	**2**	**1**	**70**	**30**	**-**	**3**	**100**
		24	**6**					**22**	**8**					
	Total Hours/Week	**30**						**30**				**Total Marks**		**1500**

Departmental Course Descriptions

Table No. (18)
Architectural Engineering Department
Third Year

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Ex Lab	Final Exam	Year Work	Oral		Lec	Ex Lab	Final Exam	Year Work	Oral		
ARC3014	Architectural and Interior Design	6 2	2	40	120 30	40 20	6	6 2	2	40	120 30	40 20	6	500
ARC3015	Execution Design (2)	4	2	30	90	30	4	4	2	30	90	30	4	300
HUM3117	Regional and City Planning	2	2	70	30	-	3	-	-	-	-	-	-	100
ARC3116	Theories of Architecture (3)	4	-	70	30	-	3	-	-	-	-	-	-	100
ARC30xx	Elective Course (1)	2	2	50	25	-	3	2	2	50	25	-	3	150
CES3045	Structural engineering (2) a- Reinforced Concrete b- Steel Structures	1	1	50	25	-	2	1	1	50	25	-	2	150
ARC3222	Urban Planning and Housing	-	-	-	-	-	-	2	2	70	30	-	3	100
ARC3223	Quantities and Specifications	-	-	-	-	-	-	2	2	50	25	25	2	100

Departmental Course Descriptions

		21	9		19	11	
	Total Hours/Week	30			30	Total Marks	1500

Departmental Course Descriptions

Table No. (19)
Architectural Engineering Department
Fourth Year

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Ex Lab	Final Exam	Year Work	Oral		Lec	Ex Lab	Final Exam	Year Work	Oral		
ARC4124	Architectural Design (2)	8	4	60	180	60	4	-	-	-	-	-	-	300
ARC4125	Execution Design (3)	6	2	40	120	40	3	-	-	-	-	-	-	200
ARC4126	Research methodology and Programs	2	-	35	15	-	2	-	-	-	-	-	-	50
ARC4127	Theories of Architecture and Criticism	4	-	70	30	-	3	-	-	-	-	-	-	100
ARC41xx	Elective Course (2)	2	2	70	30	-	3	-	-	-	-	-	-	100
ARC4228	Graduation Project	-	-	-	-	-	-	14	4	-	270	180	-	450
HUM4227	Law and Architectural Legislations	-	-	-	-	-	-	2	-	35	15	-	2	50
HUM4228	Architecture Professional Practice	-	-	-	-	-	-	2	-	35	15	-	2	50
ARC42xx	Elective Course (3)	-	-	-	-	-	-	2	2	70	30	-	3	100
ARC42xx	Elective Course (4)	-	-	-	-	-	-	2	2	70	30	-	3	100
		22	8					22	8					
	Total Hours/Week	30						30				Total Marks		1500

Departmental Course Descriptions

Departmental Course Descriptions

Architectural Engineering Department

Elective Courses

ARC30xx	**Elective Course (1)**
ARC3017	Method of upgrading and conservation
ARC3018	Building Rehabilitation
ARC3019	Building Technology and Construction Systems
ARC3020	Computer in Architecture
ARC3021	Environmental Planning and Design

ARC4xxx	**Architectural Elective courses (2,3,4)**
ARC4x29	landscape
ARC4x30	Contemporary Arts
ARC4x31	Heritage Preservation
ARC4x32	Architecture and Environment
ARC4x33	Site Analysis Studies
ARC4x34	Construction Project Management
ARC4x35	Construction and Building Technology
ARC4x36	Design of Rural Communities
ARC1137	Architectural Construction

Departmental Course Descriptions

The student selects elective courses 2,3 and 4 among the elective courses.

Departmental Course Descriptions

Civil Engineering Department

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Departmental Course Descriptions

Table No. (20)
Civil Engineering Department
First Year

Course	Course Name	First Semester	Second Semester	Total

Departmental Course Descriptions

Code		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	Marks
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
CES1001	Structural Analysis (1)	4	2	100	50	--	3	3	2	85	40	--	3	275
CES1002	Plane Surveying	4	2	90	30	30	3	3	3	90	30	30	3	300
CES1103	Properties and Testing of Materials (1)	4	2	90	30	30	3	-	-	--	--	--	--	150
PHM1008	Engineering Mathematics(2)	4	2	100	50	--	3	4	2	100	50	--	3	300
ARC1137	Architectural Construction	2	2	70	30	--	3	--	--	--	--	--	--	100
HUM1103	The Engineer and Environment	2	--	40	10	--	2	--	--	--	--	--	--	50
CES1204	Civil Drawing	--	--	--	--	--	--	2	4	90	60	--	4	150
EPM1231 MEP1217	Electromechanical Equipments and Installments Engineering	--	--	--	--	--	--	3	1	70	30	--	3	100
CES1205	Engineering Geology	--	--	--	--	--	--	2	1	50	25		2	75
		20	10					17	13					

Departmental Course Descriptions

	Total Hours/Week	30		30	Total Marks	1500

Departmental Course Descriptions

Table No. (21)
Civil Engineering Department
Second year

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
CES2006	Structural Analysis (2)	3	2	85	40	--	3	3	2	85	40	--	3	250
CES2007	Design of Reinforced Concrete Structures (1)	3	2	85	40	--	4	3	2	75	25	25	4	250
CES2108	Properties and Testing of Materials (2)	4	3	100	40	35	4	-	-	--	-	-	--	175
CES2109	Fluid Mechanics	3	2	75	25	25	3	--	--	--	--	--	--	125
CES2110	Hydrology	3	2	85	40	--	3	--	--	--	--	--	--	125
HUM2110	Applied Statistics	2	1	50	25	--	2	--	--	--	--	--	--	75
CES2211	Topographical Surveying	-	-	-	--	--	--	4	3	100	40	35	4	175
HUM2213	Engineering Economy	-	-	-	--	--	--	2	2	70	30	-	3	100
CES2212	Soil Mechanics(1)	-	--	-	-	-	-	3	2	75	25	25	3	125

Departmental Course Descriptions

CES2213	Irrigation and Drainage Engineering	-	-	-	--	--	--	2	2	70	30	-	3	100
		18	12					17	13					
	Total Hours/Week	30						30		Total Marks				1500

Table No. (22)
Civil Engineering Department
Third year

Departmental Course Descriptions

Course Code	Course Name	First Semester						Second Semester						Total Marks
		Hrs. Week		Max Marks			Exam Period	Hrs Week		Max Marks			Exam Period	
		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
CES3114	Theory of Structures	4	3	125	50	--	4	--	--	--	--	--	--	175
CES3015	Design of Reinforced Concrete Structures (2)	3	2	85	40	--	4	3	2	75	25	25	4	250
CES3016	Design of Steel Structures	2	2	70	30	--	3	3	2	75	25	25	4	225
CES3117	Soil Mechanics (2)	3	2	75	25	25	3	--	--	--	--	--	--	125
CES3118	Transportation &Traffic Engineering	2	2	60	20	20	3	--	--	--	--	--	--	100
CES3119	Hydraulics	3	4	125	25	25	3	--	--	--	--	--	--	175
HUM3219	Construction and Project Management	--	--	--	--	--	--	3	2	85	40	-	3	125
CES3220	Foundation Engineering (1)	--	--	--	--	--	--	3	2	85	40	-	3	125
CES3221	Design of Irrigation Works (1)	--	--	--	--	--	--	4	4	150	50	-	4	200
		17	15					16	12					
	Total Hours/Week	32						28				Total Marks		1500

Departmental Course Descriptions

Table No. (23)
Civil Engineering Department
Fourth year

Course Code	Course Name	First Semester			Second Semester			Total Marks
		Hrs. Week	Max Marks	Exam Period	Hrs Week	Max Marks	Exam Period	

Departmental Course Descriptions

		Lec	Tut	Final Exam	Year Work	Oral		Lec	Tut	Final Exam	Year Work	Oral		
CES4122	Design of Reinforced Concrete Structures (3)	4	2	100	25	25	4	--	--	-	-	--	-	150
CES4123	Sanitary Engineering	3	2	85	40	--	3	--	-	-	-	--	-	125
CES4124	Design of Irrigation Works (2)	3	3	100	40	10	4	-	-	--	-	-	--	150
CES4125	Highway Engineering	3	2	75	25	25	3	--	--	--	--	--	--	125
CES4126	Foundation Engineering (2)	3	2	75	25	25	3	--	--	--	--	--	--	125
CES4227	Computerized Structural Analysis	-	-	-	-	-	-	2	2	60	20	20	3	100
CES4228	Metallic Bridges	-	-	-		--	-	3	2	75	25	25	3	125
CES4229	Railways Engineering	-	-	-	--	--	--	2	2	70	30	-	3	100
CES423X	Elective Course (1)	-	-	-	--	--	--	2	2	70	30	-	3	100
CSE423X	Elective Course (2)	-	-	-	-	-	-	2	2	70	30	-	3	100
HUM4226	Specification and Quantities	-	-	-	--	--	--	2	2	70	30	-	3	100
CES4040	Project*	1	2	-	50	-	-	1	4	50	50	50	-	200
		17	13					14	16					

Departmental Course Descriptions

	Total Hours/Week	30		30	Total Marks	1500

*** Students are distributed on the projects specified by the council of the Department of Civil Engineering**

Elective Course (1)

CES4230 Airport Engineering
CES4231 Systems of Traffic Management
CES4232 Remote Sensing and Applications
CES4233 Water and Sanitary Networks
CES4234 Geodesy and Satellite Surveying

Elective Course (2)

CES4235 Soil improvement
CES4236 Special Topics in Reinforced Concrete Design
CES4237 Inspection and Quality Control
CES4238 Earthquake Engineering
CES4239 Plastic Design of Steel Structures

Departmental Course Descriptions

Departmental Course Descriptions

Departmental Course Descriptions

Mechanical Engineering Department

Departmental Course Descriptions

a- Mechanical Power Engineering

MEP0001 Mechanics (1)

Preparatory Year: General Engineering. (Cont.)

Departmental Course Descriptions

Hrs/Week: [(2+2) + (2+2)]
Marks:[(70+30+0) + (70+30+0)] = 200

Course Contents

Concurrent force systems and particle equilibrium: Forces, Vector algebra, Resultant of a concurrent force system, Equilibrium of a particle. Moment, Couples and force systems: Moments, Couples, System of forces (general, coplanar, parallel) and their resultants. Equilibrium of rigid bodies: Forces due to supports, Free body diagrams, Condition for static equilibrium, Static indeterminacy and partial constraints. Frames and machines: Frames, Trusses and machines. Friction: Dry friction, Sliding and tipping, Basic machines having friction (wedges, belt friction). Kinematics of a particle - rectilinear motion: kinematics of a particle, kinematical description of motion, Rectilinear motion, Freely falling bodies. Kinematics of a particle - Curvilinear motion: Rectangular components, Cylindrical components, Path variables components, Kinematical applications (projectile motion, Joint kinematical description, relative motion). Kinetics of a particle - force -acceleration method: Rectilinear motion, Curvilinear rectangular motion, Curvilinear cylindrical motion, Curvilinear intrinsic motion, Orbital motion. Kinetics of a particle -work - energy method: Work done by forces - fields and forces, gravitational force, Elastic spring force, Potential energy, Work and potential energy, The kinetic energy, Work - energy principle, Conservation of energy. Kinetics of a particle -impulse - Momentum method: Linear impulse and momentum, Impact.

References:

- Beer, F. P. and Johnston, Jr., E. R., Vector Mechanics for Engineers (Statics and Dynamics), McGraw Hill, .
- Hibbeler, R. C., Engineering Mechanics (Statics and Dynamics), Macmillan, .
- Irving Shames, Engineering Mechanics (Statics and Dynamics), Prentice Hall, .
- Meriam, J. L. and Kraige, L. G., Engineering Mechanics (Statics and Dynamics), John Wiley and Sons.

Laboratory:

Mechanics Lab

Departmental Course Descriptions

- Statics
- Friction
- Newton's second law, linear and angular momentum, kinetic energy
- Free fall
- Projectiles

MEP1202 Mechanics (2)

1st Year: Mechanical Engineering . (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Mass properties: Centroids, Center of mass, Mass moment of inertia. Kinematics of rigid bodies: Translational motion, Rotational motion, General motion, Instantaneous center of zero velocity, Rolling motion. Kinetics of rigid bodies (force and acceleration method): Pure translational motion, Pure rotational motion, General motion. Kinetics of rigid bodies (work and energy methods): Work done by a force, Kinetic energy, Work, Energy principle, field forces, The potential energy, Energy conservation principles. Kinetics of rigid bodies (impulse and momentum methods): Linear impulse momentum relations, Angular impulse momentum relations, Impulsive forces.

References:

- Beer, F. P. and Johnston, Jr., E. R., Vector Mechanics for Engineers (Statics and Dynamics), McGraw Hill, .
- Hibbeler, R. C., Engineering Mechanics (Statics and Dynamics), Macmillan, .
- Irving Shames, Engineering Mechanics (Statics and Dynamics), Prentice Hall, .
- Merriam, J. L. and Kraige, L. G., Engineering Mechanics (Statics and Dynamics), John Wiley and Sons, .

Departmental Course Descriptions

Laboratory:

Mechanics Lab

- Center of gravity relations, Impulsive forces.
- Determination of the moment of inertia using the oscillation method
- Determination of the angular velocity and the angular acceleration
- Centrifugal force as a function of mass, angular velocity and radius
- Determination of the angular momentum, conservation of angular momentum
- Physical Pendulum

MEP1203 Thermodynamics (1)

1st Year: Mechanical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (60+20+20)] = 100

Course Contents

Basic concepts and definitions: System, types of systems, Property, state, Processes, thermodynamic equilibrium, the zeroth law of thermodynamics. System of units: unit of length, mass, time, temperature, force, pressure, energy, power, conversion of units. Heat and work: definition of Heat, definition of work, forms of work, displacement work, moving boundary work, electrical work, spring work, surface tension work. Ideal gas: equation of state, specific heats, processes of ideal gas. The first law of thermodynamics: the first law for cyclic process, the first law for a closed system, , the first law for open system, steady flow process, application of the first law. The second law of thermodynamics: limitation of the first law, conversion of heat into work, Kelvin- Plank statement, heat engine, Clausius statement, reversed engine, efficiency of heat engines, coefficient of performance, Clausius inequality, Carnot cycle, Carnot theorem, the absolute temperature scale.

Departmental Course Descriptions

References:

- Sonntag, R. E.; Borgnakke, C. and Van Wylen, G. J., Fundamentals of Thermodynamics, John Wiley and Sons Inc., 1998.
- Cengel, Y. A. and M. A., Thermodynamics: An Engineering Approach, WCB/McGraw Hill, 1998.

Laboratory:

Thermodynamic Lab

- Mechanical Equivalent of Heat
- Reciprocating Compressor Test
- Evaluation of Higher Heating Value of Gaseous Fuels
- Evaluation of Air to Fuel Ratio Using ORSAT Apparatus
- Steam Properties
- Energy Conversion Test

MEP2104 Thermodynamics (2)

2nd Year: Mechanical Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(100+30+20) + (0+0+0)] = 150

Course Contents

Entropy: definition, change in entropy in reversible process, entropy and irreversibility, principle of increase in entropy, relation of entropy with the properties. The pure substance: phase equilibrium, P-V-T diagrams , property tables and charts. Gas and vapor cycles: Ideal gas cycles: Otto , Diesel, Dual, Brayton Vapor cycles: Rankine cycle- modification to Rankine cycle. Refrigeration cycles: reversed carnot cycle, vapor compression cycles, vapor absorption cycles. Availability and irreversibility: entropy balance,

Departmental Course Descriptions

available energy, reversible work, availability analysis, exergy destruction, second law efficiency. Mixtures of gases: mixture of ideal gas, Daltons law of additive pressure, Amagat:s law of additive volumes , mixture of ideal gas and vapor. Thermodynamics of reactant systems: chemical equilibrium, combustion, enthalpy of formation, enthalpy of reaction, adiabatic flame temperature.

References:

- Sonntag, R. E.; Borgnakke, C. and Van Wylen, G. J., Fundamentals of Thermodynamics, John Wiley and Sons Inc., 1998.
- Cengel, Y. A. and M. A., Thermodynamics: An Engineering Approach, WCB/McGraw Hill, 1998.
- J.P. Holman ,Advanced thermodynamics, McGraw Hill 1989

Laboratory:

Thermodynamic Lab

- Mechanical Equivalent of Heat
- Reciprocating Compressor Test
- Evaluation of Higher Heating Value of Gaseous Fuels
- Evaluation of Air to Fuel Ratio Using ORSAT Apparatus
- Steam Properties
- Energy Conversion Test

Departmental Course Descriptions

MEP2005 Fluid Mechanics

2nd Year: Mechanical Engineering. (cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(60+20+20) + 60+20+20)] = 200

Course Contents

Introductory concepts: fluids and non fluids , liquid ,gas and vapour, continuum, co-ordinate system, fluid mechanics, system and fluid particles , control volume, force and moment, stress at a point, rate of strain, properties of fluid, the atmosphere, classification of fluids and regimes of flow. Fluid statics: the state of rest :Pascal's law , the hydrostatics law, hydrostatic force on a submerged plane surface, location of the hydrostatic force , force on a submerged curved surface , piezometric head, single –tube manometers, U-tube manometers, differential manometers, buoyancy, determination of the metacentric height, oscillation of a floating body, liquid in a container subjected to an acceleration, liquid in a container subjected to a constant rotation. Fluid kinematics: description of fluid flow, dimensions of flow, steadiness and uniformity of flow, acceleration in fluid flow, streamlines , pathlines and streaklines, existence of flow, continuity equation: differential form, stream function for two-dimensional flow, continuity equation: integral form, average velocity, kinematics of a fluid element , irrotational flow , flow nets with examples, circulation in a flow , flow patterns for different references. Fluid dynamics: statements of laws for a system , Euler's equation of motion , Bernoulli's equation: derivation from the Euler's equation, flow through a confined passage, flow through orifices and mouthpieces, Euler's equation and Bernoulli equation in a stream wise direction, Navier-Stokes equation of motion, integral momentum equation , forces on confinements, force on a rectangular sluice gate, impact of a jet of fluid on a vane, jet engine and propeller action, angular momentum equation, energy equation: steady flow energy equation, Bernoulli equation : derivation from the energy equation, status of the Bernoulli equation , tips for choosing a control volume, correction factors for non-uniform flows. Flow measurement: introduction , measurement of static, stagnation and dynamic pressures and velocity, measurement of discharge through a pipe by a venturimeter, a flow nozzle and an

Departmental Course Descriptions

orifice meter, measurement of discharge by a wire, a notch or a venture-flume , flow through a rectangular notch, flow throw a triangular notch. Laminar flow: laminar and turbulent flows, laminar flow through a round pipe, laminar flow through an annulus, laminar flow between parallel plates, laminar flow between co-axial rotating cylinders, measurement of viscosity. Flow through pipes: introduction , friction loss in pipe flow, minor losses in pipe flow, energy line and hydraulic gradient line, power transmission through pipes, pipes in series and in parallels. Ideal fluid flow: introduction, importance of ideal fluid flow, the uniform flow, the source flow, the sink flow, the free-vortex flow, superimposed flow patterns, the source and sink pair, the doublet, a plane source in a uniform flow, a source and sink pair in a uniform flow, a doublet in a uniform flow, a doublet and free vortex in a uniform flow. Dimensional analysis and similitude: introduction, dimensions of physical quantities, dimensional homogeneity, dimensionless groups: Buckingham theorem , the group method , the Raleigh's indicial method, important force-ratio dimensionless numbers, applications of the dimensional method, similitude. Boundary layer flow: introduction, development of Boundary layer, estimates of Boundary layer thickness, Boundary layer equations, drag on flat plate, nature of turbulence, smooth and rough surfaces, boundary layer separation, mechanism of transition, Flow around immersed bodies: introduction, lift and drag, classification of drag, streamlined and bluff bodies, flow around a circular cylinder, flow around an aerofoil, flow around axisymmetric and three-dimensional bodies, forces on immersed bodies: integral momentum equation, terminal velocity of body.

References:

- Roberson Crowe, Engineering Fluid Mechanics, Houghton Mifflin Co., 1975.
- John, James E. A., Introduction to Fluid Mechanics, Prentice Hall, 1983.
- Munson, Yound and Okiishi, Fundamental of Fluid Mechanics, John Wiley and Sons, 1990.

Laboratory:

Fluid mechanics Lab

- Effect of Momentum Change
- Velocity Survey in a Circular Pipe Using Pitot Tube
- Primary and Secondary Losses in Pipes

Departmental Course Descriptions

MEP2206 Heat & Mass Transfer

2nd Year: Mechanical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (100+25+25)] = 150

Course Contents

Definitions and different methods of heat transfer, Fourier equation for heat conductions. General equation of heat transfer (Cartesian coordinates, cylindrical coordinates and spherical coordinates).steady state one dimension simple and composite plane , cylindrical and spherical wall ,thermal insulation for plane and cylindrical walls. Extended surfaces and fins (temperature distribution, heat loss , efficiency, and effectiveness). Heat conduction with heat inner source (plane wall, cylindrical wall and spherical wall). Unsteady heat conduction for lumped and unlumped systems. Heat convection (forced convection for plane wall ,forced convection inside tubes and ducts, forced convection outside tubes , forced convection around sphere, forced convection in hollow spaces). (free convection on the plane wall , free convection inside and outside tubes). Thermal radiation (Plank's theory, shape factor, radiation between bodies, radiation shields, radiation in gases). Heat exchangers (types, efficiency and effectiveness). Mass transfer(basic equation of mass transfer , Fick's law, simulation of mass transfer with heat transfer). Application of heat and mass transfer (distillation and cooling tower).

References:

- Bird, R. B.; Steward, W. E. and Lishtbast, E. N." Transport Phenomena" John Wiley and Sons Inc., 1960.
- Incroperal David, P. Devitt " Introduction to Heat Transfer" John Wiley and Sons, 1990.
- Holman, J. P., Heat Transfer, McGraw Hill Book Co., 1990.
- Geankoplis, C. J. "Transport Processes and unit operations" Prentice Hall Int., 1993.

Departmental Course Descriptions

Laboratory:

Heat Transfer Lab

- Determination of the thermal conductivity coefficient of an insulating material
- Determination of the temperature of a metal piece using the optical pyrometer
- Heat exchanger evaluation
- Study of surface properties of two tubes in steam condensation

MEP2207 Renewable Energy

3rd Year: Mechanical Engineering - Mechanical Power

Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Alternative energy sources: nuclear energy, hydraulic energy, wind energy, solar energy, geothermal energy, biomass and biogas, wave and tidal energy. Wind energy: availability of wind energy, energy in the wind, energy and frequency curves, classification of wind machines, wind turbine, theory and performance, measurements of wind speed and direction. Solar radiation: basic sun-earth angles , radiation on a horizontal surface, radiation on tilted surfaces, estimation of extraterrestrial radiation , estimation of radiation on earth surface, measurement of solar radiation. Utilization of solar energy: thermal conversion : collection(flat-plate, air heater, concentrators), storage(thermal, chemical, electrical). Applications of thermal conversion (water heating, space heating, refrigeration, power generation, drying, desalination, cooking). Photovoltaic voltaic conversion: PV construction and operation theory, PV system.

References:

- Duffie and Beckman, Solar Engineering of Thermal Processes, John Wiley, 1980.

Departmental Course Descriptions

MEP2208 Measurements

2nd Year: Mechanical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Definitions: performance characteristics of measuring instruments: Calibration, Fixed and random errors, Error estimation, Sensitivity, Linearity, Dynamic characteristics. Pressure measurements: Mechanical pressure transducers, Manometers, Elastic pressure measurement, Electrical pressure transducers, Inductive transducers, Piezo electric transducers, Strain gauges. Flow measurements: Orifices nozzles, Venturi, Turbine flow meters, Magnetic flow meters, Rotameters, Positive displacement flow meters, Ultrasonic meters, Velocity measurements: Pitot tube laser doppler anemometers, Hot wire anemometers. Temperature measurements: Thermal expansion thermometers, Bimetallic expansion, Resistance thermometers, Semi conductor thermometers, Thermocouples, Thermal radiation thermometers. Analysis of combustion products: Props, Sample condition, Gas analysis equipments for measuring O_2, CO, CO_2, UHC, NO_x and SO_x, Gas chromatography. Force measurements: Weights and springs, Calibrating rings, Strain and deflection measurements. Strain and stress measurements: Load cells, Strain gauges.

References:

- Sawhney, A. K. "A Course in Mechanical Measurements and Instrumentation" Dhanpat and Sons, Delhi, 1989.
- Doebelin, Erest O., Measurement Systems Applications and Design, McGraw Hill, 1990.
- Holman, J. P., Experimental Methods for Engineers, McGraw Hill, 1999.

Laboratory:

Measurement Lab

Departmental Course Descriptions

- Statical Analysis of Calibration Data of a Pressure Gauge.
- Probability Analysis of Scattered Data Obtained Randomly for an Experimental Error.
- Using the Temperature Measurement Bench for Calibrating a Thermocouple and Resistance Thermometers.
- Temperature Measurements Using the Optical Pyrometer.
- Calibrating Different Kinds of Pressure Transducers Fitted on an Experimental pressure Measurement Bench.
- Calibrating Different Kinds of Flow Meters Fitted on an Experimental Flow Measurement Bench.
- Using the Pitot Tube to Measure the Distribution Over the Tube Cross Section of the Velocity of air Flowing Inside the Tube
- Using the ORSAT Apparatus to Analyze the Products of Combustion Gases Products

MEP3109 Hydraulic Machines

3rd Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(4+2) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Centrifugal pumps: Theory, Construction, Performance, Operation, Cavitation, Axial and radial thrust, Maintenance trouble shooting and selection. Positive displacement pumps: Reciprocating pumps, Diaphragm pumps. Rotary pumps: gear pump, Vane type rotary pump, Rotary piston pumps, Radial cylinder pumps, Parallel cylinder pumps.

Cavitation phenomenon in water turbines: Theory, Effects and avoidance. Water hammer phenomenon in pipelines: Theory, Effects and methods of protection. Hydraulic turbines: Theory, Turbine Classifications, Construction, Power calculations, Performance, Power house and environmental Impact, Non-conventional turbomachinery applications. Hydraulic power in Egypt.

Departmental Course Descriptions

References:

- Church, A. J., Centrifugal Pumps and Blowers, John Wiely and Sons Inc. London, 1973.
- Govinda Rao, Fluid Flow Machines, McGraw Hill, 1983.
- Daugherty and Franzini, Fluid Machines with Engineering Applications, McGraw Hill, 1983.
- Sayers, A. T., Hydraulic and Compressible Flow Turbo machinery, McGraw Hill, 1990.

Laboratory:

Turbomachinery Lab

- Pelton Wheel Test
- Francis Turbine Test
- Kaplan Turbine Test
- Priming of Centrifugal Pumps.
- Performance of Centrifugal Pumps Under Different Speeds.
- Performance of Two Centrifugal Pumps in Series Connection.
- Performance of Two Centrifugal Pumps in Parallel Connection.

MEP3110 Automatic Control

3rd Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Departmental Course Descriptions

Course Contents

Introduction: Definitions, Control terminology, Control system configuration, Classification of control systems. Modeling of the physical systems and process description: Mechanical, Electric, Hydraulic, Pneumatic, Thermal. Determination of system time and frequency responses: Solution of deferential equations, Laplace transform, Convolution, Analog computers …etc. Industrial control systems: Sensors and transmitters, Controllers of different types, Control laws, Valves, Final control elements.

References:

- Tolbah, Farid A., Notes on Industrial Control Systems, Hakym Printshop, Cairo, 1985. Dorf, R. C., Modern Control Systems, Addison Wesley, 1995.
- Dorf, R. C., Modern Control Systems, Addison Wesley, 1995.
- Ogata, K., Modern Control Engineering, Prentice Hall Int., 1997.

MEP3111 Thermal Power Stations (1)

3rd Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Steam generators, Steam properties and processes, boilers, water tube boilers, fire tube boilers, heat recovery boilers, dearators, feed water heaters, economizers, super heaters, air heaters. Modification of Rankine cycles: reheat cycle, regenerative cycles, binary cycle and combined gas- steam cycles, condensers: jet condensers, air pumps, design of condensers, cooling towers, flow through nozzles.

References:

- Domkundwor, S., Power Plant Engineering, Hanpat Ruixson, 1981.

Departmental Course Descriptions

- El Wakil, M. M., Power Plant Technology, McGraw Hill Co., 1988.
- Cole, H., Thermal Power Cycles, Edward Arnold, 1991.

Laboratory:

Thermal Systems Lab

- Performance of a fire tube steam boiler
- Performance of a steam turbine

MEP3112 Theory of Combustion

3rd Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Chemical reactions, Properties of some hydrocarbon fuels, Enthalpy of formation, Application of first law of thermodynamics on reacting systems, adiabatic flame temperature, Chemical equilibrium, Chemical equilibrium constant, Equilibrium of single reaction, Equilibrium in multiple reactions, Chemical kinetics, Simple global reaction mode, Detailed mechanisms of reactions, Reaction rate formulae. Laminar premixed flame: Definitions, Simple mathematical model and solution of the equations, Factors affecting flame speed and thickness. Ignition, Extinction, Flammability limits, Flame stability, Laminar non-premixed flame, Definitions, Simple mathematical model and solution, Factors affecting flame height, Droplet evaporation. Applications, Simple mathematical model and solution, Evaporation rate, Time of evaporation, Factors affecting evaporation time. Burners: Gaseous fuel burners, Liquid fuel burners solid fuel burners.

Departmental Course Descriptions

References:

- Van Wylen, Gordon J. and Sonntag, Richar E., Fundamentals of Classical Thermodynamics, John Wiley and Sons Inc., 1965.
- Spalding, D. B., Combustion and Mass Transfer, Pergamon Press, 1979.
- Turns, S. T., An Introduction to Combustion, Concepts and Applications, McGraw Hill, Inc., 1996.

Laboratory:

Combustion Lab

- Flame Propagation Characteristics.
- Flame Stability Characteristics.
- The Effect of Air to Fuel Ratio on Combustion Efficiency.
- The Effect of Air to Fuel Ratio on Heat Transfer and Energy Balance.

MEP3113 CAD of Mechanical Power Engineering

3rd Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(2+1) + (0+0)]
Marks: [(50+25+0) + (0+0+0)] = 75

Course Contents

- Modelling and simulation of thermal systems, Applications in heat transfer by conduction, Convection and radiation, Applications in energy systems, Applications in fluid flow systems, Applications in refrigeration and air conditioning systems.

References:

Departmental Course Descriptions

- Duffie, J. A. and Beckman, W. A., Solar Engineering of Thermal Processes, John Wiley, 1982.
- Sherratt, A. F. C., Air Conditioning System Design for Building, McGraw Hill, London, 1983.
- Curtis, F. Gerald and Wheathey, Patrick, O., Applied Numerical Analysis, Addison Wesley Publishing Co., 1984.
- Munson, Yound and Okiihi, Fundamental of Fluid Mechanics, John Wiley and Sons, 1990.
- Stoecker, W. F., Design of Thermal Systems, McGraw Hill, 1992.

MEP3214 Internal Combustion Engines (1)

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Definitions, Classification of I.C.E. The fuel -air standard cycle, Deviations between the actual cycle and fuel air standard cycle, Combustion in S.I.E. Combustion chambers of S.I.E., Combustion in C.I.E., Combustion chambers of C.I.E., Fuel properties and its impact on engine performance. Friction and lubrication, Effect of engine operating conditions on friction loss, Engine performance at constant speed. Comparison of two strokes and four stroke engines, Comparison of SIE and CIE, scavenging and supercharging, types of lubrication and their properties , lubrication oil filters , Heat losses in engines , effect of operating conditions on cooling losses , controlling the temperature of engine parts , coefficient of heat transfer , Cooling cycles , Effective thermal efficiency at full and part loads , air pollution and severity of pollution, types of air pollution generated from ICE and its control, emissions.

References:

Departmental Course Descriptions

- Ferguson, Coline R., Internal Combustion Engines, John Wiley and Sons Inc., 1985.
- John, B., Internal Combustion Engines Fundamentals, Heywood Macmillan Book Co., 1988.
- Richard Stone, Introduction to Internal Combustion Engines, Macmillan Press Ltd., 1992.

Laboratory:

Internal Combustion Engines Lab.

- Test For Constant Speed Diesel Engine, Performance at Different Loads, Power, Thermal Efficiency, Specific Fuel Consumption.
- Test For Variable Speed Spark ignition Engine Performance at Constant Throttle Opening, Power, Torque, Thermal Efficiency, Specific fuel consumption, F/ A Ratio. atmosphere and the methods of reducing them
- Test of Friction Loss for Constant Speed Diesel Engine, Willan's line, and for Variable Speed Spark Ignition Engine, Morse Test.
- Measurements of Flash Point, Open, Close and fire point, For light Diesel Fuel oil.
- Measurements of The Physical Properties of Engine Lubricating Oil, Viscosity test, Flash Point test, acidity test for used oil.
- Measurements of Engine cooling Loss and Engine Heat Balance.

MEP3215 Gas Dynamics

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (75+25+25)] = 125

Course Contents

Introductory concepts to compressible flow: (Sound velocity, Difference between incompressible, subsonic, and supersonic flow, Mach number and Mach angle, Classifications of compressible flows). Steady one

Departmental Course Descriptions

dimensional gas dynamics: (Introduction - Continuity equation - Energy equation - Euler's equation - Momentum equation - Reservoir conditions - Isentropic conditions - Area/Velocity relations - Bernoulli equation and dynamic pressure - Flow in constant area - Normal shock relations for a perfect gas). Compressible flow in ducts: (Introduction - Flow in varying channels - Area relations – Operation of converging and converging diverging nozzles- compressible duct flow with friction – Frictionless duct flow with heat transfer). Waves in supersonic flow: (Introduction - Oblique shock waves - Relations between β and Θ - Supersonic flow over a wedge - Mach-lines - Piston analogy - Weak oblique shocks - Subsonic compression by turning - Supersonic expansion by turning - The "Prandtl-Meyer" function - Simple non simple regions - Reflection and intersection of oblique shocks - Intersection of shocks - Intersection of shocks of the same family - Detached shocks - Mach reflection - Shock/Expansion theory - Thin airfoil theory - The hodograph plane - Cone in supersonic flow). The method of characteristics: (Introduction - Hyperbolic Equations - The compatibility relation - The computation method - Interior and boundary points - Axially symmetric flow - Non isentropic flow - Theorems about plane flow - Computation with weak finite waves - Interaction of waves - Design of supersonic waves - Comparison of characteristics and waves).

Computer Usage:

Numerical implementation of the method of characteristics - Design of supersonic nozzles.

References:

- Liepman, H. W. A. Roskko: Elements of gas dynamics, John Wiley & sons, New York, 1956.
- Zucrow, and Hoffman: "gas dynamics vol. 1", John Wiley & sons, New York,1976.
- Shapiro, A. H. ,"The dynamics and thermodynamics of compressible fluid flow Vol. (1)", Ronald New York, 1953.

MEP3216 Thermal Energy Systems

3th Year: Mechanical Engineering - Mechanical Power (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (2+2)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Basic Definitions: The destruction of energy: Lost available work (lost exergy), Heat engines cycles, Refrigeration Cycles , Heat pump cycles, Non-flow process ,Steady flow processes, Mechanisms of entropy generation and exergy destruction, Heat transfer across a finite temperature difference, Flow with friction, mixing processes. Generalized exergy analysis: Power generation, External and internal irreversibility, Advanced steam turbine power plants, Advanced gas turbine power plants, Chemical reactive systems, Single phase systems, Multi-Phase systems.

References:

- Bejan: "Advanced Engineering Thermodynamics", John Willey & Sons, 1988.
- JE. Ahern: " The Exergy Method of Energy System Analysis", John Willey & Sons, 1980.
- Bejan: Entropy Generation Through Heat and Fluid Flow" John Willey & Sons, 1980.
- G.J. Van Wylen and R.E. Sonntag: " Fundamentals of Classical Thermodynamics ", John Willey & Sons, 1985.

MEP 1217 Electromechanical Equipment and Installments Engineering

1st Year: Civil Engineering . (2nd Term)

Hrs/Week: [(0+0) + (3+1)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Departmental Course Descriptions

Influence of electrical current in our lives, introduction to electric circuits, measuring instruments for electric current, voltage, power and energy, transmission and distribution network, indoor connection electric equipment and apparatus, lighting, Heating, refrigeration, air conditioning, lifts, automatic water lifting, alarm systems, traffic signals, electric drawing standards, electric installation specification, mechanical installation, pumps, control methods.

MEP2018 Mechanical Power Engineering

2nd Year: Electrical Engineering (cont.)

Hrs/Week: [(2+2) + (2+1)]
Marks:[(70+30+0) + (50+25+0)] = 175

Course Contents

Properties of fluids , Ideal fluids , Pressure , Parometer , Measuring of pressures , Fluids static , Fluids flow , Bernoulli equation and its application , Types of pumps and efficiency calculations , Gas properties , First law of thermodynamics , Principles of heat transfer , Heat conduction , Heat convection and radiation , Internal combustion engines (definitions and classification) , Air stander cycles , Combustion of spark ignition engines , Compression ignition engines , Effective engine efficiency , Two stroke engines , Four stroke engines , gas turbine and modifications , steam properties and generation , steam process and cycles , steam power plant and modifications.

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Departmental Course Descriptions

MEP3119 Power Plants

3rd Year: Mechanical Engineering - production (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Steam generators, Steam properties and processes, boilers, water tube boilers, fire tube boilers, heat recovery boilers, dearators, feed water heaters, economizers, super heaters, air heaters. Modification of Rankine cycles: reheat cycle, regenerative cycles, binary cycle and combined gas- steam cycles, condensers: jet condensers, air pumps, design of condensers, cooling towers, flow through nozzles.

References:

Domkundwor, S., Power Plant Engineering, Hanpat Ruixson, 1981.

El Wakil, M. M., Power Plant Technology, McGraw Hill Co., 1988.

Cole, H., Thermal Power Cycles, Edward Arnold, 1991.

Laboratory:

Thermal Systems Lab

- Performance of a fire tube steam boiler
- Performance of a steam turbine

Departmental Course Descriptions

Departmental Course Descriptions

MEP4120 Pipelines and Networks

4th Year: Mechanical Engineering - Mechanical Power (1stTerm)

Hrs/Week: [(2+2) + (0+0)]

Marks: [(60+20+20) + (0+0+0)] = 100

Course Contents

Steady incompressible flow through simple pipe systems: Pipe flow, Smooth pipes, Rough pipes, Laminar flow, Turbulent flow. Minor losses in pipes: Sudden expansion, Sudden contraction, Gradual expansion or contraction, Entrance loss, Pipe fittings, Equivalent length. The siphon, Pipes connections, Pipes in series, Equivalent pipes, Pips in parallel, The Haizen Williams formula, Branching of pipes, Pumping from one reservoir to two or more other reservoirs. Graphical solution of branch line pumping systems. Branches in closed loop systems, Branches in open ended systems, Centrifugal pump bypass. Networks of pipes: The hardy cross method, Hydraulic path, Linear algebraic equations, Steady state hydraulic systems contain more than one fixed hydraulic grade line.

References:

- Streeter, Fluid Mechanics, McGraw Hill, 1983.
- Garzy, Z., Analysis and Control of Unsteady Flow in Pipe Lines, Butterworths, 1984.

MEP4121 Turbo-machinery

4th Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

Introduction : Review of gases and steam flow through nozzles: Energy equation – Ideal velocity – Flow analysis – Convergent divergent nozzles – Calculation of : critical pressure, critical velocity, minimum area- Effect of friction and nozzle efficiency- Super saturated flow through steam nozzles. Steam Turbines : General principles – Single stage of impulse turbine – Velocity diagram of impulse turbine blade – Combination of inlet and exit velocity triangles – Work done on blade- Velocity stage – Velocity diagram for two rows of blades – Pressure compounding – The reaction turbine – Velocity diagram of reaction turbine blade – Blade height for impulse and reaction turbines – Comparison between performance of impulse and reaction turbines – Multi stage of impulse turbine – Turbine governing. Axial flow compressors: types of air compressors – Analysis of an axial flow compressor stage – Velocity diagram of an axial flow compressor – Thermodynamics of the axial compressor stage – Power required – Max. pressure ratio – Performance curves of air compressors. Gas Turbine Cycles: Introduction – Types of gas turbine – Open and closed circuit plants – Gas turbines power cycles: Constant pressure power cycle – Improvement in the constant pressure cycle – Cycle with exhaust gas heat exchanger, Cycle with reheat - Cycle with reheat and exhaust gas heat exchanger, Cycle with intercooling - Cycle with intercooling, Reheat and exhaust and gas heat exchanger. Matching of gas turbine cycle components – Performance curves – Linking of the component

References:

- Stepanoff, A. J., Centrifugal and Axial Flow Pumps, John Wiley and Sons Inc., London, 1957.
- Addison, H., Applied Hydraulics, Chapman and Hall Ldt. London, 1964.
- Church, Austin H., Centrifugal Pumps and Blowers, Jagdishlal Meropoitan Book Co., PVT.
- Harman, Richard T. C., Gas Turbine Engineering, Applications, Cycles and Characteristic, MacMillan Press Ltd., London, 1981.
- Yahya, S. M., Turbines, Compressors and Fans, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 1983.
- Steam Turbine, Theory and Practice, Kerrton Pitman and Sons Ltd., London, 1991.

- **Laboratory:**
  Turbomachinery Lab. & Thermal Systems Lab.
- Performance of Steam Turbines

Departmental Course Descriptions

- Performance of Gas Turbines
- Performance of Centrifugal Fan
- Performance of Axial Flow Pumps

MEP4022 Thermal Power Stations (2)

4th Year: Mechanical Engineering - Mechanical Power (Cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(75+25+25) + (75+25+25)] = 250

Course Contents

Load curves , Selection of units , Location of plants, Optimum load division between units, Performance of power plants, Cost of electrical energy rate , Types of furnaces and types of boilers and boilers heat balance , Types of draught systems, Thermal power plant piping systems, Different pollutants and their treatments, Nuclear power stations , Principles and types of reactors, Reactors calculations , Safety systems.

References:

- Skortzki, R. G. and Vopat, W. A., Applied Energy Conversion, McGraw Hill, 1985.
- Stocker, W. F., Design of Thermal Systems, McGraw Hill, 1992.
- Hicks, Tyler G., Power Plant Evaluation and Design Reference Guide, McGraw Hill, 1994.

Laboratory:

Thermal Systems Lab.

Departmental Course Descriptions

- Use of Convergent divergent Nozzles to Measure Thrust
- Use of Steam Jet Air Ejector to Create Vacuum Influence of Motive Steam
- Use of Steam Jet Ejector as a Thermo-Compressor
- Run Plant of Fire tube Boiler and Steam Turbine to determine Steam Rate, Heat Rate and Input, Output Characteristics

MEP4023 Refrigeration & Air Conditioning

4th Year: Mechanical Engineering - Mechanical Power (Cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(75+25+25) + (75+25+25)] = 250

Course Contents

Definitions and methods of refrigeration. Simple vapor compression systems, Compound vapor compression systems, Absorption refrigeration systems, Steam jet refrigeration systems, Air refrigeration systems, Thermoelectric refrigeration. Refrigerants, Cooling load for cold stores. Methods of defrosting, Psychometry and psychometric processes. Air conditioning systems: cooling and heating load for air conditioning systems - Summer, winter and all year air conditioning systems, Refrigeration system components, Types and selection of evaporators, Types and selection of compressors, Types and selection of condensers, Types and selection of expansion devices. Air conditioning system components, Air handling units types and selection, Fan coil units. Air distribution (duct design - Air outlets - Fan calculations), Control of refrigeration and air conditioning systems.

References:

- Stoecker, W. F., Refrigeration and Air Conditioning, McGraw Hill, 1955.
- Threlkeld, T. L., Thermal Environmental Engineering, Prentice Hall, 1962.
- Mull, Tomas E., HVAC, Principles and Application Manual, McGraw Hill, 1997.
- ASHRAE, Hand Book.

Departmental Course Descriptions

- Laboratory:
  Refrigeration & Air Conditioning Lab.
- Performance study of An Educational Air, Cooled Refrigerating System at Different Operation conditions.
- Performance study of An Educational Water, Cooled Refrigerating System at Different Operation Conditons
- Performance study of a Cooling Towers at Different Operation Conditions
- Performance study of an Educational Air Conditioning Unit at Different Operation Conditions.

MEP4024 Project

4th Year: Mechanical Engineering - Mechanical Power (Cont.)

Hrs/Week: [(0+4) + (0+4)]
Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, in addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

- Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Departmental Course Descriptions

Departmental Course Descriptions

MEP4125 Hydraulic Power Systems

4th Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

MEP4130 Hydraulic Power Systems

4th Year: Mechanical Engineering – Production (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Hydraulic systems: Constant displacement pumps, Outer and inner vane pumps, Outer and inner gear pumps, Variable displacement pumps, Piston pumps, Eccentric plate pumps, Pumps control systems: Systems efficiency, Hydraulic circuits types, Power losses at opening and closing also at partial load, Total efficiency for system and the control of speed at loading, The control of constant displacement pumps, Hydraulic motor: High speed motors, High torque and low speed, High and average displacement with high torque and low speed. Hydraulic transmission: Hydraulic system efficiency, Different application and control.

References:

- Pneumatic and Hydraulic Systems, Bosch Publications, SAE, 1994.

MEP4126 Pneumatic Power Systems

4th Year: Mechanical Engineering - Mechanical Power (1st Term)

Departmental Course Descriptions

Hrs/Week: [(2+1) + (0+0)]
Marks:[(70+30+0) +(0+0+0)] = 100

Course Contents

Pneumatic systems: Air valves, Braking valves, Braking stopping valves, Vehicle loading sensor valves, Pressure measurements valves, Air pressure regulators, Safety valves air drying, Air cushion vehicle systems and performance studying.

References:

- Pneumatic and Hydraulic Systems, Bosch Publications, SAE, 1994.

MEP4227 Internal Combustion Engines (2)

4th Year: Mechanical Engineering - Mechanical Power (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Performance map and the performance of 4-stroke and 2-stroke engines. Engine fuel feeding systems: Spark ignition engine: The carburetor, Engine mixture requirements for best performance, The simple carburetor and methods of automatic mixture control. Fuel injection, Types of systems and components. Compression ignition engines: Diesel fuel injection systems, Types and components, Performance and tests. Supercharging: Methods, Turbo-charging, Matching of engine and supercharger. Ignition: Types and components, Conventional and electronic ignition. Governors: Types, Components and testing. Design of cooling system elements, design of lubricating system elements, design of turbo charging systems, design of exhaust system.

Departmental Course Descriptions

References:

- Nunney, M. J., Light and Heavy Vehicle Technology, Newnes, 1994.
- Heywood, J. B., Internal Combustion Engine Fundamentals, McGraw Hill, 1994.
- BOSCH, Electric and Electronic, BOSCH Handbook, 1999.
- Norman, Diesel Technology, The Goodheart Willcox Co., 1999.

Laboratory:
Internal Combustion Engines Lab.

- Calibration and Testing of Diesel Fuel Injector.
- Calibration and Testing of Diesel Fuel Injection Pumps
- Performance tests and Performance Map of a Spark Ignition Engine.
- Testing and Adjustment of the Hydraulic GM Engine Governor.

MEP4228 Maintenance of Mechanical Power Systems

4th Year: Mechanical Engineering - Mechanical Power (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Description of boilers, performance of boilers, Boiler control systems, Operation and maintenance of boilers, Performance of compressors, Compressor selection, Flow, Pressure and temperature control, Operation of steam turbines, Start-up and shut down of steam turbines, Matching of gas turbine components, Performance curves, Linking of components, Maintenance of condensers and cooling towers.

Departmental Course Descriptions

MEP4229 PLC Control of Power systems

4th Year: Mechanical Engineering - Mechanical Power (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

The programmable logic controller (PLC) and industrial control, PLC architectures, PLC programming, ladder diagrams, timers, counters, arithmetic functions, data manipulation, data communication, numerical control, safety measures, maintenance and fault finding. :

b- Design & Production Engineering

MDP0001 Engineering Drawing & Projection

Preparatory Year: General Engineering. (Cont.)

Hrs/Week: [(2+3) + (1+4)]

Marks:[(0+50+0) + (150+50+0)] = 250

Course Contents

Departmental Course Descriptions

Engineering drawing techniques and skills. Conventional lettering and dimensioning, Geometric constructions, Theories of view derivation, Orthographic projection of engineering bodies, Projection of points, Lines, Surfaces and bodies, Derivation of views from isometric drawings and vice versa, Derivation of views and sections from given views, Intersection of bodies and surfaces, Development of surfaces, Steel construction, Symbols of electrical circuits, Fasteners, Assembly drawings for some mechanical components.

References:

- Thomas, E. F., Fundamentals of Engineering Drawing, McGraw Hill Co., 1998.
- Hart, K. R., Engineering Drawing, English Universities Press Ltd., 1999.
- Thomas, E. F. and Vierck, C. J., Engineering Drawing and Graphic Technology, McGraw Hill Co., 2001.

MDP0202 Production Technology

Preparatory Year: General Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+3)]
Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Production technology: Properties of engineering materials and material selection, Casting and joining of metals, Forming processes, Basic machining processes, Measurement, Standardization, International measuring systems, Cost analysis and estimation, Maintenance (systems, types and programming), Organization structure.

References:

Departmental Course Descriptions

- Singer, C.; Holmyard, E.J. and Hill, A.R., A History of Technology, Oxford University Press, London, 1975.

MDP1003 Machine Drawing

1st Year: Mechanical Engineering. (Cont.)

Hrs/Week: [(2+4) + (1+4)]

Marks:[(0+40+0) + (100+35+0)] = 175

Course Contents

Methods used in drawing and designing offices, Kinds of drawings, Positioning of dimensions, Views of sections, Parts and elements of machines, Drawing parts of machines using computer.

References:

- Hart, K. R., Engineering Drawing With Problems, John Wiley and Sons, 1982.
- Giesecke, F., Technical Drawing, Macmilan Publisher Co., 1986.

MDP1104 Metallurgy

1st Year: Mechanical Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+30+20) + (0+ 0+0)] = 125

Course Contents

Departmental Course Descriptions

Solidification of metals and mechanism of plastic deformation – annealing process and hot working – phase diagram and metallographic examination of phases – heat treatment of steel and alloy steel – cast iron – non ferrous metals and their alloys – metal corrosion and its prevention – failure analysis – plastics – ceramics and composites .

MDP1105 Production Engineering (1)

1st Year: Mechanical Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+30+20) + (0+ 0+0)] = 125

Course Contents

Machining: Principles of machining, Materials of cutting tools, Turning machines and processes, Drilling machines and processes, Shaping and planning machines and processes, Milling machines and processes, Grinding machines and processes, Methods of tools and work piece fixation, Machining time, Non-conventional cutting processes (ECM, EDM, USM, AJM, WJM and AWJM), Metal forming: Introduction includes mechanical behavior of the materials, Plastic deformation, Effect of temperature on plastic behavior, Types of forming processes: Hot, Cold, Massive or sheet metal work, Metal forming processes: Forging and its types, Rolling, Extrusion, Types of drawing (rod, wire, tube, and deep), Sheet metal work (shearing, pressing, blanking, spinning, bending, coining, etc.), Brief explanation to forming machines and equipment, Heat treatment of alloys: Diffusion and phase transformation in alloys, Heat treatment processes for iron and steel alloys, Heat treatment processes for non-ferrous alloys.

References:

Departmental Course Descriptions

- Serope Kalpakjian, Manufacturing Engineering and Technology, Addison Wesley Publishing Co., 1992.
- Walker, John R., Machining Fundamentals, The Goodheart Willcos Co., 1993.
- Krar, S.F., Technology of Machine Tools, McGraw Hill Co., 1996.
- Groover, Mikell P., Fundamentals of Modern Manufacturing, Prentice Hall Int., 1996.

Laboratory:
Production Workshop Lab

- Turning machines and processes
- Shapers
- Planers and slotters
- Horizontal and vertical milling machines
- Universal milling machine
- Free, die forging and upsetting
- Bending
- Rolling
- Extrusion
- Wire and deep drawing
- Harden ability test
- Hardening of steel
- Precipitation hardening

MDP1206 Materials Engineering & Testing

1st Year: Mechanical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (120+40+40)] = 200

Departmental Course Descriptions

Course Contents

Materials engineering: Types of engineering materials, Crystal structure, Imperfections in crystalline structures and their relation to properties, Strengthening mechanisms, Solidification and grain formation, Binary phase diagrams, Iron carbon diagram, Heat treatment, Engineering alloys and their properties. Polymers: Structure, Types, Properties, Deformation and applications. Ceramics: Structure, Types, Properties and applications, Composite materials. Testing of materials: Mechanical behavior of materials (elastic and plastic behavior), Mechanical testing (tension, compression, bending, shear, hardness, impact, creep, fatigue), Type of fracture, Property/structure relationship, Wear, non destructive tests, Corrosion and corrosion prevention.

References:

- Van Vlack, Materials for Engineering: Concepts and Applications, Addison Wesley Press, 1982.
- Smith, W., Materials and Engineering, McGraw Hill Publ., 1990.
- Callister, W., Materials Science and Engineering, John Wiley Pub., 1997.

Laboratory:
Metal berg Lab

- Identification of materials
- Crystal structure
- Sample preparation and grain size measurement
- Cooling curves
- Phase diagrams
- Iron carbon diagram
- Microstructure evaluation
- Characterization of polymers
- Applications
- Tension test

Departmental Course Descriptions

- Compression test
- Bending test
- Problems applications
- Hardness test
- Impact test
- Creep test
- Fatigue test
- Corrosion test

MDP2107 Theory of Machines

2nd Year: Mechanical Engineering. (1st. Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(100+50+ 0) + (0+ 0+0)] = 150

Course Contents

Mechanisms: Definitions, Inversions of reciprocating engine, Inversions of double slider mechanism, Motor vehicle steering mechanism, Hook's joint-velocity and acceleration, Equilibrium of machines and force analysis: Static and power analysis, Friction and inertia-effect, Center of percussion, Flywheel and turning moment diagram, Cams: Types of cams, Types of followers, Motion of followers, Cam profile and motion of followers, Gears: Types of gears, Gear geometry and gear trains, Balancing: Introduction, Balancing of rotating masses, Balancing of the reciprocating engines and engine out of balance, Gyroscopes.

References:

- Hannah, J., Mechanics of Machines, British Library, 1984.
- Mobie, H. H., Mechanics and Dynamics of Machinery, John Wiley and Sons, 1987.

Departmental Course Descriptions

MDP2008 Machine Design

2nd Year: Mechanical Engineering. (Cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(0+40+0) + (120+40+0)] = 200

Course Contents

Basic considerations in casting, Forging, Machining and assembly operations, Margins and factor of safety, Springs design, Design of permanent joints (Welding, riveting), Design of detachable joints, Prestressed bolted joints under static and dynamic loading, Design of shafts, Construction and design of couplings and chains.

References:

- Dobrovolsky, Machine Elements, MIR Publisher, 1977. couplings and chains.
- Orlove, Fundamentals of Machine Design, MIR Publisher, 1977.
- Shigly, Machine Design, McGraw Hill Co., 1999.

Departmental Course Descriptions

MDP2109 Stress Analysis

2nd Year: Mechanical Engineering. (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Properties of plane areas, Combined stresses, Mohr's circle, Theories of elastic failure, Transmission shafts, Slopes and deflections, Strains and deformations, Plane analysis and calculation of internal forces for statically indeterminate beams, Flexural analysis of curved beams, Thin shell pressure vessels, Thick cylinders, Buckling of compression members and plates, Thermal stresses in bars, Plates, Pistons and cylinders.

References:

- Popov, E.P., Mechanics of Materials, Prentice Hall Int., London, 1978.
- Khurmi, R.S., Strength of Materials, S.CH and Company, New Delhi, 1998.

MDP2210 Production Engineering (2)

2nd Year: Mechanical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (60+20+20)] = 100

Course Contents

Part (1): Metal casting technology: Introduction, Solidification processing, Liquid metals, Principles of solidification, Primary (wrought) and casting, Metals and alloys, Production of primary metals, Production

Departmental Course Descriptions

of shaped casting, Patterns, Molding techniques: Molding techniques and dynamics, Melting procedures and equipment, Design considerations, Structure, Properties and defects of casting, Computer applications in metal casting, Quality control in casting. Part (2): Metal welding technology: Classification of welding operations for ferrous materials, Thermal welding, Oxy-Acy, Welding, Arc welding, Resistance welding, Submerged arc welding, Spot and seam welding, Plasma welding, Cold pressure welding, Adhesive welding, Testing of welded joints, Classification of vehicles, Main principles of operation and schematic representation of the different types of part: Automotive engine, Transmission line, Braking system, Suspension.

References:

- أحمد سالم الصباغ, هندسة لحام المعادن, عالم الكتب, ١٩٧٧.
- Charles, F. Walton (ed) and Timothy, J. Opar, (Co ed) Iron Casting, Iron Casting Soc, Inc., USA, 1981.
- John Campell, Butterworth, Heinemann, Casting, Ltd. Publishing Co., 1991.
- Metals Handbook, V.15 -Casting, ASM Int., USA, 1998.

Laboratory:
Production Workshop Lab

- Project
- Casting processes (1)
- Casting processes (2)
- Casting design/ pattern
- Fluidity
- Forces acting on mould
- Gating system design
- Feeding system design
- Material balance
- Ingot structure and grain refinement (1)
- Ingot structure and grain refinement (2)

Departmental Course Descriptions

- Casting defects
- Sand testing
- Mould/ core making
- Furnaces and equipment
- Cast iron
- Computer aided Tempe ration recording
- Oxy- Acy- welding
- Oxy- Acy- cutting
- Arc welding
- Variables affecting arc welding
- Spot welding
- Welding symbols

MDP2211 Introduction To Mechatronics

2rd Year: Mechanical Engineering - (2nd Term)

Hrs/Week: [(0+0) + (2+1)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction and basic definitions, Mechatronics as interdisciplinary subject, Configuration of a mechatronic system (examples from the field), Mechatronics approach in the design of smart machinery: Life cycle of a product, Mechatronics concurrent eng, Design methodology, Examples (field), Data processing and signal handling, I/O data transfer (analog I/O, digital I/O), A/D and D/A converters, Sensors and actuators for mechatronic systems, Data acquisition and control cards and systems, Design of mechatronic systems using PLC, PC and microcontrollers (hardware and software), Using lab view and mat lab for simulating the mechatronic systems (with examples).

Departmental Course Descriptions

References:

- Tomkinson, D. and James, H., Mechatronics Engineering, McGraw Hill, N.Y., 1996.
- David, G. and Michael, B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.

Laboratory:
Mechatronics Lab

- Demonstration and presentation of at least two mechatronic systems.
- Performing some experiments on some basic components.
- Using an ADDA card to control two types of systems through a PC, based system.
- Using a PLC and a microcontroller to control two types of systems.
- Simulating two types of systems using lab view and simulink software packages

Departmental Course Descriptions

MDP3012 Machine Design

3rd Year: Mechanical Engineering - Production (Cont.)

Hrs/Week: [(3+3) + (3+3)]

Marks:[(100+50+0) + (100+50+0)] = 300

Course Contents

Part I: Power transmission: Clutches (positive and friction), Variation in geometry of friction surface (plane, conical, cylindrical), Various forms for force generation (mechanical, electromagnetic, hydraulic, pneumatic), Introduction to reological clutches, Belt drives: Flat, V-shape and ribbed, Variable speed drives: Stepped and step less, Disk, Cone and Spherical drives, Gears: Straight spur, Helical, Bevel (straight, spiral, skew) and worm drives, Gear loading forms (static, dynamic, endurance and wear resistance). Part II: Brakes (radial and axial, internal and external, single and double) and band brakes, Rolling bearings: Dynamic and static capacities, Grease and oil lubrication, Rubbing and non- rubbing seals. Sliding bearings: Hydrodynamic and hydrostatic lubrication. Part III: Introduction to the use of computers in machine design.

References:

- Reshetov, D. N., Machine Design, MIR Publisher, 1978.
- Shigley, J. E., Mechanical Engineering Design, McGraw Hill Book Co., 1986.
- Stolariski, T. A., Tribology in Machine Design, Hienemann Newness, 1990.

MDP 3113 Measuring Instruments

3rd Year: Mechanical Engineering - Production (1st Term)

Departmental Course Descriptions

Hrs/Week: [(3+3) + (0+0)]
Marks:[(90+30+30) + (0+0+0)] =150

Course Contents

International system of units, Theory of measurements, Instrument classification, Types of magnification (mechanical, electrical, optical, pneumatic), Measuring signals (static, ramp, dynamic), Dynamic response of measuring equipment, Sensors and transducers, Fits, Tolerances and limit gauges, Simple measuring Instruments (venires, micrometers, dial gauges, angle gauges, protractors, sine bar, sensitive level), Comparators, Measuring machines, Errors and calibration of measuring equipment.

References:

- Gupta, R.C., Engineering Precision Metrology, Khanna Publishers, 1979.
- Jain, Engineering Metrology, Khanna Publishers, 1999.

Laboratory:
Measurement Lab

- Fixed gauges
- Limit gauge design
- Angle gauges
- Slip gauges
- Micrometers
- Venires
- Dial indicators
- Measuring microscopes
- Contour projector
- ABBE vertical
- Optical- mechanical comparators

Departmental Course Descriptions

- Sine bar
- Bevel protractors
- Sensitive levels
- Circular division
- Interferometers
- Miscellaneous measurement
- Elec. strain gauge
- Inductive transducer

MDP3114 Automatic Control

3rd Year: Mechanical Engineering - Production (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction and objectives, Control systems configuration, Control system examples (concentration on logic systems and servos), Control system components: Logic control components (electric, electronic, pneumatic, hydraulic, mixed), Sensors, Switches, Shaft encoders, Synchros, Resolvers, Design of the logic control systems: Combinational and sequential systems, Using step and displacement diagrams, State - diagrams: Ladder diagram FC, Grafcet, Petri nets, With examples on CNC M/C and FMC, Introduction to servo systems: Electric, Electronic, Hydraulic, Pneumatic, Examples on slides M/c control in conventional and CNC workshop equipment.

References:

Departmental Course Descriptions

- Srivinas, D. and Richard, N., Sequential Logic Testing and Verification, Kluwer Academic Publishers, 1991.
- Lala, Parag K., Practical Digital Logic Design and Testing, Prentice Hall, 1995.
- Ozbay, H., Introduction to Feedback Control Theory, CRC Press, 1999.
- Levine, W. S., Control System Applications, CRC Press, 1999.

Laboratory:
Automatic Control Lab

- Demonstration and presentation of at least two types of logic control systems, a combinational and sequential LCS, using a real system or real models.
- Testing and experimentation of the basic components of LSC.
- Assembly and testing of at least two real LCS.
- Presentation and testing of a position servo system applied on the slides control of a CNC or a robot model, two types of systems should be considered.

Departmental Course Descriptions

MDP3115 Theory & Technology of Metal Forming

3rd Year: Mechanical Engineering - Production (1st Term)

Hrs/Week: [(3+3) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Engineering and true stress and strain, Stress strain curves and models of mechanical behavior, Effect of temperature on stress strain curve, Strain rate and its effect on stress strain curve, Deformation and recrystalization, Cold and hot working, Strain hardening, Analysis of stress and strain, Elastic deformation, Plastic deformation of metals, Yield criteria, Methods of calculation of loads required to metal forming, Forging and dimensional changes, Calculation of load during friction and frictionless drawing and upsetting, Factors affecting forging load, Rolling and neutral point in deforming zone, Calculation of load, Torque and rolling mill power, Factors affecting rolling load, Extrusion and metal flow, Extrusion pressure diagram, Calculation of friction and frictionless extrusion pressure and parameters affecting extrusion, Wire drawing and wire drawing die, Calculation of friction and frictionless wire drawing load, Stress strain curve and maximum reduction permissible, Optimum wire drawing die angle and parameters affecting wire drawing, Tube drawing and dimensional changes in diameter and wall thickness, Calculation of drawing thin walled tubes, Plug tube drawing and mandrel tube drawing, Deep drawing and dimensional changes in flange and wall thickness, Calculation of deep drawing load, Redrawing and parameters affecting deep drawing.

References:

- Johnson, W. and Mellor, P. B., Plasticity for Mechanical Engineers, Van Nostrand, London, 1962.
- Chaaban, M. A., An Introduction to Metal Forming, Alselehder Printer, Cairo, 1976.

Departmental Course Descriptions

Laboratory:
Metal Forming Lab

- Spring back in bending
- Upsetting
- Rolling
- Drawing out
- Extrusion
- Wire drawing
- Mannesmann
- Cam plastometer
- Tutorials
- Plasticity
- Forging
- Rolling
- Extrusion
- Wire drawing
- Tube drawing
- Deep drawing

Departmental Course Descriptions

MDP3216 Theory & Technology of Metal Cutting

3rd Year: Mechanical Engineering - Production (2ndt Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Basic concepts and definitions, Tool geometry (definitions, reference planes, geometry of single point tools, twist drills and milling cutters), Tool materials (types and applications), Chip formation (types of chips, built up edge BUE, chip compression ratio, determination of shear angle and shear strain), Mechanics of metal cutting (merchant's analysis, factors affecting cutting forces), Measurement of the cutting forces, Empirical cutting force relationships in conventional cutting (turning, drilling and milling), Heat in metal cutting (heat generation and dissipation, cutting temperature, measurement, distribution, relationships of cutting temperature), Tool failure (types and causes), Tool wear and its measurement, Tool life, Taylor's relationship, Factors affecting tool life, Chatter in machining (causes, measurements, limiting width of cut, factors, affecting the limiting width of cut), Cutting fluids (functions, requirements, types and applications), Surface roughness (sources, parameters, factors affecting surface roughness, theoretical relationship), Machining economy (machining cost equation, optimum tool life, optimum machining variables), Machinability (definitions, criteria and indices).

References:

- Boothroyd, G., Fundamentals of Metal Machining and Machine Tools, McGraw Hill, Singapore, 1985.
- Shaw, M. C., Metal Cutting Principles, Oxford University Press, New York, 1996.
- Stephenson, D. A. and Agapiou, J. S., Metal Cutting Theory and Practice, Marcel Dekker, New York, 1997.

Laboratory: *Metal Cutting Lab*

Departmental Course Descriptions

- Metal cutting experiments
- Tool geometry
- Chip formation
- Chip compression ratio
- Cutting forces (orthogonal cutting)
- Cutting forces (conventional cutting in turning and drilling)
- Measurement of cutting temperature in turning
- Measurement of tool wear and tool life
- Chatter in turning (limiting width of cut)
- Measurement of surface roughness in turning

Departmental Course Descriptions

Theory of Vibrations

MDP3217

3rd Year: Mechanical Engineering - Production (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

MDP3222

3rd Year: Mechanical Engineering - Power (2nd Term)

Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Introduction, Vibration of single degree of freedom systems (free, damped, forced) Vibration isolation, Vibration of two degree of freedom systems (free, forced), Vibration absorber, Torsional vibrations (free, forced), Dynamic stresses, Equivalent torsional systems: Geared system, Crank system, Vibration of multi-degree of freedom systems (free, forced), Critical speeds of shafts: Shafts with lumped masses, Shafts with distributed masses.

References:

- Thomson, William T., Theory of Vibration with Applications, Prentice Hall, Inc., 1981.
- Rao, Singiresu S., Mechanical Vibrations, Addison Wesley Publishing Co., Inc., 1990.

MDP3218 Machines Of Metal Cutting And Forming

Departmental Course Descriptions

3rd Year: Mechanical Engineering - Production (2nd Term)

Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (125+25+25)] = 175

Course Contents

Performance criteria for machine tool design, rigidity of the MFTW system and accuracy of production on machine tools, Determination of principle specification of the machine tool being design, drives of machine tools, machine tool spindles and spindle bearings, frame parts of machine tools, joints of machine tools, machine tools testing and research. Forming tools: methods of forming sheet-metals types of dies (single , compound, combination and progressive dies), Shearing (blanking and piercing), Bending (U- and V-bending), Deep drawing of cylindrical cup with and without flanges, Quadratic and rectangular shapes, Ironing,, Manufacturing of dies.

Departmental Course Descriptions

Material Handling
MDP3219

3rd Year: Mechanical Engineering –Production (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (75+25+25)] = 125

MDP3224

3rd Year: Mechanical Engineering –power (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course contents

Classification of Material handling equipments and properties of its performance- movable loads – lifting equipments (chains- pulleys system – cylinder wire roll -….)
Design of (screw –belt – roller -) equipment of lifting

Mechatronics (1)
MDP3220

3rd Year: Mechanical Engineering - Production (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (75+25+25)] = 125

MDP3223

3rd Year: Mechanical Engineering - Power (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (2+2)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Basic components of mechatronic systems, Electric circuits including grounding and electrical interference, Semiconductor electronics including optoelectronic devices, System response including system modeling and analogies, Analog signal processing using operational amplifiers, Digital circuits including some special purpose digital integrated circuits, Data acquisition system including digital/analog conversion, Hardware, Software code sign of embedded systems based on code sign finite-state machines, Introduction to VHDL for modeling digital hardware devices using structural, Dataflow and behavioral styles.

References:

- Bhasker, J., VHDL Primer, 3rd Ed., Person Education, 1999.
- Alciatore, D. G. and Histand, M.B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.

Laboratory:

- Demonstration and presentation of at least two mechatronic systems.
- Performing some experiments on some basic components.
- Using an ADDA card to control two types of systems through a PC, based system.

MDP3121 Mechanical Design

3rd Year: Mechanical Engineering – Power (1st Term)

Departmental Course Descriptions

Hrs/Week: [(3+3) + (0+0)]
Marks:[(100+50+0) + (0+0+0)] = 150

Course Contents

Part I: Power transmission: Clutches (positive and friction), Variation in geometry of friction surface (plane, conical, cylindrical), Various forms for force generation (mechanical, electromagnetic, hydraulic, pneumatic), Introduction to reological clutches, Belt drives: Flat, V-shape and ribbed, Variable speed drives: Stepped and step less, Disk, Cone and Spherical drives, Gears: Straight spur, Helical, Bevel (straight, spiral, skew) and worm drives, Gear loading forms (static, dynamic, endurance and wear resistance). Part II: Brakes (radial and axial, internal and external, single and double) and band brakes, Rolling bearings: Dynamic and static capacities, Grease and oil lubrication, Rubbing and non- rubbing seals. Sliding bearings: Hydrodynamic and hydrostatic lubrication. Part III: Introduction to the use of computers in machine design.

References:

- Reshetov, D. N., Machine Design, MIR Publisher, 1978.
- Shigley, J. E., Mechanical Engineering Design, McGraw Hill Book Co., 1986.
- Stolariski, T. A., Tribology in Machine Design, Hienemann Newness, 1990.

Industrial Organization

MDP4225

4th Year: Mechanical Engineering - Power (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Departmental Course Descriptions

MDP4134

4th Year: Mechanical Engineering - Production (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks: [(70+30+0) + (0+0+0)] = 100

Course Contents

Plant organization: Organization charts, Decision making process and theory, Project management: Planning and scheduling with gantt charts, PERT/ CPM, Design of work systems: Job design, Work measurement, Facilities layout: Basit Type layouts, Design of product layout (line balancing), Design of process layout, Production planning and control: Forecasting, Scheduling and sequencing, Inventory management, Operations research: Linear programming (formulation, graphical solution, simplex method), Transportation problem, Assignment problem.

References:

- Taha, Hamdy A., Operations Research, Prentice Hall Inc., 1997.
- Stevenson, William J., Production/Operations Management, McGraw Hill, 1997.
- Daniel Sipper and Bulfin, Robert L., Production: Planning, Control and Integration, McGraw Hill, 1998

MDP1126 Electrical Materials Technology

1st Year: Electrical Engineering. (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+20+20) + (0+0+0)] = 100

Departmental Course Descriptions

Course Contents

Microstructural of metal, ceramics and engineering plastics - Physical and mechanical properties of conductive, semi conductive and insulators (tension, compression and bending) - conductive, semi conductive and electrical insulators production (machining and forming processes and metal joining process). Applications (parts of motors, transformer ……..etc).

MDP4027 Project

4th Year: Mechanical Engineering - Production (Cont.)

Hrs/Week: [(0+4) + (0+4)]

Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project text and at the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his coming engineering career.

References:

Departmental Course Descriptions

- Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

Departmental Course Descriptions

MDP4128 Quality Control

4th Year: Mechanical Engineering - Production (1st Term)

Hrs/Week: [(2+2) + (0+0)]
Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Presentation and description of data, Theory of probability, Discrete probability distributions, Continuous probability distributions, Sampling distributions, Estimation theory, Testing hypotheses, Regression and correlation analysis, Quality definitions and concepts, Process capability analysis, Theory of control charts, Statistical control charts for attributes, Statistical control charts for variables. Acceptance sampling: Principles and concepts, Acceptance sampling by attributes, Acceptance sampling by variables.

References:

- Grant, E. L., Statistical Quality Control, McGraw Hill, New York, 1996.
- Montgomery, D. C., Introduction to Statistical Quality Control, John Wiley and Sons N. Y., 1997.

MDP4129 Machines Tool design

4th Year: Mechanical Engineering - Production (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

Introduction- design of gear boxes –speed calculations-method of changing speeds- speed nomograms-spindles and spindles bearing design- design of spindle bearings-materials of spindle bearings –design of machine tool structure s –materials of machine tool structures- machine tool frames force analysis – slide ways.

MDP4130 Computer Applications in Industry

4th Year: Mechanical Engineering – Production (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks: [(60+20+20) + (0+0+0)] = 100

Course Contents

To develop an appreciation of the uses and advantages of the recent computer applications in industry.

References:

- Groover, Mikell P.; Emory, W. and Zimmers, Jr., CAD/CAM: Computer Aided Design and Manufacturing, Prentice Hall Inc., 1984.
- Nazementz, John W.; Hammer Jr. William E. and Sadowski, Randa P., Computer Integrated Manufacturing Systems: Selected Readings, Industrial Engineering and Management Press, 1985.
- Eric Teicholz, CAD/CAM Handbook, McGraw Hill Book Co., 1985.

MDP4131 Environmental engineering

4th Year: Mechanical Engineering - Production (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks: [(60+20+20) + (0+0+0)] = 100

Departmental Course Descriptions

Course Contents

Introduction – natural environmental equilibrium – environmental control : methods of reducing exhaust gases pollution (mechanical < chemical < and thermal treatments)< optimum design of chimney – air population effects (green house effect 03 on layer degradation, smoke fog , acidic rain , climate change) water pollution control – crude oil pollution – radiation pollution control.

MDP4132 Introduction to Tribology

4th Year: Mechanical Engineering – Production (1st Term)

Hrs/week [(2+2) + (0+0)]
Marks [(60+20+20) + (0+0)]=100

Course Contents

Introduction, Fluid film lubricant (lubricant properties, Reynolds equation, hydrodynamic, squeeze and hydrostatic lubrication, thermal effects, analytical methods for bearing of large width, control volume for bearing of finite width), Surface contact mechanics (hertzin theory, subsurface stresses and plastic flow, surface topography), Application of fundamentals (friction, flash temperatures, bounding lubrication, partial fluid film lubrication, elastohydrodynamic lubrication, wear, systematic approach to tribological analysis).

References:

- Neale,M.J. (1973) Tribology handbook. Butterworth, TJ107 N4.
- Peterson, M.B. and Winer,W.o. (1980) Wear control handbook, American Society of Mechanical Engineers, TA418.4
- Booser,E.R. (1984) Handbook of lubrication: Vol. I and Vol.II. American society of lubrication Engineers, CRC Press,TJ1075 C7.

Departmental Course Descriptions

MDP4133 Measurements

4th Year: Mechanical Engineering - Production (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+20+20) + (0+0+0)] =100

Course Contents

Measurement standards, Linear measurements, Angular measurement, Form measurement, Indirect measurements, Screw thread measurement (standard, power and pipe thread), Gear measurement (spur, helical, worm and bevel), Form error measurement (squareness, parallelism, alignment), Straightness, Flatness, Roundness measurement, Surface roughness measurement (2D and 3D measurement), Static tests for machine tools, Advanced measuring techniques (leaser measurement, computer- aided measurement, machine vision).

References:

- Jain, Engineering Metrology, Khanna Publishers, 1999.

Laboratory:
Measurement Lab

- Thread measurement using hand tools
- Thread measurement using projectors
- Thread measurement using microscope
- Thread measurement using ABBE
- Gear measurement using hand tools
- Gear measurement using projectors
- Gear measurement using microscope

Departmental Course Descriptions

- Gear measurement using dividing head
- Straightness using straight edge
- Straightness using levels
- Flatness using rochdale arm
- Flatness using levels
- Roundness using dividing head
- Roundness using Taly- round
- Roughness using non contact methods
- Roughness using contact methods
- Alignment test
- Squareness and parallelism checking
- Ball bearing measurement
- Acceptance tests for machines On line measurement

MDP4235 Tool Design & Applications

4th Year: Mechanical Engineering - Production (2sndTerm)

Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (90+30+30)] = 150

Course Contents

Injection Molding: Manufacturing processes of plastics, Types of injection moulds for thermoplastics, Clamping forces, Number of cavities and layout, Parting planes, Draft angles, Shrinkage, Feeding systems (runners, gate, sprue and vents), Cooling systems, Ejection systems, Tolerances, Min and max. Wall thickness, How to manufacture injection mould, Advantages of Jigs and fixtures, Principles of location, Types of locators, Over determined location, Principles of clamping, Types of clamping, Clamping forces, Design procedure, Drilling Jigs, Indexing Jigs, Milling Fixtures, Indexing table, Single and multiple piece Fixtures, Turning Fixtures, Welding Fixtures, Assembly Fixtures, Manufacturing of Jigs and Fixtures, Economy of Jigs and Fixtures. Machining: Modern cutting tool materials, Coated carbide tips, Boron

Departmental Course Descriptions

nitride, Ceramics, Diamond tips, Design and manufacturing of cutting form tools, Turning form drilling tools, Form relieved milling cutters, Threading tools and broaching.

References:

- Wilson, F., Die Design Handbook, McGraw Hill, 1986.
- Hoffman, Edward G., Jigs and Fixtures Design, Galgatia Publ., New Delhi, 1987.

Numerical Control Machines
MDP4236

4th Year: Mechanical Engineering - Production (2nd Term)

Hrs/Week: [(0+0) + (3+3)]
Marks:[(0+0+0) + (100+25+25)] = 150

Course Contents

Components of CNC machines (mechanical parts, sensors, transducers, limit switch, speed drives and control, hot electrical panel), Describing the operation panel of CNC machine tool (emergency stop, mode select, cycle start, feed hold, single block, optional block skip, dry run, reference return, feed rate override, rapid traverse, machine lock, optional stop …. Etc), Data, Coding system, Data entry, Axes, Programming of CNC machines, Manual programming for complex work pieces, Manual programming using fixed cycles, Looping, Subroutines etc.

Departmental Course Descriptions

References:

- Steve Krar and Arthur Gill, CNC Technology and Programming, McGraw Hill Publishing Co., 1990.
- John Polywka and Stanley Gabrel, Programming of Numerical Controlled Machines, Industrial Press Inc., 1992.
- Mikel Ynch, Computer Numerical Control for Machining, McGraw- Hill, Inc., 1992.

Laboratory:

- Analysis of CAM Profile Drawn by Auto CAD Software
- Manual Data Input
- Perforated Tape Input, Magnetic Tape Data Input
- Data Input Via Portable Electronic Storage Unit, Magnetic Disk Input Via an Interfaced Computer
- Machining a Simple WP (Straight Lines)
- Machining WP of Combined Lines and Curved Shape

MDP4237 Non destructive tests

4th Year: Mechanical Engineering - Production (2nd Term)

Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (125+25+25)] = 175

Course Contents

Eddy currents-radiography- ultrasonic- photo elasticity – magnetic methods- pneumatic methods.

Departmental Course Descriptions

MDP4238 Mechatronics (2)

4th Year: Mechanical Engineering – production (2nd Term)

Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (125+25+25)] = 175

Course Contents

Microcontroller programming and interfacing including: Microcontroller architectures using a specific example with details of its assembly language programming and interfacing some common peripheral. Sensors including: position and speed measurement, Stress and strain measurement, Temperature measurement, Stress and strain measurement, Temperature measurement, Vibration and acceleration measurement, Pressure and flow measurement and semiconductor sensors and MEMS (microelectromechanical systems). Actuators including: solenoids and relays, Electric motors, Stepper motors, Hydraulic and pneumatic actuators. Mehatronic systems including: Control architectures and a number of case studies, Using codesign concepts and VHDL.

References:

- Bhasker, J., VHDL Primer, 3rd Ed., Person Education, 1999.
- Alciatore, D. G. and Histand, M.B., Introduction to Mechatronics and Measurement Systems, McGraw Hill, 2003.

Laboratory:
Mechatronics Lab

- Design examples of at least two mechatronic systems.
- Using emulators, EVB, and software simulators to test and evaluate the embedded system microcontroller.
- Using a PLC and a microcontroller to control two types of systems.

Departmental Course Descriptions

- Implementation of a small project to apply the embedded microcontroller concepts to control a simple mechatronic system

MDP4239 Facilities Planning

4th Year: Mechanical Engineering - Production (2nd Term)

Hrs/Week: [(0+0) + (4+2)]
Marks:[(0+0+0) + (125+25+25)] = 175

Course Contents

Introduction to production systems, Types and characteristics of production systems, Types of layouts, Advantages and disadvantages of each, Layout objectives, Types of layout data, Quantitative and qualitative data, Construction of flow matrix, Construction of activity relationship chart, Space determination, Number of machines and manpower, Quantitative and qualitative techniques for construction of initial layout, CORELAP, MAT, INLAYT, Optimal and suboptimal (heuristics) as improvement layout techniques, Computerized layout techniques CRAFT, SZAKY, New trends in techniques for layout (SA, Genetic), Evaluation of solutions and selection of the optimum, Single facility location problem, Site selection, Factors affecting the selection, Introduction to materials handling .

References:

- Apple, J. M., Plant Layout and Materials Handling, John Wiley and Sons, 1995. equipment and systems.
- Francis, L.R. and White, J. A., Facility Location and Layout: An Analytical Approach, Prentice Hall Inc., Englewood Cliffs, N.J., 1998.
- Tompkins, J. and White, J. A., Facilities Planning, John Wiley and Sons, 2000.

Departmental Course Descriptions

Departmental Course Descriptions

MDP4240 Project Management and Marketing

4th Year: Mechanical Engineering - Production (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Nature of organizations, Corporate objectives, The mission statement, Managing by objectives, Strategies for survival, Functions of the organization, Purchasing, operations, Marketing and sales, Finance, Products development, Quality and manpower, Finance accounting, Cash flow projection, Financial accounting ratio, Products development, Stages of design from concepts to specifications, Management techniques in products development, Types of production operations, Production planning, Materials management, Quality management, Inspection and testing, Quality assurance, Total quality management and ISO 9000, Project planning and management, Project definition, Project proposal, Planning the project, CPM and PERT, Cost analysis and control, Risk analysis and uncertainty.

References:

- Slack, N.; Chambers, S.; Harland, C. and Others, Operations Management, Pitman Publishing Co., London, 1966.
- Gail, F. B. and Balkwill, J., Management in Engineering: Principles and Practice, Prentice Hall, N.Y, 1996.

MDP4141 Project feasibility studies

4th Year: Mechanical Engineering - Mechanical Power (1st Term)

Departmental Course Descriptions

Hrs/Week: [(2+1) + (0+0)]
Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

The course defines the concept of feasibility studies and the importance of conducting necessary economic studies as a precursor to the determination of design criteria. Related issues include the economic of preliminary and operating costs and overheads , and economic returns . the course also discusses the project development cycle , preliminary feasibility studies (marketing , technical , financial , organizational , social gain , human resource and time/ cost relationships).

MDP2242 Engineering Materials (advanced)

2nd Year: Mechanical Engineering (2nd Term)

Hrs/Week: [(0+0) + (2+1)]
Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Metal alloys: Ferrous, Non-ferrous, Refractory, Super alloys, Controlling material properties . Thermal processing of metal alloys: Annealing , Heat treatment of steels, Precipitation hardening , Composite materials, Failure of materials, Corrosion and degradation of materials, materials selection, Case studies.

References:

- Callister, W., Materials science and Engineering, John Wiley, 1999.

Departmental Course Descriptions

Labboratory: Metalberg Lab

01 Phase diagram review
02 Heat treatment: hardenality test
03 Heat treatment: effect of C% and cooling media on hardening
04 Heat treatment: Al-Cu
05 Composite preparation and testing
06 Corrosion teast
07 Case studies

MDP3143 Introduction in Quality Systems

3rd Year: Mechanical Engineering - Mechanical Power (1st Term)

Hrs/Week: [(2+1) + (0+0)]
Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Basic concepts, History of quality control, quality control engineering , Quality systems for design and developments, Construction of quality control systems, Quality control of purchases, planning, organization, quality costs, Economics of quality , Training, Quality control during product use, introduction to statistical quality control and data analysis.

References:

- Juran, Joseph M. and Blanton, Godfery A., Juran's quality control handbook, McGraw Hill book Co., 2000.
- Gryna, Frank M., Quality planning and analysis , McGraw Hill Book Co., 2000.

Departmental Course Descriptions

MDP2244 Mechanical installations

2nd Year: Architecture Engineering (2nd Term)

Hrs/Week: [(0+0) + (2+0)]

Marks:[(0+0+0) + (35+15+0)] = 50

Course Contents

Fundamentals of air conditioning – psychrometry – cooling and heating load calculations – fire protection – elevators and escalators.

Departmental Course Descriptions

Electrical Engineering Department

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Departmental Course Descriptions

Electrical Engineering (Power & Machines)

EPM 1201 Electrical Measurements & Measuring Instruments

1st Year: Electrical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+4)]

Marks:[(0+0+0) + (90+30+30)] = 150

Course Contents

Electrical measurements, Measurement errors, Accuracy, Statistical analysis. Static calibration, Resolution and precision, Dynamic response. Units, Systems, Dimensions and standards. Moving-coil instruments, Moving iron instruments, Electro-dynamic instruments, Induction-type instruments, Current and voltage measurements, Measurement of power, Measurement of energy and charge, Measurement of frequency and power factor. Cathode ray-oscilloscopes application. Dc bridges, Ac bridges, Resistance and capacitance measurement, Allocation of cable faults. Strain gauges, Temperature transducers, Displacement, Velocity and acceleration transducers, Force and pressure transducers, Light transducers, Data converters, Voltage-to-frequency converters. Digital devices : Digital voltmeters,

References:

- Sawhny, J., An Introduction to Electrical and Electronic Measurements, McGraw Hill, 1975.
- Berlin, H.M. and Gillz, Merill F.C., Principles of Electronic Instrumentation and measurements, Publishers, 1988.
- Frank, An Introduction to Electrical Instrumentation and Measuring Systems, McGraw Hill, 1992.

Departmental Course Descriptions

EPM 2002 Electric Tests (1)

2nd Year: Electrical Engineering. (Cont.)

Hrs/Week: [(0+4) + (0+3)]

Marks:[(60+20+20) + (40+15+20)] = 175

Course Contents

A set of laboratory experiments applied to the courses studied by the students in the first and second year: Electrical circuits: Applications of network theorems, Magnetically coupled circuits, Electric filters, Transients in electrical circuits, Operation with variable frequency. Electrical measurements and measuring instruments: Definition of various types of electrical measuring instruments and their applications, Calibration of ammeters, Voltmeters and watt-meters, Oscilloscopes and their applications. Energy conversion: Appreciation of the construction of electrical machines, A set of experiments on dc machines, Elementary tests on transformers. Electronic and logic circuits: Tests on some integrated electronic circuits and chips.

References:

- Laboratory Instructions, Manuals, Catalogues, Data books.

Departmental Course Descriptions

EPM 2103 Electromagnetic Fields

2nd Year: Electrical Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Vector analysis, Coulomb's law, Electric field intensity, Electric flux, Gauss's law, Divergence, Electric energy and potential, Electric conductors, Electrical resistance, Dielectric materials, Electrical capacitance, Electric field plotting, Poisson's equation, Laplace's equation. Steady magnetic fields, Ampere's law, Magnetic forces, Magnetic materials, Magnetic circuits, Inductance. Time varying magnetic fields, Maxwell's equations, Plane electromagnetic waves in free space, Propagation of electromagnetic waves in matter, Reflection and refraction.

References:

- Carson, D.R. and Lorrain, P. L., Introduction to Electromagnetic Fields and Waves, Taraporevala Sons and Co., 1970.
- Hayt, William H., Engineering Electromagnetics, McGraw Hill Publishers, 1989.

EPM 2204 Energy Conversion

2nd Year: Electrical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Departmental Course Descriptions

Conventional methods of energy conversion : Introduction, Sources of energy, Electrical power systems. Electromechanical energy conversion, Electric motors and generators, Faraday's law, Lorenz forces, The basic electric generator, The basic electric motor, Magnetically single excited systems, Magnetically multi-excited systems, Dynamic energy conversion equations, Conservative fields, Coupled magnetic fields, Torque and stored energy in magnetic fields, Co- energy and torque calculations, The reluctance machine, Multi-fed rotating systems, Electrostatic systems. Renewable methods of energy conversion : Solar energy, Solar cells, Batteries, Wind-energy generators.

References:

- Brown, D. and Hamilton, E.P., Electromechanical Energy Conversion, McMillan, 1984.
- Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.

Laboratory: Energy Conversion Lab

- DC separately excited generator
- DC shunt and compound excited generator
- Retardation test of d.c. machine

Departmental Course Descriptions

EPM 3005 Electric Tests (2)

3rd Year: Electrical Engineering - Power & Electrical Machines (Cont.)

Hrs/Week: [(0+4) + (0+4)]

Marks:[(60+20+20) + (60+20+20)] =200

Course Contents

A set of laboratory experiments applied to the courses studied by the students in the third year: Electrical machines (1&2): Detailed tests on dc machines and single-phase and three-phase transformers. Transmission and distribution of electrical energy: Tests on transmission line models. High voltage engineering: High voltage testing on electrical insulators of different shapes, Training the students on handling, Control and using of high voltage equipment, Electric cables. Electric traction motors. Power electronics (1): Experiments on converter circuit using diodes and thyristors.

References:

- Laboratory Instructions, Manuals, Catalogues, Data books.

EPM 3106 Electric Machines (1)

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

D.C. machines : Theory and design: The generation of E.M.F., Work, Power, Force torque, The magnetic circuit of the dc machine, Armature windings, Armature reaction, Inductance, Energy in magnetic field,

Departmental Course Descriptions

Commutation, Methods of excitation, Load characteristics of dc generators and motors, Efficiency, Testing of dc machines, Special dc machines, Construction of dc machines, Mechanical details, Design, Main dimensions, The armature, Design of poles and inter-poles, Design of commutator, Calculation of efficiency, Examples on the design of dc motors and generators.

References:

- Clayton, A. E. and Hancock, N. N., The Performance and Design of dc Machines, Pitman
- Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
- Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory:
Electrical Machines Lab

- DC separately excited, shunt and compound motors
- DC traction motor
- Back-to-back test on dc machines

Departmental Course Descriptions

EPM 3107 High Voltage Engineering

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Advantages and limitations of using high voltages for transmission, Generation and measurement of high voltage for testing, Generation of impulse waves, The impulse generators, Specifications of high voltage laboratories, Insulators for transmission lines and substations, Insulator materials: Shapes and types, Factors affecting performance of insulators, Testing of insulators: Destructive and non-destructive insulation tests- electrical breakdown in gases, Ionization and attachment coefficients, Electro-negative gases, Electrical breakdown in liquids and solids. Corona discharge, Single and three-core cables, Electrical stresses in cables, High voltage equivalent circuits, High voltage cables, Thermal properties of cables, Earthing systems.

References:

- Naidu, M.S., High Voltage Engineering, Tata McGraw Hill Co., 1982.
- Zaengl, W.S. and Kuffel, E., High Voltage Engineering, Pergamon Press, 1984.
- Abdel Salam, M.; Anis, H., El-Morshedy, A. and Radwan, R., High Voltage Engineering, Marcel Dekker Inc., 2000.

Laboratory: Electric Power Lab

- High voltage tests (1), (2) & (3)

Departmental Course Descriptions

EPM 3108 Power Electronics (1)

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to power electronics, Power diodes, Thyristors: Construction, Characteristics -application in rectifier circuits (converters), Firing circuits, Power transistors as switches, Phase shift controls, Phase controlled rectifiers-static switches.

References:

- Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
- Mohan, N., Undeland, T.M. and Robbines, W.P., Power Electronics: Converters, Applications and Design, John Wiley and Sons Inc., 1990.
- Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

Laboratory: Power Electronics Lab

- Poly phase uncontrolled rectifier circuits
- Single phase half-wave controlled rectifier
- Thyristor firing circuits

EPM 3209 Electrical Machines (2)

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (4+2)]
Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Transformers : Theory and design : Fundamental concepts, Mutual inductance, Electric and magnetic circuits, Power transformers, Phasor diagrams, Magnetizing current and core loss, Equivalent circuits, Transformers at load, Efficiency, Voltage regulation, Three phase transformers, Three phase transformer connections, Three phase to two phase connections, Auto transformer, Voltage regulation in auto transformers, Tap changers, On load tap changers, Harmonics, Transformers testing, Transformer design, Main dimensions, Magnetic cores, Transformer windings, Insulation, Cooling, Calculation of transformer characteristics, Examples on transformer design.

References:

- Say, M.G., Theory and Performance of ac Machines- Third Edition, Pitman, 1967.
- Say, M.G., Alternating Current Machines- Fifth edition, Pitman, 1990.
- Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
- Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory: Electrical Machines Lab

- Single-phase power transformer
- Three-phase power transformer: 4 tests

EPM 3210 Transmission & Distribution of Electrical Energy

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction, Representation of power systems, Parameters of transmission lines, Models of transmission lines, Series impedance, Electrical capacitance, Representation of capacitance in parallel with transmission lines, Voltage and current relationships in transmission lines, Operation characteristics, Symmetrical components, Unsymmetrical faults on transmission lines, Introduction to underground cables, Design of transmission lines, Mechanical design, High- voltage dc overhead transmission lines, Insulated electrical cables, Determination of faults in underground cables, Design of electrical distribution systems, Substations, Introduction to power system planning.

References:

- Gross, C.A., Power System Analysis, John Wiley, 1980.
- Glover, J. and Sarma, M., Power System Analysis and Design, PWS Publishers, 1987.
- Stevenson, W. D., Elements of Power System Analysis- Third Edition, McGraw Hill, 1995.

Laboratory: Electric Power Lab

- Transmission lines (1) & (2)

EPM 3211 Power System Analysis (1)

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Departmental Course Descriptions

Course Contents

Symmetrical components: Synthesis of unsymmetrical phase diagrams from their symmetrical components, The symmetrical components of unsymmetrical systems, Power in terms of symmetrical components, Positive, negative and zero phase sequence networks, Unsymmetrical faults : Shunt faults, Series faults, Network matrices: Network topology, System admittance and system impedance matrices, Load flow solutions and control: Load flow equations, The Gauss- Seidel method, Newton-Raphson method and approximations, De-coupled methods, Regulating transformers.

References:

- Venikov, V.A., Transients in Electrical Power Systems, MIR Publisher, 1979.
- Gross, C.A., Power System Analysis, John Wiley, 1980.
- Elgerd, O., Electric Energy System Theory: An Introduction, McGraw Hill, 1991.

EPM3212 Utilization of Electrical Energy

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Electrical traction systems, Mechanical and electrical characteristics, Speed curves, Operations during electrical traction, Electrical traction motors, Modern control of traction motors. Illumination: Artificial illumination requirements and characteristics, Standard specifications, Types of lamps and luminaries, Illumination curves, Installation of lamps, Luminaries and connections- gas filled lamp ignition. Electric heating: Resistance wires, Electric furnaces, Induction heating. Electric welding of metals: Welding

Departmental Course Descriptions

transformers and generators, Arc welding, Spot welding. Electrolytic processes: Metal coating. Electric transportation: Cranes and hoists, Elevators and conveyor belts.

References:

- Hancock, N.N., Electric Power Utilization, Pitman Publishers, 1967.
- Laithwaite, E.R. and Freris, L. L., Electric Energy: Its Generation Transmission and User, McGraw Hill Co., 1984.
- Wood, A.J. and Woolenberg, B. F., Power Generation, Operation and Control, John Wiley, 1984.

Laboratory: Electrical Machines Lab

- Illumination test

EPM 3213 Power System Protection

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Protection engineering: Introduction, Effects of short-circuits on power systems, Basic elements of protective gear, Current and potential transformers, Protective relays, Electromechanical and static relays, Different types of electromechanical relays, Types of protection in electrical power systems, Differential protection of power systems, Protection of ring main systems, Protection of parallel feeders.

references:

Departmental Course Descriptions

- Rao, S. S., Switchgear and Protection, Khann Publishers, 1983.
- Deshpande, M. V., Switchgear and Protection, Tata McGraw Hill Co., 1991.
- Horowitz, S.H. and Phadk, A. G., Power System Relaying, John Wiley, 1992.

EPM 4014 Electric Tests (3)

4th Year: Electrical Engineering - Power & Electrical Machines (Cont.)

Hrs/Week: [(0+4) + (0+4)]

Marks:[(60+20+20) + (60+20+20)] = 200

Course Contents

A set of laboratory experiments applied to the courses studied by the students in the fourth year: Electrical machines (3) and (4): Detailed tests on single-phase and three-phase induction machines, Three-phase synchronous machines, Measurement of the power angle in synchronous machines, Measurement of synchronous machines parameters. Power system analysis (1) and (2): Experiments on analog and/or digital models of power systems. Power electronics (2): Inverters, Voltage regulators. Switchgear and protection engineering: Definition of different types of protection relays, Circuit breakers.

References:

- Laboratory Instructions, Manuals, Catalogues, Data books.

EPM 4015 Project

4th Year: Electrical Engineering - Power & Electrical Machines (Cont.)

Departmental Course Descriptions

Hrs/Week: [(0+2) + (0+6)]
Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project report and oral exam, the student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering

References:

- Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

EPM 4116 Electrical Machines (3)

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(4+2) + (0+0)]
Marks:[(100+50+0) + (0+0+0)] = 150

Course Contents

Synchronous machines : Theory and design : Introduction, Cylindrical-rotor and salient-pole synchronous machines, Types of windings in ac machines, Winding coefficients, Generator performance, Motor performance, Phase diagrams in three-phase synchronous machines, Synchronous impedance steady state operation, Voltage regulation, Parallel operation, Synchronous machine to an infinite bus, The

Departmental Course Descriptions

synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, Short circuit characteristics, Potier reactance, Zero-power-factor characteristic, Damper bars, Testing of synchronous machines, Construction, Design, Main dimensions, Examples on the design of turbo-generators and low speed generators.

References:

- Say, M.G., Theory and Performance of ac Machines- Third Edition, Pitman, 1967.
- Say, M.G., Alternating Current Machines- Fifth edition, Pitman, 1990.
- Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
- Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory: Electrical Machines Lab

- Three-phase synchronous generator testing
- Synchronization of a three phase machine to an infinite busbar
- Synchronous motors
- Power angle characteristic of synchronous generator

EPM 4117 Electric Power System Analysis (2)

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(4+2) + (0+0)]
Marks:[(100+50+0) + (0+0+0)] = 150

Course Contents

Departmental Course Descriptions

Transients in electrical systems: Types of transients, Equivalent circuits of power system elements, Multi-machine linear systems, Maximum power and loading limit, Modeling of basic elements of electrical systems: Vector diagram representation, Simplified systems, Excitation and speed control systems, Block diagram representation, Simplified criteria of transient stability : Concept of transient stability, Equal area criterion, Numerical solutions of rotor electromechanical equation, Dynamic stability: Analysis of uncontrolled systems, Controlled systems, Power system stabilizers, Voltage stability of loads and power systems: Criteria of voltage stability, Voltage collapse in electrical power networks

References:

- Venikov, V.A., Transients in Electrical Power Systems, MIR Publisher, 1979.
- Elgerd, O., Electric Energy System Theory: An Introduction, McGraw Hill, 1991.
- El-Sadek, M.Z., Power System Voltage Stability and Power, Mukhtar Press, Assuit, 2002.

Laboratory: Power Lab

- Load management
- P.L.C. based load management
- Power system stability investigation

EPM 4118 Planning of Electrical Networks

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

The utility perspective, Utility financial accounting, Utility economic evaluation, Fixed charge rate, Total annual fixed charge rate, Revenue requirements, Financial and regulatory analysis, Corporate financial simulation, Regulatory incentive, Utility incentives, Power generation economics, Co-generation overview and regulations, Steam turbine co-generation cycles, Gas turbine cycles, Generation planning, Manual and automated generation planning, Dynamic programming, Approximate techniques, Capacity resource planning, Integrated demand-supply planning, Marginal costs, Small improvement projects, Planning under uncertainty, Bulk power transmission planning, Transmission

References:

- Arrillage, J. and Arnold, C.P., Computer Modelling pf Electrical Power Systems, , 1983.
- Wood, A.J. and Woolenberg, B. F., Power Generation, Operation and Control, John Wiley Publishers, 1984.
- Stoll, H.G., Least - Cost Electric Utility Planning, J. Wiley Publishers, 1989.
- Berrie, T. W., Power System Economics, Peregrinus Publishers, 1998.

EPM 4119 Over-Voltages in Power Systems

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to types of over-voltages in power systems, Lightning over-voltages, Physical phenomenon of lightning, Interaction between lightning and power system, Factors contributing to line design, Switching over-voltages: Recovery transient initiated by the opening of circuit breaker, Double frequency transient, Current suppression, Capacitance switching, Traveling waves: Wave equation, Reflection and refraction of the wave, Lattice diagram, Attenuation and distortion of waves.

Departmental Course Descriptions

References:

- Guile, A.E. and Paterson, W., Electrical Power Systems, Oliver and Boyd Publishers, .
- Allan Greenwood, Electrical Transients in Power Systems, J. Wiley and Sons Inc., 1971.
- Rudenberg, R., Transient Performance of Electric Power System, M.I.T. Press, 1980.

EPM 4120 Electric Drives

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Basics of industrial motor control, Criteria for selecting drive components, Dc motor drives, Equivalent circuit of dc motors, Permanent magnet dc motors, Dc servomotors, Adjustable speed dc drives, Industrial examples, Electric traction examples, Induction motor drives, Slip power recovery from an induction motor, Forced commutated, Variable frequency ac motor drives, Injection braking of induction motors, Synchronous motor drives, Stepper motor drives, Computer controlled drives.

References:

- Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
- Ramshaw, R. and Van Heeswijk, R.G., Energy Conversion, Sanders College Publishers, 1990.
- Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

Laboratory:

Departmental Course Descriptions

- Basic function of P.L.C.
- Application of P.L.C. in motor control
- PID controller: concepts and applications
- Word Leonard system

EPM 4121 Theory of Electrical Machines

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

The basic two-pole machine, Kron's primitive machine. Linear transformations, Power invariance, Rotating axes of reference, Three phase frame of reference, Transformation between different frames of reference, Torque equations, Restrictions. Applications of the generalized theory: dc machines: Steady state and transient operation, Cross-field generators, Electrical braking. Polyphase synchronous machines: Parameters, Steady state and transient analysis, Dual- excited synchronous machines. Polyphase induction machines : Transformations, Steady state and transient analysis, Special modes of operation, Single phase motors, Revolving field theory, Starting. AC commutating machines-transformers.

References:

- Adkins, B., The generalized Theory of Electrical Machines, Dover Publishers, 1980.
- Bimbhra, P., The general Theory of Electrical Machines- Second Edition, Tata McGraw Hill, 1992.

Departmental Course Descriptions

EPM 4122 High Voltage Applications

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Phenomenon of over-voltages in power systems, Wave propagation over lines and equipment, Theory of travelling waves and standing waves, Electrostatic field of extra-high-voltage (EHV) lines, Lightning and lightning protection, Over- voltages in EHV systems caused by switching operations, Insulation characteristics of long air gaps, Power-frequency voltage control and over- voltages, EHV testing and laboratory equipment, Design of EHV lines, Design of high voltage lines design examples.

References:

- Jha, R.S., A Course in High Voltage Engineering, Rai and Sins Dihi, 1977.
- Naidu, M.S., High Voltage Engineering, Tata McGraw Hill Co., 1982.
- Zaengl, W.S. and Kuffel, E., High Voltage Engineering, Pergamon Press, 1984.
- Abdel Salam, M.; Anis, H., El-Morshedy, A. and Radwan, R., High Voltage Engineering, Marcel Dekker Inc., 2000.

EPM 4123 Advanced Control of Power systems

4th Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

Central operations: Operation of power systems, Organization and operator activities, Control center experience, Supervisory and control functions : Data acquisition, Monitoring and event processing, Control functions, Reports and calculations, Man-machine communications: Operators duties, Mimic diagram functions, System structures: Subsystems, System classes, System interactions, Performance and reliability considerations: Performance criteria, Software considerations, Hardware considerations, Databases, Technical realization: Central system, Communication system, Maintenance, Real time network modeling, Security, Training, Control system examples.

References:

- Cigrell, C., Power System Control Technology, Prentice Hall, 1992. Power & Electrical Machines
- Mahalanalas, A. K.; Kothari, D.P. and Ahson, S.I., Computer Aided Power System Analysis and Control, Tata McGraw Hill, 1994.
- El-Sadek, M.Z., Power System Voltage Stability and Power, Mukhtar Press, Assuit, 2002.

Laboratory: PL.C Lab

- Application of PLC (1) & (2)
- Digital Control Systems (1) & (2)

EPM 4224 Electric Machines (4)

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Departmental Course Descriptions

Induction machines: Theory and design: Introduction, Construction of three- phase induction motors, The magnetic circuit, Slip ring induction motors, Cage motors, Performance at constant flux, Electromotive force, Currents, Torque, Equivalent circuits, Torque speed curves, Phase diagrams, The circle diagram, Starting methods, Classification of induction motors, High starting torque types, Performance with higher harmonics, Testing of induction motors, The induction generator, The induction regulator, Induction type phase shifter, Single phase induction motors, Construction, Theory of rotating fields, Methods of starting, Fractional horsepower motors, Design of three-phase motors, The output equation, Selection of the main dimensions, Standard frames, Windings, Power factor – specific loading- design examples.

References:

- Say, M.G., Theory and Performance of ac Machines- Third Edition, Pitman, 1967.
- Sen, P.C., Introduction to Electrical Machines and Power Electronics - First edition, Pitman, 1990.
- Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
- Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

Laboratory: Electrical Machines Lab

- Three-phase induction motor testing (1) & (2)
- Three-phase induction regulator
- The synchronous - induction motor

EPM 4225 Power Electronics (2)

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Departmental Course Descriptions

Course Contents

Ac voltage controllers: The single phase ac thyristor controller, Three phase controller, Phase control of ac controllers, Integral cycle control, Thyristor commutation techniques: Natural commutation, Forced commutation, Main principles, Circuits, Dc choppers: The single thyristor chopper, Two thyristor chopper, Inverters: Single phase circuits, Bridge inverter circuits, Dc drives, Ac drives.

References:

- Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986. Power & Electrical Machines
- Mohan, N., Undeland, T.M. and Robbines, W.P., Power Electronics: Converters, Applications and Design, John Wiley and Sons Inc., 1990.
- Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

Laboratory: Power Electronics Lab

- Full wave controlled rectifier circuits
- Half controlled three-phase controlled rectifiers
- Fully controlled three-phase controlled rectifiers
- D.C. choppers

EPM 4226 Protection & Switchgear in Electrical Power Systems

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Departmental Course Descriptions

Course Contents

Protection relaying philosophy and fundamental considerations, Transmission line protection, Short lines, Medium length lines, Long distance power transmission, Compensating distance relaying. Rotating machinery protection: Relay protection for ac generators, Loss of field relay operation, Power transformer protection, Relay input sources, Switchgear engineering: Circuit breakers, Types, Construction, Performance and ratings, Interruption of fault currents and arcs in circuit breakers, Circuit breaker test oscillograms, Circuit breakers synthetic and direct tests. Switching over-voltages, Resistance switching, Capacitance switching.

References:

- Flurscheim, C.H., Power Circuit Breaker: Theory and Design, IEE Power Eng. Series, 1982.
- Rao, S. S., Switchgear and Protection, Khann Publishers, 1983.
- Deshpande, M. V., Switchgear and Protection, Tata McGraw Hill Co., 1991.
- Horowitz, S.H. and Phadk, A. G., Power System Relaying, John Wiley, 1992.

Laboratory: Power Lab

- High voltage testing: restriking voltage transients
- Switchgear testing

Departmental Course Descriptions

EPM 4227 Special Electrical Machines

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Theory of single-phase rotating machines, Two phase motors, Single-phase induction motors, Windings and connections, Split phase induction motors : Operation and protection, Capacitor start motors, Two value capacitor motors, Shaded pole motors, Drag-cup motors, Linear motors, Synchronous motors, Reluctance motors, Hysteresis motors, Permanent magnet motors, Inductor type motors, Stepper motors, Dc motors, Universal motors, Dc special purpose motors, Variable speed drive systems, Dc servomotors, Selecting motors for required operations.

References:

- Vinott, A., Fractional Horsepower Motors, McGraw Hill, 1980.
- Fitzgerald, A.E.; Kingsley, C. and Umans, S.D., Electric Machinery - Fifth edition, McGraw Hill Co., 1990.
- Chapman, S. J., Electric Machinery fundamentals, McGraw Hill Co., 1991.

EPM 4228 Applications in Protection & Switchgear Systems

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Departmental Course Descriptions

Item protection : Protection of generators, Protection of transformers, Protection of bus-bars, Protection of transmission lines (carrier protection), Protection against over-voltages, Protection schemes, Substations, Power stations, Protection of low-voltage systems, Coordination of protective devices. Over- voltage transients and travelling waves, Surge velocity, Surge impedance, Surge power and energy stored. Terminations: Incident reflected and transmitted waves, Applications. Over-voltage protection, Surge divertors, Insulated neutral systems over-voltages protection, Earthing systems earthing electrodes, Safety and power earthing, Engineering and calculations of systems and equipment

References:

- Chunikhin, A. and Zhaboronikov, M., High Voltage Switchgear, Analysis and Design, MIR Publisher, 1975.
- Flurscheim, C.H., Power Circuit Breaker: Theory and Design, IEE Power Eng. Series, 1982.
- Rao, S. S., Switchgear and Protection, Khann Publishers, 1983.
- Deshpande, M. V., Switchgear and Protection, Tata McGraw Hill Co., 1991.

Departmental Course Descriptions

EPM 4229 Power Electronics

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Ac voltage controllers: The single phase ac voltage controller, Three phase controller, Integral cycle control, Thyristor commutation techniques, Main principles, Circuits, Dc choppers: The single thyristor chopper, Two thyristor choppers, Inverters: Single phase circuits, Bridge inverter circuits, Dc drives, Ac drives, Basics of industrial motor control, Criteria for selecting drive components, Dc motor drives, Equivalent circuit of dc motors, Permanent magnet dc motors, Dc servomotors, Adjustable speed dc drives, Industrial examples, Electric traction examples, Induction motor drives, Slip power recovery from an induction motor, Forced commutated, Variable frequency ac motor drives, Injection braking of induction motors, Synchronous motor drives, Stepper motor drives, Computer controlled drives.

References:

- Bose, B.K., Power Electronics and AC Drives, Prentice Hall, 1986.
- Mohan, N., Undeland, T.M. and Robbines, W.P., Power Electronics: Converters, Applications and Design, John Wiley and Sons Inc., 1990.
- Rashid, M.H., Power Electronics, Circuits, Devices And Applications, Prentice Hall, 1995.

EPM 3130 Electromagnetic Waves

3rd Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Departmental Course Descriptions

Course Contents

Power flow on TL, Smith chart and impedance matching, Theory of small reflections, Power and energy relations, Guided waves: Waves between two conducting parallel plates, TE and TM waves and their characteristics, Velocities of propagation, Attenuation and quality factor, Wave impedance, Basic closed wave, Guides TE and TM waves and their characteristics in rectangular wave guides, Waves solution in cylindrical coordinates, TE and TM waves in circular wave- guides, Attenuation and quality factor of the wave- guide, Dielectric planar wave- guide, Surface waves, Modes of TE and TM waves in planar dielectric guide, Optical fibbers.

References:

- Bahl, I. and Bhartra, P., Microwave Circuit Design, John Wiley and Sons Inc., New York, 1988.
- Collin, R. E., Foundations for Microwave Engineering, McGraw Hill Book Co., New York, 2000.

Laboratory: Microwave Lab

- SWR and impedance measurements
- Reflection and refraction of MWs
- Scattering matrix and wave guide attenuation measurements
- Study of waveguide Hybrid-T and its application for impedance

EPM 1231 Electromechanical Equipment and Installments Engineering

1st Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+1)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Departmental Course Descriptions

Fundamentals of electric circuit theory, Ohm's law, Kirchhoff's laws, Ac circuits, Polyphase systems. Electric motors: Dc motors, Induction motors, Fractional horsepower motors. Industrial and commercial applications: Construction engineering, Petroleum industry, Steel mills, Agriculture, Electric hoists, Electric elevators, Air conditioning, Refrigeration.

References:

- Hancock, N.N., Electrical Power Utilization, Pitman Publishers, 1970.
- Hughes, E., Electrical Technology, Longmans Publishers, 1977.
- FLOYD, T.L., Principles of Electrical Circuits, Charles Merrill Publishers, 1990.

EPM 1132 Electrical & Electronic Engineering

1st Year: Mechanical Engineering. (1st Term)

Hrs/Week: [(4+2) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Electrical engineering: Constants and variables of electrical circuits, Elements of electrical circuits, dc circuits, Network theorems, Sinusoidal alternating current circuits at steady state, Phasor diagram representation of sinusoidal quantities, Application of network theorems to alternating current circuits, Electric power in alternating current circuits, Power factor, Inductance. Electronic Engineering: Review on types of solids: Bohr's model and its limitation, Energy bands (conduction, valence, energy gap), Fermi-Dirac distribution function, Intrinsic and extrinsic semiconductors (n-type, p-type), Electrons and holes, Concentration, Types of currents (drift, diffusion). PN-junction: I-V characteristics, Diffusion potential, Depletion layer capacitance. Diode circuits: Half and full-wave rectifiers, Smoothing, Clipping and clamping-circuits, Battery charger, Peak rectifier, Voltage doublers.

References:

- Nilsson, J.W., Electric Circuits, Addison Wesley Publishers, 1995.
- Jacob Millman and Arvin Grabel, Microelectronics, McGraw Hill, Latest Ed.

Departmental Course Descriptions

- Sedra, Adel S. and Smith, Kenneth C., Microelectronic Circuits, Holt, Rinehart and Winstron (HRW), Latest Ed.

EPM 2133 Electrical Engineering

2nd Year: Mechanical Engineering. (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Fundamentals of electrical measuring instruments, Oscilloscopes and their applications, Three-phase systems, Transformers, Electric generators and motors, Dc machines, Synchronous machines, Induction motors, Fractional horsepower motors, Electric traction, Electric transportation, Transmission lines.

References:

- Gregory, B.A., An Introduction to Electric Instrumentation and Measurement Systems, McMillan Publishers, 1981.
- Ramshaw, R. and Van Heeswijk, R.G., Energy Conversion, Sanders College Publishers, 1990.
- Balton, W., Measurements and Instrumentation Systems, Newnes Publishers, 1996.

Departmental Course Descriptions

EPM 3234 Electrical Power Engineering

3rd Year: Mechanical Engineering - Mechanical Power (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (60+20+20)] = 100

Course Contents

Introduction to electric power systems, Applications of high voltages in electric power systems, Overhead transmission lines, Underground cables. Generation of high voltage for test purposes, Methods of high voltage measurement, Electric insulation, Types, Corona. Earthing of electrical equipment, Safety, Resistance of earthing electrodes. Protection of power stations, Protection of sub-stations, Protection of transmission lines power stations, Types of circuit breakers.

References:

- Wood, A.J. and Woolenberg, B. F., Power Generation, Operation and Control, John Wiley, 1984.
- Zaengl, W.S. and Kuffel, E., High Voltage Engineering, Pergamon Press, 1984.
- Stevenson, W.D., Elements of Power System Analysis - Third Edition, McGraw Hill, 1995.

Departmental Course Descriptions

Electrical Engineering
(Electronics & Electrical Communication)

ECE 1001 Electric Circuits

1st Year: Electrical Engineering. (Cont.)

Departmental Course Descriptions

Hrs/Week: [(3+2) + (3+2)]
Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Electrical circuit variables and elements, Simple resistive circuits, Analysis of electrical circuits, Source transformation, Network theorems, Star-delta transformation, Sinusoidal steady state analysis, Phase diagram representation, Application of network theorems on alternating current circuits, Electric power in alternating current circuits. Transients in electrical circuits, Non linear resistance circuit, Poly-phase circuits, Magnetically coupled circuits, Mutual inductance, Resonance in electrical circuits, Electric filters, Two-port networks, Locus of phase diagrams at variable frequency, Analysis of electrical circuits with non-sinusoidal alternating currents, Higher harmonics, Fourier series.

References:

- Smith, R.J. and Dorf, R. C., Circuits, Devices and Systems, John Wiley and Sons, 1992.
- Nilsson, J.W., Electric Circuits, Addison Wesley Publishers, 1995.

Laboratory:

Electrical Engineering Fundamental Lab

- Electrical circuits experiments
- Measurement of resistance
- Fourier analysis and voltage signal
- Wave filters
- Three-phase circuits
- Instruments and C.R.O.
- Fundamentals of PLC's

Departmental Course Descriptions

ECE 1202 Electronic Engineering

1st Year: Electrical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Review on semiconductors: Bohr's model, Schroedinger equation, Fermi-dirac distribution function, N-type and p-type semiconductors, Methods of current flow, Continuity equation. Pn-junction: I-V ccs., Reverse saturation current depletion layer capacitance, Diffusion capacitance. Diode applications half- and full-wave rectifier, Battery charger, Peak rectifier, Voltage doublers. Other two-terminal devices: Zener diodes, Schottky barrier diodes, Light emitting diodes (LED), Solar cells. Bipolar junction transistor (BJT): Ebermoll model, Static and dynamics characteristics, Field effect transistors. (linear and nonlinear and pinch off regions), JFETs symbol and model and biasing. Insulated gate FETs: Types, Regions of operation, MOSFETs symbol and model and biasing. Uni polar FET, FETs applications: MOSFET as a resistance, JFET as a constant current source, Selected applications examples. Integrated circuit technology.

References:

- Jacob Millman and Arvin Grabel, Microelectronics, McGraw Hill, 1987.
- Sedra, Adel S. and Smith, Kenneth C., Microelectronic Circuits, Holt, Rinehart and Winston (HRW), 1998.

ECE 2103 Electronic Circuits (1)

2nd Year: Electrical Engineering - . (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Departmental Course Descriptions

Course Contents

Review: Biasing techniques of BJT and FETs. Transistor biasing stability: Current feedback, Voltage feedback, Current and voltage feedback, Stability factor. Transistor small signal models: T models, z, y and h-parameters. Analysis of AF amplifiers: RC- and transformer-coupled AF power amplifiers: Power transistor considerations, Class-A amplifiers (direct, transformer coupled), Push-pull operation (class-A, class-B). Operational amplifiers (OP-AMPs): Difference amplifier, OP-AMP specifications, Frequency characteristics. OP-AMP applications: Adder, Subtracter, Integrator, Differentiator, Electronic analogue computation, I to V and V to I converter, Comparators, Schmitt trigger, OP-AMP oscillators (rectangular, sinusoidal, wien bridge and phase shift).

References:

- Jacob Millman and Arvin Grabel, Microelectronics, McGraw Hill, 1987.
- Jacob Millman and Halkias, Christos C., Integrated Electronics: Analog and Digital Circuits and Systems, McGraw Hill, Latest Ed.

ECE 2204 Signal Processing

2nd Year: Electrical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Signals and systems: Continuous time and discrete-time signals, Exponential and sinusoidal signals, The unit Impulse and unit step functions, Basic system properties. Linear time-invariant systems: Discrete-time LTI systems: The convolution sum. Continuous-time LTI systems, Properties of LTI systems, Causal LTI systems described by differential and difference equations. Fourier series representation of periodic signals: Fourier representation of continuous, Time periodic signals, Fourier series representation of discrete, Time

Departmental Course Descriptions

periodic signals, Filters described by differential equations and filters described by difference equations. The continuous-time Fourier transform: Representation of a periodic signals, The Fourier transform for periodic signals, The properties of continuous-time Fourier transform, The discrete-time Fourier transform: Representation of a periodic signals, The discrete Fourier transform for periodic signals, Properties of the discrete-time Fourier transform. The Z-transform: Region of convergence, the Inverse Z-transform, Properties of the Z-transform, Analysis and characterization of LTI systems using Z-transform, System function algebra, The unilateral Z-transform.

References:

- Oppenheim, A. V. and Willsky, A. S., Signals and Systems, Prentice Hall, 1997.

ECE 3005 Communication Systems (1)

3rd Year: Eslectrical Engineering - Electronics & Electrical Communication (Cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(85+40+0) + (85+40+0)] = 250

Course Contents

Introduction to communication systems, Analysis of amplitude modulation, Frequency modulation, Phase modulation, Pulse modulation systems, Transmitters and receivers, Detectors, Mixers, Automatic gain control, Automatic frequency control, Phase-locked-loop, Applications of RF power amplifiers, Limiters, Harmonic generators and AM modulators, Stereo coder and decoder, FM stereo broadcast transmitters and receivers, Black and white television system: Scanning methods, Synchronization, Black and white camera and picture tubes, Black and white transmitters and receivers and their associated circuits, Color TV systems (PAL/ SECAM/NTSC), PAL coders and decoders, SECAM coders and decoders, NTSC coders and decoders, Color TV transmitters and receivers, Alignment of color TV receivers.

References:

Departmental Course Descriptions

- Hutson, Color TV Systems, McGraw Hill, 1991.
- Grey Miller, Communication Electronics, McGraw Hill, 1999.

laboratory: Communication Lab

- Linear and adaptive delta modulation
- Pulse Code Modulating (PCM)
- Color television receiver
- Phase Locked Loop (PLL)
- AM receiver

ECE 3006 Electronic Measurements & Testing (1)

3rd Year: Electrical Engineering - Electronics & Electrical Communication (Cont.)

Hrs/Week: [(2+3) + (2+3)]
Marks:[(85+20+20) + (85+20+20)] = 250

Course Contents

Analog Instruments, Precautions, Data converters, Digital Instruments, Testing of linear systems, Wave analyzers, Transducers, Noise effects, Optical fiber measurements, Electronic and communication experiments to support the theoretical aspects of the course material.

References:

- Helfrick, A. and Cooper, W., Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall, 1990.
- Laboratory Instructions, Manuals, Catalogues, Data books.

Departmental Course Descriptions

ECE 3107 Electronic Devices

3rd Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(4+2) + (0+0)]

(1st Term) Marks:[(100+50+0) + (0+0+0)] = 150

Course Contents

Reviewing charge transport in semiconductors, Generation recombination mechanisms, High field effects, High injection in PN junctions, Large and small signal models for BJTs, Metal semiconductor contacts, MOS capacitors, Large and small signal models for MOSFETs, Short and narrow channel effects, Power devices, Device simulators, Other semiconductor devices, Applications.

References:

- Yang, E. S., Microelectronic Devices, MH, 1988.

ECE 3208 Optical Electronics

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (4+2)]

(2nd Term) Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Interaction of radiation and atomic systems, Theory of laser oscillation: Fabry- perot laser, Oscillation, Frequency, Power output, Some laser system, Electro- optic modulation of laser, OPTO-electronic

Departmental Course Descriptions

semiconductor devices, DC and AC characteristics, avalanche photodiodes, Applications: OPTO isolator types, Parameters and characteristics, Circuit applications, Solar cells, LCD's.

References:

- Joseph Verdeyen, Laser Electronics, Prentice Hall, 1995.

Departmental Course Descriptions

ECE 3209 Electronic Circuits (2)

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (4+2)]

(2nd Term) Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Feedback (FB) amplifiers: FB concept, General characteristics of negative FB amplifiers, Input and output impedances with FB, Oscillators (sinusoidal, phase shift, resonant circuits and crystal). Multivibrators (MVs): Bistable MVs (fixed and self-bias), Triggering, Schmitt trigger (emitter coupled), Monostable and astable MVs (collector and emitter-coupled). Radio frequency (RF) voltage amplifiers. RF power amplifiers. Voltage regulators: Basic requirements, Regulator types (shunt, series and FB-regulators), Complete FB regulator.

References:

- Jacob Millman and Halkias, Christos C., Integrated Electronics: Analog and Digital Circuits and Systems, McGraw Hill, Latest Ed.
- Joyce, Mourice V. and Clarke, Kenneth K., Transistor Circuit Analysis, Addison Wesley Publishing Co., Inc., Latest Ed.

Laboratory: Electronics Lab

- BJT amplifiers (gain, i/p and o/p resistances, cut-off frequencies, bootstrap and Darlington)
- FET amplifiers (CD, CS, CG, gain Av, Rin, Rou, Ai)
- Measurements of h-parameters
- Regulated power supplies (regulators)
- OPAMPs applications
- Oscillators (crystal, v-controlled, RC)

Departmental Course Descriptions

- Simulation of OPAMP
- D/A converters
- A/D converters
- Introduction to VHDL

ECE 3210 Digital Circuits

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (4+2)]

Marks: [(0+0+0) + (100+50+0)] = 150

Course Contents

CMOS Inverter: Noise margin, Propagation delay, Power dissipation, CMOS combinational circuits: Static design, Pass transistors and transmission gates, Dynamic design, CMOS sequential circuits: Latches, Flip-flops, Counters, Finite- state, Machines, Pipelined structure, Non-bistable CMOS circuits: Monostable, Ring oscillator.

References:

- Rabaey, Jan M.; Anantha Chandrakasan and Vorivoje Nikollic, Digital Integrated Circuits, 2/E Prentice Hall, 2003.

Departmental Course Descriptions

ECE 3211 Digital Signal Processing

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (4+2)]
Marks: [(0+0+0) + (100+50+0)] = 150

Course Contents

Digital filter design: Finite impulse response, Infinite impulse response. Adaptive digital filters: Concepts, Algorithms, Applications. Speech coders: Speech signal analysis, Waveform coders, Vocoders, Hybrid coders. Image processing: Image coding, Image enhancement, Image compression.

References:

- Jayant, N. S. and Peter Noll, Digital Coding of Waveforms: Principles and Applications to Speech and Video, Prentice Hall, 1984.
- Mitra, Sanjit K., Digital Signal Processing, McGraw Hill, 1999.

ECE 3212 Applications of Electromagnetic

3rd Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (4+2)]
Marks: [(0+0+0) + (100+50+0)] = 150

Course Contents

Equivalent circuit of waveguides: N-port circuit, Circuit description, Scattering parameters, Excitation of wave guides, Waveguides coupling by aperture Passive devices: Terminations, Attenuators, Phase shifters, Directional couplers, Hybrid junctions, Circuit theory of resonators, Fabry perot and optical resonators, Microwave and optical measurements: Detection of optical power, Detection and measurement of microwave power, Measurement of wavelength, Measurement of impedance, Fibber parameter measurements.

References:

Departmental Course Descriptions

- Collin, R. E., Field Theory of Guided Waves, IEEE Press Piscataway, N. S., 1991.
- Collin, R. E., Foundations for Microwave Engineering, McGraw Hill Book Co., New York, 2000.

ECE 4013 Electronic Measurements & Testing(2)

4th Year: Electrical Engineering - Electronics & Electrical Communication (Cont.)

Hrs/Week: [(0+3) + (0+4)]

Marks:[(40+20+15) + (60+20+20)] = 175

Course Contents

The student performs testing measurements in two domains: Communication systems: Study of PLL characteristics, Study of digital communication techniques: PCM, Delta modulation, Optical communication systems, TV characterization, Satellite receiver systems, Telephone system, Electromagnetic waves: Propagation of radio waves, Microwave generators, Semiconductor devices, Characterization of microwave circuits. Active filter , logarithmic amplifier, digital transformer, frequency to voltage conversion, extracting high noisy signal, spectrum analysis.

References:

- Helfrick, A. and Cooper, W., Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall, 1990.
- Laboratory Instructions, Manuals, Catalogues, Data books.

ECE 4014 Project

4th Year: Electrical Engineering - Electronics & Electrical Communication (Cont.)

Departmental Course Descriptions

Hrs/Week: [(0+2) + (0+6)]
Marks:[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering

References:

- Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

ECE 4115 Microwave Electronic Engineering

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Microwave tubes: Linear beam tubes (O-type): Two cavity klystron, Reflex klystron, Multi cavity klystron amplifiers, Traveling wave tube amplifiers, Backward wave oscillator, Extended interaction oscillator.

Departmental Course Descriptions

Microwave crossed field tubes (M-type): Magnetron oscillators, Forward wave crossed field amplifier, Backward wave crossed field amplifier (Amplitron), Backward wave crossed field oscillator (Carcinotron), Gyratron. Microwave solid state devices: Schottky barrier mixer diodes, Tunnel diodes, Transferred electron devices, IMPATT, TRAPATT, BARITT, Varactors. Parametric devices: Manley- rowe relations, Parametric up converters, Negative resistance parametric amplifiers. Microwave transistors.

References:

- Liao, S. Y., Microwave Devices and Circuits, Prentice Hall, 1990.
- Collin, R. E., Foundations for Microwave Engineering, McGraw Hill, 2000.

Laboratory: Microwave Lab

- Reflex klystron
- Gun oscillator
- Microwave cavities
- Injection phase looking of a microwave oscillator

ECE 4116 Communication Systems (2)

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term).

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Sampling Process, Pulse amplitude Modulation. Quantization Process: Quantization noise, Conditions for optimality of scalar quantizers. Pulse Code modulation, time division Multiplexing. Digital multiplexers,

Departmental Course Descriptions

Random Processes: Stationary process, Mean, covariance and correlation functions, Ergodic process, Transmission of Random Process through Linear time invariant filter: Power spectral Density. Noise: Gaussian process and central limit theorem, white noise, Narrow band noise. Noise effect on CW modulation Systems: DSB-SC, AM envelope, FM. Base-band Pulse. Transmission: Line Codes, Equalizers, Filter, probability of Errors in base-band, Inter-symbol Interference, Nyquist criterion for distortionless base band transmission, Raised Cosine spectrum. M-Ary Probability of error, Regenerative repeaters, Eye Pattern, Power spectrum of pulse amplitude modulation. Signal space analysis, correlation receiver. Pass-band data transmission, BPSK, QPSK, QPSK, Pe, Spectrum, generation. M-ary PSK, Hybrid Amplitude-phase modulation, Coherent Frequency shift keying, M-Ary FSK, Non-coherent binary FSK. Differential phase shift Keying. Comparison of digital modulation schemes using a single carrier. Application: Modems.

References:

- Simon Hykin, Communication Systems, John Wiley and Sons, 2001.

Laboratory: Communication Lab

- Line coding
- Digital signal processing
- Digital communication systems
- Private Automatic Branch Exchange (PABX)
- Computer simulation of MODEMS

ECE 4117 Integrated Circuits

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Departmental Course Descriptions

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

IC Processing, Post Processing, Processing economics, Design of basic digital IC building blocks, NMOS Inverter : Noise margin propagation delay, Power dissipation, NMOS and CMOS gate circuits, digital circuits(IlL, TTL, ECL gates, BiCMOS), Memory cores: (ROM, EPROM, EEPROM, Flash ROM, SRAM, DRAM), Memory peripheral Circuitry: Row and column decoders, Array structure: PLA, PAL, PLD.

References:

- Sherif Embabi; Abdellatif Bellaouar and Mohamed Elmasry, Digital BiCMOS Integrated Circuit Design, Kluwer Academic Publishers, 1993.
- Sedra, Adel S. and Smith, Kenneth C., Microelectronic Circuits, Holt, Rinehart and Winston (HRW), 1998.
- Rabaey, Jan M.; Anantha Chandrakasan and Vorivoje Nikollic, Digital Integrated Circuits, 2/E Prentice Hall, 2003.

ECE 4118 Electronics For Instrumentation

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Switched Capacitor power supply, Time base generators, Active filters, Analog multiplier, Logarithmic and exponential amplifiers, Sample and hold circuits, Sensors and transducers, Data transmission, Digital to

Departmental Course Descriptions

analog converters DACs and analog to digital converters ADCs, Voltage to frequency and frequency to voltage conversion, Data acquisition systems, Pulling a signal from noise: Lock-in detection, Spectrum analyzer.

References:

- Jacob Millman and Arvin Grabel, Microelectronics, 2/D, McGraw Hill, 1987.
- Diefenderfer, James A. and Holton, Brian E., Principles of Electronic Instrumentation, Saunders College Publishing, 1994.

Laboratory: Electronics Lab

- Sawtooth Generators
- Active Filters
- Sensors and Transducers
- Build-up of a data acquisition system

ECE 4119 Satellite Communications

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Communication satellite system, Orbiting satellites, The satellite channel, Llink calculation, Satellite electronics, Frequency division multiple access, Time division multiple access and code division multiple access, On board processing.

Departmental Course Descriptions

References:

- Gagliardi, Robert M., Satellite Communication, Van Nostrand Reinhold Co., 2000.
- Roddy, D., Satellite Communications, McGraw Hill, 2001.

Departmental Course Descriptions

ECE 4120 Integrated Circuits Technology

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Defining terms, technology roadmap, Basic silicon processes, Fabrication of passive and active components, Process integration and standard technologies, Process simulation, Layout design rules, Layout parasitics, Typical examples, Layout techniques, Interconnect modeling, Substrate coupling issues, ESD protection techniques, Packaging.

References:

- Campbell, The Science and Engineering of Microelectronics Fabrication, Oxford University, 1996.

ECE 4121 Optical Communication Systems

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Overview of optical fibber communications, Optical fibber power launching and coupling, Optical receiver operation, Digital and analog detectors and pre-amplifiers, Digital transmission systems, Point to point

Departmental Course Descriptions

links, Systems considerations, Power and rise time budgets, Analog systems, Carrier to noise ratio, Multi-channel transmission techniques, Coherent optical fibber communication, WDM multiplexing, Optical amplifiers.

References:

- Gerd Keiser, Optical Fibber Communications, McGraw Hill, 2000.

Laboratory: Laser Lab

- Fiber optics
- M-lines
- Simulation of optical communication system

ECE 4122 Application Specific Integrated Circuits Communication Systems (ASICCS)

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to ASIC's, ASIC library design, Programmable ASIC's, Programmable ASIC logic cells, Programmable ASIC I/O Cells, Programmable ASIC interconnect, Programmable ASIC design software, VHDL and verilog HDL, Logic synthesis, Simulation and verification, Floor planning, Placement and routing.

References:

Departmental Course Descriptions

- Smith, Michael J. S., Application Specific Integrated Circuits, Addision Wesley, 1997.

ECE 4123 Integrated Circuits Applications

4th Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks: [(90+35+0) + (0+0+0)] = 125

Course Contents

Amplifiers : RF IF and video, Oscillators: Tuned and un -tuned oscillators stability, VCO, Phase locked loop, Modulators: AM ,SSB balanced FM, PM, Pulse modulators, Digital modulators, Demodulators: AM, FM and PM detectors, Transmitter and receiver circuits, Circuit simulators, Digital, Analog and mixed

References:

- Paul Young, Electronic Communication Techniques, Macmillan, 1990.

ECE 4224 Telecommunication Networks

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Departmental Course Descriptions

Introduction to telecommunications, Telegraph and telephone, Switching: Telegraph, Telephone, Telex, Data, Signaling, ISDN, Broad band, Private switching. Management network multiplexing: Analog, Digital, Wavelength division. Data transmission interface equipment: Modems, Digital data interface equipment. Codecs: Audio, Video. Copper lines: Open wire, Twisted pair cable, Coaxial cable. Optical fibber technology: Types of optical fibbers, Cables, Applications, Radio relay technology, Systems. Mobile radio: Service mode technology. Satellites: Services, Technology, Digital subscriber lines.

References:

- Halsall, F., Data Communications, Computer Networks and Open Systems, Addison Wesley, 1996.
- Elahi Ata, Network Communications Technology, Delmar, 2001.

Departmental Course Descriptions

ECE 4225 Antennas

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (3+2)]
Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Fundamentals and definitions for transmitting and receiving antennas and antenna arrays. Dipoles array synthesis and antenna arrays, Line sources. Resonant antennas wires and patches: Folded dipole antennas, Yagi Uda antennas, Micro-strip antennas. Broadband antennas: Traveling wave wire antennas, Helical antennas, Bi-conical antennas, Sleeve antennas. Aperture antennas: Rectangular and circular apertures, Reflector antennas. Feeding networks for wire antennas, Arrays and reflectors. Antennas in communication systems: Friis transmission formula, Antenna noise temperature. Microwave propagation: Atmospheric effects, Ground effects and plasma effects.

References:

- Balanis, C. A., Antenna Theory and Analysis, Wiley, New York, 1997.
- Stutzman, W. L. and Thiele, G. A., Antenna Theory and Design, Wiley, New York, 1998.
- Slide screw tuner
- Directional coupler and reflectometer measurements
- Antenna
- The simulation of micro-strip antenna

ECE 4226 Mobile Communications

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Basic concepts of mobile communications: Cell site planning: Traffic engineering, Principles of base station provisioning, Cell site configurations RF propagation characteristics: Fading phenomena, Path loss phenomena, Free space propagation, Two path model, RF coverage for mobile station inside buildings, RF propagation in highways and city streets, Shadowing effects, Practical measurements and prediction model, Noise in cellular systems. Frequency planning: Omni frequency plan, Cell sectorization, Tricellular plan, Directional frequency reuse, Microcells, Types of interference. GSM cellular system: Features, Multiple access techniques, GSM architecture, TDMA frame structure, Types of bursts, Mapping of logical channels on physical channels, Speech coding, Channel coding, Bit interleaving, Modulation, Frequency hopping, Power control, Carrier and burst synchronization, Hand over processing, Authentication encryption, CDMA spread spectrum systems, Direct sequence SSS, The performance of DS-SSS, CDMA air links: The forward pilot channel, Sync channel, Paging channel, Traffic channel, Access channel, Traffic channel. Types of codes used in CDMA, Power control in CDMA, Hand-off process in CDMA

References:

- Raymond Steele, Mobile Radio Communications, Penteh Press and IEEE Press, 1994.
- Lee, W. C. Y., Mobile Cellular Telecommunications, Analog and Digital Systems, McGraw Hill, 1995.
- Saleh Farouque, Cellular Mobile Systems Engineering, Artech House Publishers, 1996.

ECE 4227 Selected Topics in Communication Systems

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to current development in communication systems. Radar systems data, Communications and signal processing.

References:

- Selected References, Manuals, Software, Packages.

ECE 4228 Analog Integrated Circuit Design

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to analog VLSI, Device modeling – basic analog building blocks (current mirrors, common-source, common- drain, common- gate, cascode- differential pair) , Frequency response, Stability and frequency compensation, Operational amplifiers (basic, two-stage, miller, symmetrical, telescopic, folded, cascode), Noise, Voltage and current references.

References:

- Behzad Razavi, Design of Analog CMOS Integrated Circuits, McGraw Hill, Inc, 2000.

Departmental Course Descriptions

ECE 4229 Selected Topics in Electronics

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to recent development in micro- and nano-electronics, Mems and mems technologies, Integrated circuit design, Computer aided design techniques and design automation.

References:

- Selected References, Manuals, Software, Packages.

ECE 4230 Information Theory

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction: Uncertainty, Information, Entropy and its properties. Source coding: Shannon codin Prefix coding, Kraft-Mcmillan inequality, First Shannon theorem, Huffman coding, Lempel Ziv coding. Discrete memoryless channels: Transition probability, Binary symmetric channel, Mutual information and its properties. Channel capacity: Definition, Binary symmetric channel. Channel coding theorem: Second Shannon theorem differential entropy and mutual information for continuous ensamples: Differential entropy, Mutual information. Channel capacity theorem: Implications on different communication systems.

Departmental Course Descriptions

Rate distortion theory. Compression of information. Linear block codes: Syndrome decoding, Minimum distance considerations. Cyclic codes: Generator polynomial, Parity check polynomial, Encoder for cyclic, Hamming codes, Bose Chaudhuri- Hocquenghem (BCH) codes, Reed-Solomon codes. Convolutional codes: Code tree, Trellis and state diagram Maximum likelihood decoding of convolutional codes.

References:

- Simon Hykin, Communication Systems, John Wiley and Sons, 2001.

ECE 4231 Selected Topics in Microwave Engineering

4th Year: Electrical Engineering - Electronics & Electrical Communication (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to current development in microwave electronics, Microwave communication systems and antennas.

References:

- Stutzman, W. L. and Thiele, G. A., Antenna Theory and Design, Wiley, New York, 1998.
- Pozar, D. M., Microwave Engineering, Wiley, 1998.
- Scoot, A. W., Understanding Microwaves, Wiley, 1998.

Departmental Course Descriptions

ECE 3232 Data Communication Systems

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Overview of data communication systems with introduction to network protocols. Characterization of random processes. Continuous wave modulation (amplitude, frequency and angle modulation, frequency division multiplexing, phase locked loops). Pulse modulation (sampling and quantization, pulse code modulation, time division multiplexing). Base-band pulse transmission (matched filter, noise error rate, inter symbol interference, digital subscriber lines). Pass-band digital transmission (coherent frequency and phase shift keying, hybrid amplitude/phase modulation, voice band modems). Spread spectrum modulation (direct sequence and frequency hopping). Fundamental limits of information theory (source and channel coding theorems, information capacity theorem, rate distortion theory and data compression). Error control coding (linear block codes, cyclic and Convolutional codes, trellis coded modulation, turbo codes).

References:

- Halsall, F., Data Communications, Computer Networks and Open Systems, 4th Ed., Addison Wesley, 1996.
- Haykin, S., Communication Systems, 4th Ed., Wiley, 2001.

ECE 3233 Data Communication Systems

3rd Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

(2nd Term) Marks:[(0+0+0) + (70+30+0)] = 100

Departmental Course Descriptions

Course Contents

Overview of data communication systems with introduction to network protocols. Characterization of random processes. Continuous wave modulation (amplitude, frequency and angle modulation, frequency division multiplexing, phase locked loops). Pulse modulation (sampling and quantization, pulse code modulation, time division multiplexing). Base-band pulse transmission (matched filter, noise error rate, inter symbol interference, digital subscriber lines). Pass-band digital transmission (coherent frequency and phase shift keying, hybrid amplitude/phase modulation, voice band modems). Spread spectrum modulation (direct sequence and frequency hopping). Fundamental limits of information theory (source and channel coding theorems, information capacity theorem, rate distortion theory and data compression). Error control coding (linear block codes, cyclic and convolutional codes, trellis coded modulation, turbo codes).

References:

- Halsall, F., Data Communications, Computer Networks and Open Systems, 4th Ed., Addison Wesley, 1996.
- Haykin, S., Communication Systems, 4th Ed., Wiley, 2001.

ECE 2134 Acoustics

2rd Year: Arc. Engineering> (1 nst Term)

Course Contents

Definition of architectural acoustics and its important in building, Terminology., Behavior of sound waves in enclosure, sound absorption, sound reflection, sound isolation. The concepts and objectives of acoustics design: the most important considerations that have to be considered for designing auditorium

References:

- Egan, David M., Architectural Acoustics, McGraw Hill Book Co, 1972

Departmental Course Descriptions

Electrical Engineering (Computers & Systems)

ECS0101 Computer Technology

Preparatory Year: General Engineering.

Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+20+20) + (0+0+0)] = 100

Course Contents

Computer architecture, Computer systems, Operating systems, File systems, Computer networks, Internet network, Logical design of programs, Problem solving methods, Types of programming languages, Application on a structured or visual computer programming language for solving engineering problems, Database systems and information technology and decision support systems, Computer graphics and computer systems needed for graphics and image display, Multimedia systems.

References:

- Lawlor, C.V., Computer Information Systems, 8th Ed., The Dryden Press, 2002.
- Introduction to Computers, Class Notes, Ain Shams University, 2003.

ECS 1002 Computers Programming

1st Year: Electrical Engineering. (Cont.)

Hrs/Week: [(2+2) + (3+2)]

Marks:[(60+20+20) + (85+20+20)] = 225

Course Contents

Departmental Course Descriptions

1st term: Introduction to problem analysis, Algorithm generation and programming concepts using a Pascal like programming language, Variables, Declarations and assignments of numeric data types, Internal representation of numerical data, Analysis of errors in numerical computations, Input and output. Selection control structures, Loops and iteration structures, Procedures and functions, Recursion, Modular program design, Array processing, Characters, Strings and other data types, Developing computer programs to implement numerical algorithms of commonly engineering problems.

2nd term: OOL, functions, classes, operator overloading, inheritance& reusability, virtual functions, streams, files, multi-file programs, templates and exceptions, standard templates library, engineering applications, multimedia.

References:

- Griffiths, D. V. and Smith, I. M., Numerical Methods for Engineering: A Programming Approach, CRC Press, 1991.
- Koffman, E. B., Pascal Problem Solving and Program Design, Addison Wesley, 1992.

ECS 2103 Logic Circuits

2nd Year: Electrical Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(85+20+20) + (0+0+0)] = 125

Course Contents

Review on number systems: Positional notation, Binary number systems, Number base conversion, Octal and hexadecimal, Negative numbers, Coded number systems. Switching functions: Main operators, Postulates and theorems, Analysis and synthesis of switching functions, Incompletely specified functions. Design using NAND and NOR gates. Storage devices:1-bit storage, Set-reset FF, Clocked SR-FF, Positive and negative-edge triggered SR-FF, JK-FF, Race- around condition, Master-slave JK-FF, D-FF, T-FF, Excitation table. Sequential circuits: State table and transition diagram, Design of digital systems, Incompletely specified states, Counters, Shift registers. Miscellaneous topics: Adders, Subtracters,

Departmental Course Descriptions

Decoders, Coders, Multiplexer/ demultiplexer, Memories (ROM, PLA, RAM). Introduction to microprocessors.

References:

- Mano, M. M., Digital Design, 3rd Ed., Prentice Hall, 2001.
- Chen, W. K., Logic Design, CRC Press, 2003.
- Farhat, H.A., Digital Design and Computer Organization, CRC Press, 2003.

Laboratory: Logic Design Lab.

- Synchronous counters
- Logic design and simulation with logic gates using KMP (implementation)

ECS 2204 Computer Organization (1)

2nd Year: Electrical Engineering (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Structure and behavior of digital computers at several levels of abstraction (high-level, assembly/machine code, microprogramming and logic circuit). Functional organization of computer hardware. Instruction sequencing and timing: Logic circuits, Micro-operation, Micro-command, Microinstruction. Data transfer: Data bus implementation, Bus cycles, Bus timing. representation of numbers, Data coding, Operation codes in computer. Instruction set: Word format, Instruction format, Instruction types, Instruction set design tradeoffs. Addressing modes. Storage elements: Flip/Flop, Register and memory. Memory organization. Computer registers: Dedicated/general purpose registers, Implicit and explicit registers, Stacks and procedures. Organization of CPU. Arithmetic and logical operations: Operations in registers, Operations in ALU. Design of ALU. Control Unit: Function of control unit, Hardwired implementation, PLA implementation, Micro-programmed control unit, Firmware, Coprocessors. Low level I/O, Memory hierarchy, Bussing and I/O subsystems. Computer buses: Data bus, Address bus, Status bus and control

Departmental Course Descriptions

bus. Design of a simple virtual computer. Introduction to computer parallelism: Multiplicity of data/PE and instructions/CU.

References:

- Mano, M. M., Computer System Architecture, Prentice Hall Int., 1993.
- William Stallings, Computer Organization and Architecture: Principle of Structure and Function, Macmillan Publishing Co., 1995.
- Hsu, J.Y., Computer Architecture: Software Aspects, Coding and Hardware, CRC Press, 2001.

ECS 2205 Systems Dynamics & Control Components

2nd Year: Electrical Engineering (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Dynamic system model building principles. Mechanical, Electrical and electro- mechanical systems. Parametric models (input, output, state space). Simulation and response to standard inputs. Relating system dynamics to its physical parameters. Nonparametric models (frequency/impulse/step/pulse responses). Nonlinear models and linearization techniques. Fluid systems (hydraulic/pneumatic). Thermal systems. Distributed models. Examples of practical systems. Measurement and control in closed loop control. Physical quantities and transducers. Static and dynamic specifications of transducers. Displacement, Velocity and acceleration transducers. Strain gauges and Wheatstone bridge. Thermal transducers. Pressure, Flow and level transducers. Analog signal conditioning and transmission. Digitizing analog signals (D/A, A/D). Data acquisition systems in digital control loops. PC interfaces through standard I/O bus cards and parallel and serial interfaces and their drivers. Programmable controllers. Power interfacing (power amplifiers, thyristors). Control valves. Electronic/pneumatic PID controllers.

References:

Departmental Course Descriptions

- Seborg Dale, E.; Edgar Thomas, F. and Mellichamp Duncan, A., Process Dynamics and Control, John Wiley and Sons, 1989.
- Ogunnaike, Babatunde A.; Ray, Harmon W. and Ogunnaike, Ray, Process Dynamics, Modelling and Control (Topics in Chemical Engineering), Oxford University Press, 1994.
- Karayanakis, N. M., Advanced System Modelling and Simulation with Block Diagram Languages, CRC Press, 1995.
- Anderson, Norman A., Instrumentation for Process Measurement and Control, CRC Press, 1997.
- Curtis Johnson, Process Control Instrumentation Technology, Prentice Hall, 1997.
- Shearer, J., Dynamic Modelling and Control of Engineering Systems, Prentice Hall, 1997.
- Northrop, R. B., Introduction to Instrumentation and Measurements, CRC Press, 1997.

ECS 3006 Electrical Testing (2)

3rd Year: Electrical Engineering - Computer & Systems (Cont.)

Hrs/Week: [(0+4) + (0+4)]

Marks:[(60+20+20) + (60+20+20)] = 200

Course Contents

1st term: Experiments were be developed to support the courses and the curricula at this level: It will focus on industrial measurements such as (temperature, torque, pressure, flow, velocity), Digital transducers, Digital encoders, Digital to analog conversion, ADC, Computer architecture aspects, Educational kits and modules to simulate control systems, MATLAB simulation experiments.

2nd term: Computer software methodologies, Experiments on network file systems, Operating systems and advanced window programming. GUI, multimedia.

References:

- Laboratory Instructions, Manuals, Catalogues, Data Books.

Departmental Course Descriptions

ECS 3107 Programming With Data Structures & algorithms

3rd Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(4+2) + (0+0)]

Marks:[(100+50+0) + (0+0+0)] = 150

Course Contents

Programming essentials (conditions, operators, iterations, functions). Arrays, Pointers, Classes, Recursion. Stacks, Queues, Lists, Tables, Trees (binary trees), algorithm analysis, recursion, searching (linear, binary, depth fist search, breadth first, tree search). Sorting algorithms (bubble, insertion, heap, merge, quick, link sort, external sorting). Graph algorithms , shortest path algorithms, network flow problems, min spanning tree, max flow tree, algorithm design, dynamic programming, randomized & backtracking algorithms, Heaps and priority queues.

References:

- Aho, Alfred V.; Hopcroft, John E. and Ullman Jeffrey, Data Structures and Algorithms, Addison Wesley Pub. Co., 1983.
- Parker, A., Algorithms and Data Structures in C++, CRC Press, 1993.
- Hubbard, John R., Schaum's Outline of Data Structures with C++, McGraw Hill Trade, 2000.
- Lafore Robert, Data Structures and Algorithms in Java, 2nd Ed., Sams, 2002.

ECS 3108 Computer Organization (2)

3rd Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

Organization of processors, Controllers, Memories, Devices and communication links. Current state of computer architecture, Modern computer system components. Advanced processor architectures and interconnects. Instruction set design tradeoffs, Instruction set design: Minimal and reduced instruction set, Microinstruction format. Pipeline processors: Pipelining of instruction Set, Multifunction pipelines. Parallel computer organizations: Parallel processing, Multiple CPU systems, Multi-computers, Superscalar and super-vector computers, Scalability of parallel systems, Parallel programming concepts. Program partitioning, Granularity and latency. Memory hierarchy, Interleaving and bandwidth. Virtual memory. Microcontroller, Interrupts, DMA, cache memory. Memory system (access) controller. Bus protocols. Interconnection networks. Message routing mechanisms. Shared address space. Communication cost and latency-hiding techniques. Specific architectures: Shared memory multiprocessors, Message passing. Dataflow design.

References:

- Farhat, H.A., Digital Design and Computer Organization, CRC Press, 2003.
- Stallings, W., Computer Organization and Architecture: Designing for Performance, Prentice Hall, Pearson Education Inc., 2003.
- Kai Hwang and Briggs, Faye A., Computer Architecture and Parallel Processing, McGraw Hill Book Co., Latest Ed.

ECS 3109 Software Engineering

3rd Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Introduction, Computer based system engineering, Software processes, Project management, Software requirements, Requirements engineering processes, System models, Exposition to commonly used software models, Software prototyping, Formal specification, Architectural design, Distributed systems

Departmental Course Descriptions

architectures, Object oriented design, Real time software design, Design with reuse, User interface design, Software estimation techniques, Software metrics.

References:

- Leach, R., Introduction to Software Engineering, CRC Press, 1999.
- Sommerville Ian, Software Engineering, 6th Ed., Addison Wesley, 2001.
- Keyes, J., Software Engineering Handbook, CRC Press, 2002.

Departmental Course Descriptions

ECS 3110 Control Systems (1)

3rd Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Characteristics of closed loop systems: Introduction to feedback control systems, Advantages and disadvantages of feedback, Sensitivity to parameter variation. Performance of control systems: Standard test signals, Transient response, Response of first and second order systems, Properties of transient response. Stability of linear systems: The Routh-Hurwitz criterion, Special cases, Relative stability. The root locus method. Frequency response plots: Bode plots, Polar plots, Systems with transportation lag, Estimation of transfer functions from bode plots. Stability from frequency response: Nyquist criterion, Relative stability, The closed loop frequency response. Design and compensation: Using root locus, Using bode plots, Nichols charts computer aided analysis and design tools.

References:

- Levine, William S., The Control Handbook, IEEE Press, 1996.
- Ozbay, H., Introduction to Feedback Control Theory, CRC Press, 1999.
- Mutambara, Arthur G. O., Design and Analysis of Control Systems, CRC Press, 1999.
- Levine, William S., Control System Fundamentals, CRC Press, 2000.

ECS 3211 Microprocessor Based Systems

3rd Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Departmental Course Descriptions

An introduction to microprocessors and its evolution, Internal organization, Data unit, Buses, Control units, Timing, Sequences and synchronization. Assembly language programming: Instruction set, Assembler directives, I/O devices. Interface design: I/O control method, I/O synchronization, LSI and MSI interface devices. Interrupt processing: Priority interrupt, Vectored and non-vectored interrupts, Peripheral devices, Real time programming, Microprocessors in automation systems with emphasis on implementation issues, Examples on other applications as data monitoring and data logging, Weighting systems.

References:

- Lawrence, P.D. and Mauch, K., Real-Time Microcomputer System Design, McGraw Hill, 1987.
- Rafiquzzama, M., Introduction to Microprocessors and Microcomputer- Based System Design, CRC Press, 1995.
- Hall, Douglas V., Microprocessors and Interfacing/Programming and Hardware, 3rd Ed., McGraw Hill, 1998.
- Triebel, Walter A. and Singh Avtar, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, 4th Ed., Prentice Hall, 2002.
- Mazidi, Muhammad A. and Gillispie Mazidi, Janice Catherine, 80X86 IBM PC and Compatible Computers: Assembly Language, Design and Interfacing, Vols.1 and 2, 4th Ed., Prentice Hall, 2002.

Departmental Course Descriptions

ECS 3212 Operating Systems

3rd Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (4+2)]

Marks:[(0+0+0) + (100+50+0)] = 150

Course Contents

Operating system concepts, Processes, Inter-process communication, Process scheduling, Memory management, Swapping, Virtual memory, Page replacement algorithm, Segmentation, File systems, Directories, File system implementation, File system security, I/O, interrupt handier, Device drivers, Clock software, input/output software, Deadlocks, Unix operating system, Windows operating systems. Network file system, client/server model. Remote procedure call, Threads.

References:

- Stallings William, Operating Systems: Internals and Design Principles, 4th Ed., Prentice Hall, 2000.
- Silberschatz Abraham; Greg Gagne; Peter Baer Galvin and Silberschatz, A., Operating System Concepts, 6th Ed., John Wiley and Sons, 2001.
- Tanenbaum Andrew, Modern Operating Systems, 2nd Ed., Prentice Hall, 2001.

Laboratory: Operating Systems Lab.

- Unix and Unix shell scripting
- Windows 2000 server operating system
- Network File System NTFS
- Unix programming
- Window programming

ECS 3213 Control Systems (2)

3rd Year: Electrical Engineering - Computer & Systems (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction, Controllability and observability, Performance measures, Optimal control using pontryagin's maximum principle , Nonlinear control and the describing function. Parameter estimation and linear parametric model identification by least squares, Multivariable control, Robust control, Intelligent control, control integration, Applications.

References:

- Ching Fang Lin, Advanced Control Systems Design, Prentice Hall Inc., 1994.
- Astrom, K.J. and Wittenmark, B., Adaptive Control, 2nd Ed., Addison Wesley, 1995.
- Dorf, Richard C. and Bishop, Robert H., Modern Control Systems, Addison Wesley, 1995.

ECS 3214 Compiler Techniques

3rd Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Compiler definition, stages of compiler design, parser, lexical analyzer, semantics analyzer, pattern matching, finite states machines, lexical rules, super position problem, control structure, up-down partition, bottom-up partition, code generation, code optimization.

References:

-Wilhelm Maurer, Compiler Design, Addison –Wesley pub. 1995

2-Dick Grune and H. Jacobs, Modern Compiler Design, John Wiley and Sons, 2001

Departmental Course Descriptions

ECS 4015 Electrical Testing (3)

4th Year: Electrical Engineering - Computer & Systems (Cont.)

Hrs/Week: [(0+4) + (0+4)]

Marks:[(60+20+20) + (60+20+20)] = 200

Course Contents

1st Term: experiments are offered to support courses taught at this level, They cover the following: Computer interfacing techniques, Computer networks and Internet; Electronic instrumentation.
2nd Term: Robotics and AI applications; Analog, Digital control systems; Nonlinear control systems; Computer control of industrial processes, Experimental projects are given to the students to implement HW/SW systems.

References:

- Laboratory Instructions, Manuals, Catalogues, Data Books.

ECS 4016 Project

4th Year: Electrical Engineering - Computer & Systems (Cont.)

Hrs/Week: [(0+2) + (0+6)]

Marks :[(0+50+0) + (0+50+100)] = 200

Course Contents

The student deals with the analysis and design of a complete engineering system using the fundamentals, Principles and skills he gained during his study. The project's report presented by the student should include the details of the analysis and design satisfying the concerned code requirements, The computer applications as well as the experimental work when necessary, In addition to the technical engineering

Departmental Course Descriptions

drawing of his design. Throughout the project report and at oral the exam, The student should prove his complete understanding of the elements of the project and his capability to apply them in his future engineering career.

References:

- Selected References, Scientific Papers, Research Reports, Manuals, Catalogues, Software Packages.

ECS 4117 Database Systems

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to database systems and users, Architecture for a database system, Relational model: Domain, Relations and relational integrity, SQL: The relational database language standard, Database management system and examples such as oracle and access, Database design theory and methodology. Functional dependency and normalization for relational database, Entity/Relationship model (ERM) and enhanced Entity/Relationship model (EERM), Mapping from ER-EER to relational database model, Data protection: Recovery, Concurrency, Security and integrity, Object oriented database. Advanced application in database: Multimedia databases, Distributed database and data mining, Database project: Different applications on database design

References:

- Elmasri and Navathe, Fundamentals of Database Systems, 3rd Ed., Addison Wesley, 2000.

Departmental Course Descriptions

- Date, An Introduction to Database Systems, 7th Ed., Addison Wesley, 2000. and manipulation
- Bagui, S. and Richard Earp, Database Design Using Entity-Relationship Diagrams, CRC Press, 2003.

ECS 4118 Systems Software

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+20+20) + (0+0+0)] = 100

Course Contents

Overview of system software including operating systems, Compilers and interpreters for different languages (procedural, functional, object oriented, portable, scripting, logic, …). Platforms for standalone computers, Levels of interconnection in networks and the web are indicated. Integrated development environments. Basic compiler and interpreter components. Introduction to formal grammars, In particular regular and context free. Lexical analysis or scanning and their finite automata models. Error detection. Syntactic analysis for context free grammars. Operator precedence parsing as a bottom up technique. Recursive descent parsing as a top down technique. Syntactic errors. Applications to C and Java. Code generation and machine-independent code optimization. Some machine-dependent considerations. Interpreters and Pseudo machine compilers. Applications using Java Virtual Machine. Java networking aspects and applets. Compiler-compilers and examples such as YACC for Unix. XML grammar specification and how to develop valid and well-formed XML documents. Parsing XML documents and applications. Integrated development environments with an example (e.g. .NET).

References:

Departmental Course Descriptions

- Fischer, C. N. and Leblanc, R. J., Crafting a Compiler with C, The Benjamin/Cumming Publishing Co., 1991.
- Campione, M. and Walrath, K., The Java Tutorial: Object, Oriented Programming for the Internet, Addison Wesley, 1996.
- Beck, L. L., System Software, 3rd Ed., Addison Wesley, 1997.
- Holzner, S., XML Complete, McGraw Hill, 1998.

Departmental Course Descriptions

ECS 4119 Computer Networks

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to computer networks, Uses of computer networks, Network structure, Network architecture, ISO/OSI reference model, TCP/IP model, Examples of networks, Network topology, Connectivity analysis, Delay analysis, Backbone design, Local access network design, Physical layer, Data communication networks, Telephone system, Integrated services digital network, Asynchronous transfer mode network, Data link layer design issues, Error handling, Elementary data link protocols, Sliding window protocols, Medium access protocols, Network layer design issues, Routing algorithms, Congestion control algorithms, internetworking, Transport layer services and protocols, Examples of transport protocols, Session layer services and protocols, Network security and privacy, Electronic mail, File transfer protocol, World wide web, Network management.

References:

- Fred Halsall, Data Communications, Computer Networks and Open Systems, Addison Wesley, 1996.
- Davie, Bruce S.; Peterson, Larry L. and Clark David, Computer Networks: A Systems Approach, 2nd Ed., Morgan Kaufmann, 1999.
- Hura, G. S.and Singhal, M., Data and Computer Communications: Networking and Internetworking, CRC Press, 2001.
- Tanenbaum, Andrew S., Computer Networks, 4th Ed., Prentice Hall PTR, 2002.
- Tanenbaum, Andrew S., Computer Networks, Prentice Hall, 2003.

Departmental Course Descriptions

ECS 4120 Computer Security

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Overview of computer security (types of computer intrusion, computer and network security, methods of defence). Secure encryption systems (symmetric and public key encryption schemes, AES (advanced encryption standard), RSA standard). Security protocols (key distribution, authentication, and digital signature schemes). Software security (protection from viruses and similar programs, design of secure operating systems, database security). Network security (IP security and the IPSec protocol, firewalls, web security, electronic mail security, network management security aspects).

References:

- White, G. B.; Fisch, E. A. and Pooch, V. W., Computer System and Network Scurity, CRC Press, 1995.
- Cobb Chey, Network Security for Dummies®, John Wiley and Sons, 2002.

Departmental Course Descriptions

ECS 4121 Biomedical Engineering

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to mathematical modeling of physiological systems, Linear system approximation, Stochastic modeling, Cardiopulmonary system models, Myocardial mechanics, Cardiac energy and power analysis models, Models of gastrointestinal tract motility, Models of respiratory mechanics and chemical control of respiration.

References:

- Bronzino, J. D., The Biomedical Engineering Handbook, 2nd Ed., CRC Press, 1999.
- Northrop, R. B., Signal and Systems Analysis in Biomedical Engineering, CRC Press, 2003.

ECS 4122 Industrial Control

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Dynamic elements in the control loop (dead time, capacity, lag), Characteristics of real processes, Nonlinear elements in the loop, Analysis of some common loops (flow control loop-pressure control loop-

Departmental Course Descriptions

liquid level control loop, temperature control loop). Controllers, Linear controllers (PI, PID, complementary feedback controller). Digital control systems, Nonlinear controllers (on, off controller, the dual mode concept, nonlinear PID controller). Improved control through multiple loops, Including cascade control, Multiple output control system, Selective control loops and adaptive control systems. Feed forward control, Ratio control, Dynamic compensation, Effects of interaction, Decoupling.

References:

- Shinskey, F.G., Feedback Controllers for the Process Industries, McGraw Hill, 1994.
- Shinskey, F.G., Process Control Systems: Applications, Design and Tuning, 4th Ed., McGraw Hill, 1996.
- Bateson, Robert N., Introduction to Control System Technology, Prentice Hall, 1999.

ECS 4123 Expert Systems

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Architecture of expert systems and their basic components. Knowledge representation and reasoning (propositional and predicate calculus and resolution as an inferencing mechanism). Probabilistic and graph theoretic considerations related to expert systems (modeling human reasoning, reasoning under uncertainty, The principle of maximum entropy, directed acyclic graphs). Rule based expert systems (representation of uncertainty, inference networks). Typical examples. Causal or belief networks for expert systems (probability propagation, typical examples). Using prolog in expert systems (Prolog's inference engine, backward chaining with uncertainty, forward chaining, applications).

Departmental Course Descriptions

References:

- Merritt, D., Building Expert Systems in Prolog, Springer Verlag, 1989.
- Neapolitan, R. E., Probabilistic Reasoning in Expert Systems, Wiley, 1990.
- Krishnamoorthy, C.S. and Rajeev, S., Artificial Intelligence and Expert Systems for Engineers, CRC Press, 1996.
- Nilsson, N. J., Artificial Intelligence: A New Synthesis, Morgan Kaufmann, 1998.
- Russell Stuart, J. and Peter Norvig, Artificial Intelligence: A Modern Approach, 2nd Ed., Prentice Hall, 2002.

ECS 4124 Local Area Networks

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Local area networks definition and functions, Local area network structure and topology. Transmission media, Protocol architecture and reference model, IEEE 802 standard, Medium access control, Bridges and routers. Logical link control services and protocol mechanisms, Traditional LANs, CSMA/CD Carrier Sense Multiple Access with Collision Detection. Ethernet, Token bus, Token ring, High speed Ethernet-like LANs, Gigabit Ethernet, ATM LANs, Wireless LANs, LAN performance, Performance measures, Factors that affect performance. Network management system, Network management services and protocols.

References:

- Slone, J. P., Local Area Network Handbook, 6th Ed., CRC Press, 2000.
- William Stallings, Local and Metropolitan Area Networks, Prentice Hall, 2000

Departmental Course Descriptions

ECS 4125 Pattern Recognition & Image Processing

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to pattern recognition, Statistical and structural approaches, Recognition rules, Classifiers, Supervised and unsupervised learning, Digital image properties, Image enhancement, Image segmentation, Image compression, Image transformations, Image retrieval.

References:

- Gonzalez, Rafael C. and Woods, Richard E., Digital Image Processing, Addison Wesley, 1993.
- Schalkof, Robert J., Pattern Recognition: Statistical, Structural and Neural Approaches, McGraw Hill, 1997.
- Russ, J.C., The Image Processing Handbook, 4th Ed., CRC Press, 2002.

ECS 4126 Robot Systems

4th Year: Electrical Engineering - Computer & Systems (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

Introduction, Robot arm kinematics, the direct kinematics problems. The reverse kinematics solution. Robot arm dynamics, General dynamic equation, Control of robot arms. Planning of manipulator motion. Robot programming languages: Characteristics of robot-level languages and characteristics of task-level languages. Robot intelligence and task planning. Expert systems and knowledge engineering in robot's applications.

References:

- Health, Fundamentals of Robotics, Theory and Applications, Reston P. C., 1985. Computer & Systems Engineering
- Wolovich, W. A., Robotics, Basic Analysis and Design, Holt, Rinehart and Winston, 1987.
- Chernousko, F. L.; Bolotnik, N. N. and Gradetsky, V. G., Manipulation Robots Dynamics, Control and Optimization, CRC Press, 1993.
- Murray, R.; Li, Z. and Sastry, S., A Mathematical Introduction to Robotic Manipulation, CRC Press, 1994.
- Gorinevsky, D.; Formalsky, A. and Schneider, A., Force Control of Robotics Systems, CRC Press, 1997.

ECS 4227 Computer Controlled Systems

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction, Sampled data systems, Z-transform and its properties, Inverse of Z- transform, Closed loop performance and stability. Computer control schemes: Supervisory and direct digital control systems,

Departmental Course Descriptions

Digital PID control design, Pole placement digital control, Independent regulation and tracking pole placement control. SCADA systems. Real time programming considerations. Applications.

References:

- Astrom, K.J., Computer Controlled Systems, Addison Wisley, 1994.

Departmental Course Descriptions

ECS 4228 Artificial Intelligence

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to AI. Introduction to AI languages. Problem solving, State space representation, Search, Heuristics, Game playing, Knowledge representation, Production systems, Logic, Probabilistic reasoning, Frames. Applications.

References:

- Winston, P.H., Artificial Intelligence, Addison Wesley Publishing Co., 1992.
- Russel and Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 1995.
- Krishnamoorthy, C.S. and Rajeev, S., Artificial Intelligence and Expert Systems for Engineers, CRC Press, 1996.
- Giarratano, Joseph C., Expert Systems: Principles and Programming, 3rd Ed., Brooks Cole, 1998.

ECS 4229 Distributed Computer Systems

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Departmental Course Descriptions

An introduction to distributed computer systems, Architecture of distributed systems, Distributed operating systems for computer networks, Distributed data bases, Distributed problem solving. Foundations of coordinated computing models: Shared variables, Exchange functions, Concurrent processes, Data flow, Communicating sequential processes, Processor management and scheduling techniques, Languages for distributed computing: ADA, Occam or other available languages examples of distributed systems.

References:

- Coulouris George, Dollimore Jean and Kindberg Tim, Distributed Systems: Concepts and Design, 3rd Ed., Addison Wesley Pub. Co., 2000.

ECS 4230 Neural Networks

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to neuro-computing and NN concepts: Definitions, Processing elements. Learning laws: Self adaptation equations, Coincidence learning, Competitive learning, Filter learning and spatiotemporal learning, Data transformation structures, Linear associative networks, Learning matrix network, Recurrent associative networks, Back propagation networks, Counter propagation networks, Boltzmann machine, Dynamic back propagation networks. Overview of verious engineering applications of neural networks.

References:

- Cichocki, A. and Unbehauen, R., Neural Networks for Optimization and Signal Processing, John Wiley and Sons, 1993.

Departmental Course Descriptions

- Fausett, Laurene V., Fundamentals of Neural Networks, 1st Ed., Prentice Hall, 1994.
- Schalkolf, Robert J., Artificial Neural Networks, McGraw Hill, 1997.
- Haykim, S., Neural Network: A Comprehensive Foundation, 2nd Ed., Prentice Hall, 1999.

ECS 4231 Modeling & Simulation

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Simulation of a single server queuing system, Simulation of inventory system, List processing in simulation, Simulation languages, Simulation of time sharing system, Simulation output data and stochastic processes, Random number generators, Building valid and credible simulation models, Verification of simulation computer programs, Perspectives on validation, Practical consideration.

References:

- Karayanakis, N. M., Advanced System Modelling and Simulation with Block Diagram Languages, CRC Press, 1995.
- Law, Averill M. and Kelton, David W., Simulation Modelling and Analysis, 3rd Ed., McGraw Hill Science/ Engineering/ Math, 1999.

ECS 4232 Selected Topics in Computer Engineering

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to current developments in computer engineering, New computer architecture. New software engineering paradigms e.g: Object orientation, Multimedia, Virtual reality systems, Optical computers, GIS, Expert systems, Intelligent information systems, Data mining, Machine translation and natural language understanding, … etc.

References:

- Oklobdzija, V., The Computer Engineering handbook, CRC Press, 2001.
- Hennessy John, L.; Patterson David, A. and Goldberg David, Computer Architecture: A Quantitative Approach, 3rd Ed., Morgan Kaufmann, 2002.
- Selected Articles from IEEE Transactions and Journals on Computers, Software Engineering, Networks, Neural Networks, etc.

ECS 4233 Selected Topics in Systems Engineering

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Selected topics related to the state of art in systems engineering, The course will cover selected advanced topics on: Robust control systems, Optimal filtering and prediction of stochastic systems, Adaptive control, Intelligent control systems.

Departmental Course Descriptions

References:

- Selected Articles from IEEE Transactions and Other Related Journals on Control, Systems Man and Cybernetics, Neural Networks, Fuzzy Systems, etc.

ECS 4234 Real Time Systems

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Synchronous programming, Time and simulation systems, Asynchronous signal processing, Data structures, Multi-independent processes, The operator's console, Event driven scheduling, Applications.

References:

- Lawrence, P.D. and Mauch, K., Real-Time Microcomputer System Design, McGraw Hill, 1987.
- Auslander, David M. and Than, Cheng H., Real-Time Software for Control, Prentice Hall Inc., 1990.
- Laplante, P., Real-Time Systems Design and Analysis: An Engineers Handbook, IEEE Press, 1993.
- Douglass, Bruce Powel, Real- Time Design Patterns: Robust Scalable Architecture for Real- Time Systems, Addison Wesley Professional: Book and CD- ROM Ed., 2002.

Departmental Course Descriptions

ECS 4235 Intelligent Control Systems

4th Year: Electrical Engineering - Computer & Systems (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks: [(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to intelligent control, Introductory fuzzy logic, Fuzzy logic controller structure and design, Self organizing fuzzy logic control. Principles of neural networks, Network topology and learning techniques, Neural networks for control and modeling. Neuro fuzzy control systems, Advanced applications in engineering domain.

References:

- Harris, C. J.; Moore, C. G. and Brown, M., Intelligent Control Aspects of Fuzzy Logic and Neural Nets, World Scientific Publishing Co., 1993.
- Jang, J-S R., C-T S. and Mizutani, E., Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, Prentice Hall Inc., 1997.
- Jain, L.C. and Silve, C.W., Intelligent Adaptive Control: Industrial Applications, CRC Press, 1998.

ECS 3136 Automatic Control

3rd Year: Electrical Engineering - Power & Electrical Machines (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

Introduction, Dynamics of electrical and mechanical systems, Mathematical models, Analogy between electrical and mechanical systems, System equations, Linear models, Derivation of mathematical models from experimental data, State variable approach, Control system components, Transform to frequency domain, Block diagram representation, Signal flow graphs, Stability criteria, Frequency response methods, Bode plots, Nyquist criterion, Root-locus method. Root locus compensation, Domain separation criterion, Cascaded and feedback compensation, Frequency response plots, Design of automatic excitation control and stabilization, Load frequency control, Liapunove's second method.

References:

- Ogata, K., Modern Control Engineering, Prentice Hall, 1980.
- El- Hawary, M., Control System Engineering, Prentice Hall, 1984.
- Franklin, G.F. and Ponell, D., Digital Control of Dynamic Systems, Addison Wesley, 1992.

ECS 3237 Microprocessor & Applications in Power Systems

3rd Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction to microprocessors and its evolution. Architecture: Internal organization, Data and address unit, Buses, Control units, Timing, Assembly language, Fundamentals, Programming, Microprocessor system, Connections, Interrupts and interrupts and interrupt service procedure, Interfacing, Programmable chips, Signal conditioning and data acquisition systems, Applications of several control systems, Measurements, Protection, Electric derives and machines,…etc.

Departmental Course Descriptions

References:

- Greenfield, J. D. and Wray, W. C., Using Microprocessors and Microcomputers, the Motorola Family, John Wiley and Sons, 1988.
- Driscoll, F. F.; Couglin, R. F. and Villanucci, R. S., Data Acquisition and Process Control With the M68HCII Micro controller, McMillan, 1994.
- Rafiquzzama, M., Introduction to Microprocessors and Microcomputer- Based System Design, CRC Press, 1995.
- Triebel, Walter A. and Singh Avtar, The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, 4th Ed., Prentice Hall, 2002.
- Mazidi, Muhammad A. and Gillispie Mazidi, Janice Catherine, 80X86 IBM PC and Compatible Computers: Assembly Language, Design and Interfacing, Vols.1 and 2, 4th Ed., Prentice Hall, 2002.

ECS 4238 Computer Applications in Electric Power Engineering

4th Year: Electrical Engineering - Power & Electrical Machines (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks: [(0+0+0) + (90+35+0)] = 125

Course Contents

Introduction: Power system matrices, Input and transfer matrices, Admittance matrices of the bus bars, Impedance matrices, Circuit representation, Programming, Large system simulation and programming, Power flow studies concepts and methods, Approximate and fast methods, Separation methods, Distribution factors, Transfer methods, Optimal performance, Generation control, Error analysis, Simulation of power system components, Application

References:

Departmental Course Descriptions

- Stagg, G. W. and El-Abiad, A. H., Computer Methods in Power Systems, McGraw Hill, 1968.
- Gross, C. A., Power Systems Analysis, John Wiley, 1979.

ECS 3139 Microprocessors & Applications

3rd Year: Electrical Engineering - Electronics & Electrical Communication (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(90+35+0) + (0+0+0)] = 125

Course Contents

Introduction to microprocessors, Architecture, Microprocessor hardware, Assembly language fundamentals, Programming, Microprocessor system connections, Timing in microprocessors, Interrupts and interrupt service procedures, Microprocessor timing specifications, Interfacing, Programmable chips , Data acquisition systems, Applications of closed loop control, I/O hardware alternatives, Developments tools, Troubleshooting case studies.

References:

- Tokheim, R., Microprocessor Fundamentals, Schaum's Series McGraw Hill, N.Y., 1986.
- Barry Brey, the Intel Microprocessors, Prentice Hall, 2000.

Laboratory: Electronics Lab

- Peripheral Interface Adapter (PIA)
- Microprocessor/DAC interfacing and applications .

Departmental Course Descriptions

ECS 3140 information systems

3th Year: mech. Engineering – Power, 1st term

Hrs/Week: [(2+1)]

(1st Term) Marks:[(50+25+0)] = 75

Course Contents

Introduction, information management, decision making, data base management, reports, questionnaires, inventory systems, planning, Examples, analysis & design of projects, Data communication systems, Network security and privacy, File transfer protocol, World wide web.

References:

- Davie, Bruce S.; Peterson, Larry L. and Clark David, Computer Networks: A Systems Approach, 2nd Ed., Morgan Kaufmann, 1999.
- Hura, G. S.and Singhal, M., Data and Computer Communications: Networking and Internetworking, CRC Press, 2001.

Tanenbaum, Andrew S., Computer Networks, Prentice Hall, 2003

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ARC1001 Architectural Design Fundamentals

Course Contents

An introduction to the theory and practice of architecture as an art and a science. The course covers manual and digital graphic techniques used in the perception of architectural design, basic freehand drawing techniques for architectural perception and design and the introduction to various skills, issues, and methods of thinking that bear directly on architectural design. Frameworks of architectural design, design methodologies, human and environmental factors are discussed. The examination of representative architectural building types enable the comprehension of various techniques and strategies of architectural design.

Definitions of typologies, taxonomies, prototypes, and precedents as the basis for architectural design projects and continuation of development of skills required to investigate and communicate the design process - Introducing the student to a viable understanding of the factors and issues that underlie the translation of human needs and purposes into specific architectural form - Familiarizing students with images of architecture and designs selected from various cultural and historic backgrounds - Specific topics include basic elements, attributes and organizational principles of architectural form and their relationship to design objectives.

ARC1002 Building Construction

Course Contents

The course aims to increase the students' ability to comprehend various building components and behavior, where the student must demonstrate adeptness in acquiring the necessary theoretical background in building technology and developing the ability to identify basic building requirements in order to achieve better construction efficiency. The course covers the following topics: Building systems- wall bearing and skeleton systems; basic concept, main components, loads and structural behavior. Foundations- concept, types of foundations: isolated and continuous footings/ raft/ piles. Walls and partitions- types of bricks, stones, masonry and ashler/ wall details: coping, lintels, skirting, etc.

Departmental Course Descriptions

This course is a continuation to develop the students' ability to comprehend building components, loads and behavior: ceilings and roofs: basic concepts, construction systems. / damp proofing: concept, materials and details./ stairs: basic concepts / construction requirements / finishing materials and details.

ARC1103 Visual Studies and Theory of Color

Course Contents

Visual Studies: Introduction to the elements, principles and techniques of design that underlie and inform the analysis, creation and evaluation of visual compositions and are crucial to the design process and creative of form-making. The study of selected topics pertaining to the perception of visual compositions. The study of visual compositions entailing point, linear, two- and three-dimensional elements or their combinations. The study of color and its influence on visual compositions. A variety of studio exercises are utilized to apply the knowledge and skills acquired.

Theory of Color: The course introduces the basic principles, properties and stimulus of color and physiological aspects of vision. Topics include the nature, source, and perception of color sensation, color dimensions and optic system. The course will also investigate various color theories such as Munsell and Ostworlds, color relations and schemes. A variety of studio exercises are used for applications.

ARC1004 Computer in Architecture

Course Contents

This course introduces the fundamentals of three-dimensional geometric modeling and associated computer-aided design and visualization applications in architecture, urban design and computer graphics

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production. It provides a theoretical foundation, an introduction to an array of current hardware and software tools, and an opportunity to explore space and artifacts through a digital representation project.
This course introduces the fundamentals of three-dimensional geometric modeling and associated computer-aided design and visualization applications in architecture, urban design and computer graphics production. It provides a theoretical foundation, an introduction to a selection of current hardware and software tools, and an opportunity to explore space and artifacts through a digital representation project.

ARC1105 Theories of Architecture (1)

Course Contents
The course provides an introduction to architectural theories, encompassing the definition of architecture and notions that have determined the forms of the built environment. Topics include the classical elements of architecture, theories of building types, theories of styles and forms. Study of design principles: unity, composition, proportion, balance, rhythm, repetition, contrast, orders, scale, symmetry, and hierarchy. The course introduces the principles and elements of form and the relationship between form and space, and the properties of space.

ARC1206 Shade-Shadow and Perspective

Course Contents
The aim of the course is the development of students' capabilities for visualization and presentation of architectural ideas by scientific methods.
Shade and shadow: The course introduces the principles of shade and shadow - Shadow of point, lines, plane, volume, and circle. Exercises on shade and shadow of architectural elements, shadows of circular solids and shadows on buildings, etc.
Perspective: The course introduces systems and methods of perspective drawing. Study of two-point perspective of simple objects, outdoor and indoor view of building, etc. One point and three point perspective of forms and buildings. Study of principles of perspective drawing with CAD techniques.

Departmental Course Descriptions

ARC1207 Environmental Control in Buildings

Course Contents

This course addresses human needs and comfort in relation to the natural and man-made environments. It shows how environmental factors may be utilized, controlled and modified as an integral part of architectural design. Specific topics include: climate and weather; psychrometrics; solar radiation; wind patterns; heat gains and losses; air circulation in and around buildings. Study of the environmental factors that affects architectural design. Methods of protection from environmental factors and architectural treatment (building form, orientation, natural ventilation in buildings, building material, openings etc..). The course shows the climatic regions of Egypt and its characteristics.

ARC2008 Architectural Design (1)

Course Contents

The course involves the study of the factors and issues that underlie the understanding of the rendition of human needs and purposes into significant architectural forms. The course presents architectural design as a synthesis of environmental concerns, behavioral responses, functional requirements and technical systems. The course focuses on the architectural design process and its stages. Emphasis on the development of insight into the solution of building design problems: how they are studied (analysis), how they are approached and carried through (process) and how they are conceptualized and developed (synthesis). Issues of form and space, circulation patterns, geometry, space requirements, and structure systems, are explored through studio design exercises, projects and discussions.

Departmental Course Descriptions

This course aims to develop the student awareness and understanding of design theories with regard to the aspects of architectural problems, exploration and appropriate use of architectural ordering system, and understanding and the application of various analytic and design processes and methods. The course emphasizes the stimulation of creative abilities and the development of skills integral to the architect. The course focuses on the context and the influence of cultural and social factors on design. Course studio work focuses on the preparation and presentation of design projects that emphasize the acquisition of representational and analytical skills, and the development of ingenuity in design involving consideration of program, space, site context, character, symbolism, and structure, in addition to research subjects.

ARC2009 Execution Design (1)

Course Contents

This course aims at increasing students' knowledge of various finishing materials, their requirements and their methods of application. These include materials used on floors, walls and ceiling (criteria for application and maintenance). The course also covers building openings: doors and windows (basic concepts, materials and construction details).

This course is explores the various principles of execution design, the preparation of working drawings and schedules for openings and finishing materials through a application involving a small scale architectural project. It is also concerned with drafting and presentation techniques

ARC2110 Theories of Architecture (2)

Course Contents

This course presents the range of material factors (physical, cultural, social, and historical) that condition the formation of architecture and their interaction with the ideologies (interpretive, theoretical, and critical) that elaborate these factors at particular times. This attains the objective of introducing the disciplines of architecture, its distinct mode of thought and operation, recent history, and relation to other spheres of

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cultural production, such as art, science, technology, and politics by addressing issues related to the development of architectural theory.

ARC2111 Lighting

Course Contents
This course deals with kinds of lamps and its components, in addition to the various lighting systems and the classification of lighting according to qualitative and quantitative standards. Further more the course focuses on one of the methods of lighting calculation, by which the number of and type of fixtures could be determined according to the different architectural spaces

ARC2212 landscape

Course Contents
The course teaches the student the principles of landscape and its integration with the architectural design which achieves the best utilization of site and save the natural environments and uses it .
The course exposes studying the importance of landscape and saving the natural environment and studying different environments – studying different models of dealing different cultures with gardens and external urban spaces – landform – water and its uses in out door spaces – use of plant material – pedestrian circulation – paved eras – principles of external spaces formation – the complete design study to produce a complete landscape project – training the student how to prepare the landscape of a site

ARC2113 Sanitary Installations

Course Contents

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This course provides the student with a thorough knowledge of the components of the different sanitary conventional and modern systems (supply or waste). The course deals with the design concept of these systems and how it could affect the architectural design of sanitary spaces and its details; also it focuses on the execution phase to give the student a complete awareness of what is going to be faced in the real life in different sites.

ARC3014 Architectural and Interior Design

Course Contents

Architectural Design: This part provides the student with knowledge, experience and skills required in analyzing and solving problems within the context of various architectural projects, with the intention of further developing the student's ability in the formation of spaces in complex building types and urban spaces that include diverse elements. The course also provides an understanding of the formative influence of building structure, construction and materials and of architectural strategies for environmental considerations.

Interior Design: The part aims at developing the students' skills with regard to the design of interior spaces through the exploration of the associated concepts and contemporary design movements. Principles of interior space design and formation and influential factors such as visual perception, color, functional requirements and physical determinants are examined through practical exercises.

Architectural Design: This part continues to develop the student's analytical, problem-solving, conceptual, design and presentation skills. The integration of the structural and environmental control courses and their relationship to architectural form, function, space and orientation are stressed. The course also explores the physical, social, economic, cultural, historic and symbolic context of architecture and other major technical, legal and human factors which shape the urban environment; the relationship between the individual building and the setting in which it exists.

Interior Design: This part aims to explore the application of architectural treatments in interior spaces with detailed studies focusing on interior design elements and associated systems. Aspects involved in the execution of interior design including finishing materials, technical installations, furniture design are incorporated in practical exercises.

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ARC3015 Execution Design (2)

Course Contents
This course aims to develop students' ability to comprehend basic building components and construction details leading to the practical execution of building projects, whereby students are required to present a complete set of construction documents for a public-use architectural project. The course focuses on integrating the design concept and functional aspects of the building with the various systems and technical installations (electrical, plumbing, mechanical and HVAC) that govern its operation.
This course aims to enhance students' ability to achieve an adequate understanding and coordination for various techniques of building components and finishing methods in relation to other technical installations. Students are to undertake professional drafting and presentation techniques, both manually and digitally (CAD).

ARC3116 Theories of Architecture (3)

Course Contents
The course provides an overall perspective of modern architecture through the review, analysis and criticism of concepts, philosophies, ideologies, and models such as Functionalism, Internationalism, Deconstruction and Post-modernism that promulgated contemporary architectural design and represent the foundation of modern architectural thought. The course explores issues of the integrity of structure and form, the nature and expression of materials, environment and context, the relation of moral and political issues to architectural expression, the role of formal themes, and the nature of meaning in architecture.

ARC 3017 Method of upgrading and conservation

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Course Contents
The course aims to introduce the meaning of upgrading urban environment as a socio-economic urban approach to solve the problems of deterioration zones in developing countries, the meaning of re-habitation as a meaning of conservation and acrivate the efficiency of reutilization of historical, civilized and valuable areas. The course contains meaning of urban development reasons for urban deteriorations-fast urbanization and its negative effects upon communities types of communities which needs developments recent information about upgrading urban environment studing the Egyptian experiences in the field of upgrading informal housing- positives and negative aspects in informal zones effeort the government to sole informal housing and communities.

ARC 3018 Building Rehabilitation

Course Contents
The course aims to teach the student the approaches of developing communities with emphasis on the rural communities in the Egyptian villages. The course contains the development of the role of villages from the socio-economic urban aspects- actual conitions , variables, constanta and the character of villages- methods of development as urbaneconomic meaning directions of village's growth and extension- rural housing. The course also includes studing types and models of Egyptian villages and makes complete set of studies and analysis.

ARC 3019 Building Technology and Construction Systems

Course Contents
The course aims to study the advanced building technologies and methods developed and recent construction and application. The course contains: technology concepts and definitions- historical background- building technology in sites- mechanical methods- machinery- mechanical execution- prefabrication technology- mass production and prefabrication- construction systems selection-

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ARC 3020 Computer in Architecture

Course Contents
The course aims to study the advanced directions and approaches to the computer-adided design models and artificial intelligent design systems. The course contains: AI design systems- types of expert design systems- design facts- interpretive design knowledge; translative design knowledge; generative design knowledge; control systems or design reasoning technique- principle of model design- principles of how to design a model- components of expert design systems.

ARC 3021 Environmental Planning and Design

Course Contents
The course aims to enhance and developed environmental design and planning skills, with emphasis on the tools and techniques to support architectural and planning for generation processes to introduce solar and natural energy& pollution control studies together with integrated systems in and around buildings. The course contains: environmental levels and sttings review- climatic regiogs in Egypt. Features, design- and development recommendations- integrated environmental design- energy conservation principles- comfort indicators and human needs- ecological systems- storm water- pollution and pollution, moving sands, coastal protection, lighting- non fossil and natural energy- solar energy. Methods and performance- uses and applications

ARC3222 Urban Planning and Housing

Course Contents

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This course is an introduction to the bi-disciplinary studies of urban planning and housing. It addresses the basic definitions, objectives and fundamentals in the two closely related fields. Issues covered include the theories of planning practice and Housing studies at the urban level of towns and cities. The course also presents an overview of the following principal topics:
Urban Planning: Components of urban environments, site analysis, urban conservation, urban networks and processes, public participation and sustainable development.
Housing Studies: Factors affecting the housing field, typologies, economic and socio-cultural dimensions and context considerations.

ARC3223 Quantities and Specifications

Course Contents
The course aims to develop students' ability to compose specification documents concerning building materials, construction work, execution methods leading to the issue of project tenders, bills of quantity, general regulations, price spreadsheets and their analysis. The course includes practical applications involving the previous documents.

ARC4124 Architectural Design (2)

Course Contents
This is an advanced studio course, focusing on intensive, progressively elaborated architectural design problem. The course addresses architectural problems/projects of increasing scale and complexity to be tackled within the context of modern technologically advanced applications to reinforce skills in all aspects of architectural design.

ARC4125 Execution Design (3)

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Course Contents

The objective of this course is to explore the relationship between the ideas behind public building projects and the process of realizing these ideas in architectural terms. The course explores "design" as a process that extends through to the completion of a building, where "detailing" is an integral part of the design process and in which the nature and assembly of the parts can be informed by or can inform the collective design issues of the building as a whole. The course emphasizes the selection of materials, integration of services and installations, their construction details both inside and outside the building

ARC4126 Research Methodology and Programs

Course Contents

This course provides a foundation for architectural research by introducing students to the methods and techniques used to investigate architectural topics, and architectural programs and by presenting a critical review and evaluation of these methods. The course aims to train students to conduct research from an initial proposal; carry out an appropriate research methodology; draw conclusions from the research and relate those conclusions to the original proposition; and write up and produce a formal research.

ARC4127 Theories of Architecture and Criticism

Course Contents

This course examines contemporary architectural theory and criticism through the presentation and study of significant texts and buildings of the present and recent past and the architectural philosophy of contemporary architects. The goal of the course is to introduce and investigate the formal, technological, social, political, and philosophical debates at issue within the discipline. The course Introduces the principles of architectural criticism, and evaluation of architectural projects. Students learn to evaluate and

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articulate the interactions between theory and practice and develop tools of analysis and critique, thereby enabling them to formulate and assess strategies for the formation of architecture.

ARC4228 Graduation Project

Course Contents
Students are required to select one architectural topic of their choice, get approval from course tutors, and under supervision carry out research and formulate a detailed program for the proposed project. The submitted architectural project should reflect the use of creative ideas and new philosophy to address architectural problems/concerns. Special consideration ought to be paid to innovative approaches and solutions based upon place-specific aspects such as social, economic, structural, environmental, and cultural. The process should also combine design concepts with advancement in science and technology, as to produce a contemporary architectural product.

ARC4x29 Landscape

Course Contents
An overview of the fundamentals of landscape architecture, within the framework of the relationship between landscape and architectural design. Students are introduced to the study of exterior spaces as they relate to and complement building design, through the exploration of the theoretical and historical background of landscape design, site analysis, environmental issues and vegetation types. Associated fields include the study and classification of landscape elements, landform, plant life, microclimate, land use and preservation, landscape design methods, as well as the study of aesthetic and functional values. Selected projects cover a scope that includes open areas of variable scale.

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ARC4x30 Contemporary Arts

Course Contents
This course aims to define and classify art in its various forms with specific emphasis on the artistic movements of the Renaissance and Modern eras. The course also discusses the correlation between art and its architectural counterparts encompassing the relationship between traditional art and architecture and the influence of the modernist movement on architectural design.

ARC4x31 Heritage Preservation

Course Contents
This course provides a comprehensive introduction to the problems and methods of historic preservation in urban, suburban and rural environments. A conceptual framework is advanced for comprehending and managing the full range of problems and techniques encompassing the field of historic preservation. Topics include the development of historic preservation, together with its international parallels and antecedents; problems of urban, suburban and rural preservation; techniques for developing, conducting and evaluating comprehensive surveys of preservation resources; national, state and local governmental programs; legal and economic aspects of preservation; historic district zoning and neighborhood preservation.

ARC4x32 Architecture and Environment

Course Contents
This course aims to define the principles of environmental design in architecture while providing a combination of knowledge, experience and facilities which enable students to relate ecological awareness to innovation and design. The relationship between Built and Natural environments is explored and specific solutions are created. Topics include the environmental analysis of a site, ecological systems and processes,

Departmental Course Descriptions

the fundamental and design principles of sustainable architecture in addition to various related topics of current interest.

ARC4x33 Site Analysis Studies

Course Contents
The course aims to study the aspects that affect site properties for various projects and methods of analytical site study and selection. Issues include climatological and topographical factors, transportation networks, traffic levels, land use, infrastructure and public utility capability in addition to service provision in the surrounding urban area. Building density, forms as well as the legal aspects that govern building and urban planning regulations are also investigated.

ARC4x34 Construction Project Management

Course Contents
An introduction to the techniques and tools of managing the design and implementation of large construction projects. Topics include management tools, cost-control and budgeting systems and professional roles. The course defines and classifies aims, responsibilities, organizational structures, time scheduling methods, implementation programs, related documentation, theories and operating methodologies. Case studies illustrate the application of techniques in the field.

ARC4x35 Construction and Building Technology

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Course Contents
The course presents the various systems and techniques employed in the execution of building projects, principles of the mechanization in the construction process and pre-fabricated systems, including an overview of related mechanical equipment. Various systems are compared and evaluated in terms of appropriateness to local applications. Modern developments in execution techniques are also investigated.

ARC4x36 Design of Rural Communities

Course Contents
The courses defines the nature of rural communities and outlines design approaches through the evaluation of rural development projects in Third-World nations, particularly the Egyptian experience in community development and rural house upgrading. General approaches to development that emerged during the 1950s to the 1990s, as well as the current policies employed in the development of Egyptian rural communities are discussed with regard to the various socio-economic factors which have resulted in the trend of increasing urbanization of these areas.

ARC1137 Architectural construction

Course Contents
Introduction to building- systems and construction materials (bricks and stones) – architectural building elements (walls)- finishing materials for floors, walls and ceiling. External finishing materials for buildings- insulation in materials against water and moisture – principles of designing and finishing staircases and staircases.

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Departmental Course Descriptions

CES1001 Structural Analysis (1)

1st Year: Civil Engineering. (cont.)

Hrs/Week: [(4+2) + (3+2)]

Marks:[(100+50+0) + (85+40+0)] = 275

Course Contents

Types of structures and supports- Reactions– Elastic stability– Analysis of statically determinate beams, frames and trusses– Internal forces. Influence lines for statically determinate structures– properties of plane section– stresses and deformations for axially loaded members– normal stresses due to axial forces and biaxial moments.

CES1002 Plane Surveying

1st Year: Civil Engineering. (cont.)

Hrs/Week: [(4+2) + (3+3)]

Marks:[(90+30+30) + (90+30+30)] = 300

Course Contents

Classification of surveying sciences– Units of measurements– Drawing scales– Types of surveying maps– Distance measurements– Compass measurements– Angels measurements– Coordinate systems– Setting out of points. Areas and land division– Calculation of quantities for land leveling– Methods of determination of difference in elevation– Gird leveling– Contour line– Theodolite and vernier– missing observations– Theodolite traverses.

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CES1103 Properties and Testing of materials (1)

1st Year: Civil Engineering. (1st Term)

Hrs/Week: [(4+2) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Loads and stresses– Deformation and strains– Relation between stress and strain– Testing machines– Tests– Standard specifications– Aggregate– Cement– Reinforcing steel– Mixing water and admixtures– Timber– Bricks– Lime– Gypsum– Plastic– Insulation materials.

CES1204 Civil Drawing

1st Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+4)]

Marks:[(0+0+0) + (90+60+0)] = 150

Course Contents

Notation, dimensions and scale–Drawing of simple steel structures and connections of steel bridges– Drawing of concrete structures (cross sections for columns, beams, slabs, frames, and foundations– reinforcement details)– Retaining structures– Earth works (cross sections of canals, drains, roads, railways and non-rigid dams)– Irrigation structures (bridges– weirs– regulators– syphons– aqueducts–culverts)– Applications using Computer Aided Design (CAD) software.

CES1205 Engineering Geology

1st Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+1)]

Marks:[(0+0+0) + (50+25+0)] = 75

Course Contents

Engineering classification of minerals and rocks– Faults , folds and joints– earthquakes– Geological maps– engineering properties of rocks– weathering and related problems– Geophysical applications.

Departmental Course Descriptions

CES2006 Structural Analysis (2)

2nd Year: Civil Engineering. (cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(85+40+0) + (85+40+0)] = 250

Course Contents

Shear stresses in solid and hollow sections– Shear flow and shear center– Torsion of solid and hollow members with thin or thick walls– Combined and principal stresses– Properties of plastic section– Displacement calculations**.** Displacement calculation using virtual work– Analysis of statically indeterminate structures using consistent deformation for beams and three moment equations and its applications– Analysis of simple and continuous beams under moving loads– Buckling of column– Plastic analysis of beams and frames.

CES2007 Design of Reinforced Concrete Structures (1)

2nd Year: Civil Engineering. (cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(85+40+0) + (75+25+25)] = 250

Course Contents

Structural system– Statical system of floor elements– Absolute bending moment and shearing force diagrams– Load distribution– Introduction to methods of design– First principle design of reinforced concrete section subjected to flexure using limit state design method– Bond and anchorage between steel and concrete– Development length of reinforcement– Design of statically determinate beams– Details of reinforcement of beams– Shear stresses of beams. Using limit state design method for the design of continuous beams, solid slabs and short and long columns– Design of sections subjected to eccentric forces– Serviceability limit states and cracks control– Design of section subjected to biaxial bending– Design of reinforced concrete walls– Introduction to the design of concrete members using working stress design method.

CES2108 Properties and Testing of Materials (2)

Departmental Course Descriptions

2nd Year: Civil Engineering. (1st Term)

Hrs/Week: [(4+3) + (0+0)]

Marks:[(100+40+35) + (0+0+0)] = 175

Course Contents

Concrete technology– Properties and testing of fresh and solid concrete– Different types of concrete– Design of concrete mix– Non destructive tests for concrete– Quality control– Properties of metallic materials under the effect of impact, fatigue and creep– Theories of failure of materials– Flexure beyond elastic limit.

CES2109 Fluid Mechanics

2nd Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Introduction on fluids and mechanics of fluids– Engineering system – Properties of fluids – Fluid statics– Hydrostatic pressure and its applications–Fundamentals of fluid flow – Continuity equation– Energy equation and its applications– Momentum and forces in fluid flow and their applications–Similitude and dimensional analysis – Pipe flow– Pipe networks– friction and local losses– water hammer.

CES2110 Hydrology

2nd Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(85+40+0) + (0+0+0)] = 125

Course Contents

Departmental Course Descriptions

Introduction to water balance and hydrologic cycles– Computational methods and statistics– Surface hydrology: (Precipitation– Meteorology– Water shed characteristic– Hydrograph– flow measurement– Flood and flow routing)– Groundwater hydrology: (Groundwater reservoirs– Confined and unconfined seepage flow– Design of wells– Groundwater management)– Flood and storm management– Hydrology of the Nile river– Introduction to water quality and its elements.

CES2211 Topographical Surveying

2nd Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (4+3)]

Marks:[(0+0+0) + (100+40+35)] = 175

Course Contents

Tachometric surveying– Electronic measuring devices– Drawing methods of contour lines– Drawing using computers and digital maps– Horizontal curves– Vertical curves– Theory of errors– Arial surveying– Remote sensing– Image interpretation and its engineering applications– Geographic Information System– Application of surveying in engineering projects.

CES2212 Soil Mechanics (1)

2nd Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Properties of soil– Classification of soil– Permeability– Stresses inside soil– Shear strength– Soil consolidation– Settlement.

CES2213 Irrigation and Drainage Engineering

2nd Year: Civil Engineering. (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to irrigation and drainage– Sources of irrigation water– Soil water relationship– Assessment of plant water requirements using different methods– Water duties– Irrigation losses and irrigation efficiencies– Different irrigation methods– Different drainage methods– Design of surface irrigation system in Egypt– Synoptic diagram– Design of longitudinal and cross sections of water courses– Irrigation in Fayum– Irrigation development projects– GIS application in water consumptive use– Factors affecting the quality of irrigation and land reclamation– Modern irrigation systems (sprinkle and trickle irrigation)– Tile drainage– Summary of some advanced projects– Lining and maintenance of canals– Drainage stations.

CES3114 Theory of Structures

3rd Year: Civil Engineering. (1st Term)

Hrs/Week: [(4+3) + (0+0)]

Marks:[(125+50+0) + (0+0+0)] = 175

Course Contents

Displacement determination for statically indeterminate structures using the virtual work method– Analysis of statically indeterminate structures using: Consistence deformation, Slope deflection, and Moment distribution– Introduction to dynamics of structures– Free vibration analysis and forced vibration for single degree and multi degrees of freedom

CES3015 Design of Reinforced Concrete Structures (2)

3rd Year: Civil Engineering. (cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(85+40+0) + (75+25+25)] = 250

Course Contents

Departmental Course Descriptions

Design of sections subjected to torsion– Design of plate slabs– Ribbed and hollow blocks slabs and paneled beams.
Long span structures– Structural system– Frames– Design of frame base, Arches, Saw-Tooth slab, and Structural joints.

CES3016 Design of Steel Structures

3rd Year: Civil Engineering. (cont.)

Hrs/Week: [(2+2) + (3+2)]
Marks:[(70+30+0) + (75+25+25)] = 225

Course Contents

Steel properties –Loads and structural system – Design of tension and compression members, wind bracing, trusses and weld connections– Bolted ordinary connections. Connection with high strength bolts- Bases- Rolled and plate girders subjected to dynamic loads- Beam column- Rigid frames- Lateral torsional buckling- Introduction to composite structures.

CES3117 Soil Mechanics (2)

3rd Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]
Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Lateral earth pressure– Bearing capacity under shallow foundation– Stability of earth slopes– Retaining walls.

CES3118 Transportation and Traffic Engineering

3rd Year: Civil Engineering. (1st Term)

Departmental Course Descriptions

Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+20+20) + (0+0+0)] = 100

Course Contents

Urban planning– Objectives and goals and transportation planning stages– Traffic studies (volume, speed, density, and travel time delay)- Traffic flume characteristics- Interception control.

CES3119 Hydraulics

3rd Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+4) + (0+0)]

Marks:[(125+25+25) + (0+0+0)] = 175

Course Contents

Open channel flow (regime of flow and channel properties, uniform flow, gradually varied flow, computation of gradually varied flow curves, rapidly varied flow and hydraulic jump, unsteady flow and wave propagation)- Hydropower stations- Pumps and turbines.

CES 3220 Foundation Engineering (1)

3rd Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (85+40+0)] = 125

Course Contents

Shallow foundation: Spread footings- Combined footings- Footing subjected to moments- Strip footings- Mat foundation- deep foundation: Classification- Bearing capacity of deep foundation- Design of piles- Settlement of pile group- Piles subjected to lateral loads- Design of pile caps.

CES 3221 Design of Irrigation Works (1)

3rd Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (4+4)]

Marks:[(0+0+0) + (150+50+0)] = 200

Course Contents

Departmental Course Descriptions

Introduction to irrigation structures- Design of retaining walls- Small-span bridges- Intersection of roads and channels- Culverts- Aqueducts- Siphons- Tail escapes- Spillways- Introduction to hydraulic tunnels.

CES 4122 Design of Reinforced Concrete Structures (3)

4th Year: Civil Engineering. (1st Term)

Hrs/Week: [(4+2) + (0+0)]

Marks:[(100+25+25) + (0+0+0)] = 150

Course Contents

Pre-Stressed concrete- Design of marine structures- Design of shallow and deep tanks- Design of elevated, ground, and underground tanks- Design of shell structures (domes, cones,….)- Design of folded slabs.

CES 4123 Sanitary Engineering

4th Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(85+40+0) + (0+0+0)] = 125

Course Contents

Statistical methods in sanitary engineering- Water supply works- Preliminary studies for wastewater systems and structures- Water resources and collection- Treatment and recycling of wastewater- Water treatment and storage- Sources of wastewater- Water Distribution and networks- Solid waste collection, sorting, treatment and recycling.

CES 4124 Design of Irrigation Works (2)

4th Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+3) + (0+0)]

Marks:[(100+40+10) + (0+0+0)] = 150

Course Contents

Departmental Course Descriptions

Seepage theory and fundamentals of flow through porous media- Seepage beneath hydraulic structures- Erosion and sedimentation downstream hydraulic structures- Weirs- Barrages and regulators- Gate operation- Reservoir classification and storage operation- Types of locks- Systems of loading and unloading of locks- Types of dams (rigid and non-rigid)- Stability of dams.

CES 4125 Highway Engineering

4th Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Classification of roads- Planning and route selection- Geometric design criteria- Planning and design of intersection- Design and characteristics of asphalt mixes- Design of pavement and concrete roads- Surface drainage of roads.

CES 4126 Foundation Engineering (2)

4th Year: Civil Engineering. (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Sheet piling- Introduction to tunnels- Caissons- Dewatering- Earthquake effect on soil-Foundation- Dams.

Departmental Course Descriptions

CES 4227 Computerized Structural Analysis

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (60+20+20)] = 100

Course Contents

Stiffness method of the analysis for beam– Frames and trusses in plane and space and its computer applications– Applications using available software packages.

CES4228 Metallic Bridges

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (75+25+25)] = 125

Course Contents

Floors of railway bridges- Bracing of longitudinal beams and bracing of braking forces- Design of composite and plate girder bridges.

CES 4229 Railways Engineering

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Dynamics of train movement- Railway scheduling- Geometric design of Railway- Structural design of railway- Signals- Turnouts and switches- Stations and yards- Railway cost.

CES4230 Airport Engineering

4th Year: Civil Engineering. (2nd Term)

Departmental Course Descriptions

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Types and properties of airplanes- Design of runways- Design of subways- Structural design of airports in general- System of lights, drainage, and traffic signals- Design of aprons.

CES4231 Systems of Traffic Management

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Definition of management and traffic operation- Traffic planning- Traffic operating signals- Light signals- Parking control- Traffic tidal effect- Improvement of cargo transportation services.

CES4232 Remote sensing and Applications

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Basics and principle of remote sensing and applications– Advantages of remote sensing and application– Control and check of location– Systems of receive industrial satellite– Software packages and equipment for analysis of satellite images.

CES4233 Water and Sanitary Network

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Construction of water supply networks– Types of pipes and network accessories for supply and sewage networks– Construction of wastewater network – Statistical methods in sanitary engineering.

Departmental Course Descriptions

CES4234 Geodesy and Satellite Surveying

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

3-D coordinate computations and transformations- Coordinates determination using different GPS techniques- GPS operation planning- Remote sensing basics and principles- Elements of photography process- Types of microwave and radars- Terrestrial monitoring.

CES 4235 Soil Improvement

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Engineering need for soil improvements: Geotechnical problems with soft and loose soils- soil improvement techniques: mechanical stabilization (densification), Deep and shallow compaction techniques- soil parameters after densification and pre-loading (Consolidation analysis: pre-loading with and without drainage)- Design and construction of soil reinforcement- reinforcing materials: physical and mechanical properties, utilization method, advantages and limitation- grouting properties and techniques- criterion for choosing suitable techniques.

CES4236 Special Topics in Reinforced Concrete Design

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

One or more topic , from the following , should be chosen : High – rise building – Precast building – Yield line theory – Beam column joint – Design of silos- R.C. bridges- Water structures.

CES4237 Inspection and Quality Control

Departmental Course Descriptions

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Technical investigation– Procedures of quality control– Statistical control for concrete– Non destructive tests for concrete.

CES4238 Earthquake Engineering

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Properties of earthquake– importance of earthquake studies in Egypt– Response of structures with first degree of freedom to different dynamic loads– Design code– Computer application for calculation of earthquake forces– Introduction to seismic isolation– Analysis of temporal domain.

CES4239 Plastic Design of Steel Structures

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to plastic analysis– Properties of plastic sections– Analysis of structures under ultimate load– Plastic design of beams and frames.

CES4040 Project

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(1+2) + (1+4)]

Marks:[(0+50+0) + (50+50+50)] = 200

Course Contents

Departmental Course Descriptions

The projects should be offered from among structures, public works and water resources sub-specialties.

HUM1131 The Engineer and Environment

1st Year: Civil Engineering. (1st Term)

Hrs/Week: [(2+0) + (0+0)]

Marks:[(40+10+0) + (0+0+0)] = 50

Course Contents

Development of construction methods and materials– Development of the usage of water sources– Development of transportation– Development of general works– Relation between engineering and environment– Limiting the natural catastrophic effects as a result of engineering civilization.

HUM2132 Applied Statistics

2nd Year: Civil Engineering. (1st Term)

Hrs/Week: [(2+1) + (0+0)]

Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Analysis of a single variable data– Analysis of multiple variable data– Probability distribution– Random numbers and variables– Simulation using Monte–Carlo Procedure**.**

HUM2233 Engineering Economy

2nd Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Investment calculation– Different method for economic comparison– Optimization of the use of assets– Sensitivity analysis– Applications in the construction filed– Effect of inflation.

Departmental Course Descriptions

HUM 3234 Construction Project Management

3rd Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (3+2)]

Marks:[(0+0+0) + (85+40+0)] = 125

Course Contents

Different methods of preparing the time schedules– Construction project organization by owner and contractor- Planning of construction project- Types of construction contracts and bidding methods- Cash-flow for construction project- Cost estimation of construction project and bidding preparation- Bidding competition control- Follow-up of construction project- Conditions of construction contracts.

HUM 4235 Specifications & quantity

4th Year: Civil Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]

Marks:[(0+0+0) + (70+30+0)] = 100

Course Contents

Introduction to the writing of specifications documents presented with working drawings as part of the contract documents- General and special conditions of the job- Defining the scope of work and detailed descriptions of items and materials- Quantity surveying (rules and methods), check listing the finished work and detecting faulty items.

Departmental Course Descriptions

COURSES ALLOCATED TO OTHER DEPARTMENTS

CES1241 Structural Engineering (1) (properties and testing of materials)

1st Year: architecture Engineering. (2nd Term)

Hrs/Week: [(0+0) + (1+1)]

Marks:[(0+0+0) + (35+15+0)] = 50

Course Contents

Non metallic building materials e.g, building stones, bricks, aggregate materials, cement, timber, glass and their physical, and mechanical properties- Standard of testing materials- Introduction to fiber and composites laminates and light gauges steel, mild and high tensile steel, copper, aluminum and their mechanical behavior under static tensile and axial compression- Shearing and hardness testing machines and strain gages- Devices specified in quality control technique in building industry construction materials– Design consideration and criteria– Design loads– Allowable stresses.

CES1142 Surveying

1st Year: architecture Engineering. (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(60+15+25) + (0+0+0)] = 100

Course Contents

Surveying classifications– Principals of surveying- Mapping using linear measurements- Mapping using prismatic compass– Plane table surveying– Horizontal and vertical angle measurement– Open, closed and connecting traverses– Traverse networks and their adjustment– Cadastral survey and map classification– Setting and of projects– Computation of areas and land division– Hydrographic surveying.

CES2043 Theory of Structures

2nd Year: architecture Engineering. (cont.)

Hrs/Week: [(2+2) + (2+2)]

Marks:[(35+15+0) + (55+20+0)] = 125

Course Contents

Departmental Course Descriptions

Study of the principles of statics for structures- Introduction to principle theories of structural systems- Concepts of structural behavior for building systems (reactions, equilibrium, stability, stiffness)- Static analysis of forces- Study of internal and external forces and analytical solutions for rigid stable bodies- Diagrams of internal forces (bending moments, shear forces, normal forces).
Methods of calculating structural deformations and deflection of statically determinate beams- Introduction to statically indeterminate structures- The analysis of statically indeterminate structures by the method of superposition and the method of three moment equation- Analysis of plane internal stresses (types of stresses, properties of areas, distribution of normal stresses, shear stresses, bending and torsion, buckling of columns).

CES2144 Soil Mechanics and Foundations

2nd Year: architecture Engineering. (1st Term)

Hrs/Week: [(2+0) + (0+0)]

Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Properties and mechanics of soil- Soil classification- Soil compaction- Stress transmission through soil- Soil consolidation- Theory of strengthening- Lateral earth pressure- Design of shallow foundation- Deep foundation- Retaining walls- In-situ soil investigation and the choice of suitable foundation.

CES3045 Structural Engineering (2)

3rd Year: architecture Engineering. (cont.)

Hrs/Week: [(1+1) + (1+1)]

Marks:[(50+25+0) + (50+25+0)] = 150

Course Contents

Reinforced Concrete: Fundamentals of reinforced concrete structural design- Analysis and design of section subjected to bending- Load distribution- Details of beam reinforcement- Solid slabs- Columns-

Departmental Course Descriptions

stairs- Frames- Ribbed slabs- Slabs with beams- Joints of precast reinforced concrete element- hollow block slab- plane slab.
Steel Structures: Fundamentals of steel structure design- material of construction- standards of design- Loads- Allowable stresses- Design of tension members- Stability of steel structures under lateral loads- Stability of multistory steel structures- Column buckling- Design of members subjected to axial compression force- Design of beams- Design of riveted and welded joints- Design of bracing- Using column design curves to choose circular or open column section- Using beam design curves to choose composite, paneled or plate girder section.

CES1146 Civil Engineering

1st Year: Electrical Engineering. (1st Term)

Hrs/Week: [(2+1) + (0+0)]

Marks:[(50+25+0) + (0+0+0)] = 75

Course Contents

Types of structures and supports- Reactions– Elastic stability– Analysis of statically determinate beams, frames and trusses– Internal forces.
Influence lines for statically determinate structures– properties of plane section.

CES1147 Theory of Structure

1st Year: Mechanical Engineering. (1st Term)

Hrs/Week: [(2+2) + (0+0)]

Marks:[(70+30+0) + (0+0+0)] = 100

Course Contents

Types of structures and supports- Reactions– Elastic stability– Analysis of statically determinate beams, frames and trusses– Internal forces.

Departmental Course Descriptions

Influence lines for statically determinate structures– properties of plane section– stresses and deformations for axially loaded members– normal stresses due to axial forces and biaxial moments.

Departmental Course Descriptions

Physics and Engineering Mathematics

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Departmental Course Descriptions

PHM 0001 Engineering Mathematics (1)

Preparatory Year: General Engineering. (Cont.)

Hrs/Week: [(4+2) + (4+2)]

Marks:[(110+40+0) + (110+40+0)] = 300

Departmental Course Descriptions

Course Contents

Differentiation: Real functions, Limits and continuity, Derivatives to different functions from first order to higher orders and its different applications. **Integration**: Indefinite integrals, rules of indefinite integrals, techniques of integration(integration by substitutions, by parts, by partial fractions and by reduction), definite integrals, applications on definite integrals(length of curves, areas, volumes). **Algebra**: Algebra of sets, Boolean algebra, partial fractions, determinates and matrices, theory of algebraic equations, properties of the roots, mathematical induction. **Geometry**: Space coordinates(cartesian, cylindrical and spherical coordinates), translation and rotation of axes, pairs of straight lines, circle, conic sections (parabola, ellipse and hyperbola).

PHM 0002 Engineering Physics (1)

Preparatory Year: General Engineering. (Cont.)

Hrs/Week: [(4+2) + (4+2)]

Marks:[(90+30+30) + (90+30+30)] = 300

Course Contents

Properties of matter: Units and dimensions, simple harmonic motion, Circular motion, Moment of inertia, Elastic properties of materials, fluid statics, fluid dynamics and viscosity, applications. **Electricity**: Electric field and Coulomb's law, Electric potential, Capacitors and dielectrics, applications. **ElectroMagnetism**: Effects of the Magnetic field, Magnetic force, Biot-Savart law, Ampere's law, Electromagnetic induction, applications. **Heat and thermodynamics**: Heat transfer, Kinetic theory of gases, the three laws of thermodynamics, applications. **Geometrical optics**: Refraction of light, Prisms, Reflection of light, Lenses, Lens aberration, applications.

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Departmental Course Descriptions

Laboratory:
Physics Lab

- Determination of thermal conductivity of a bad conductor
- Determination of the coefficient of surface tension of a liquid
- Determination of Young's modulus
- Determination of the refractive index of glass prism
- Determination of shear modulus
- Determination of the resistivity of a material (metal wire)
- Determination of the power of lenses
- Determination of the coefficient of viscosity of a viscous liquid
- Comparison and determination of an e.m.f and R using potentiometer and meter - bridge

Departmental Course Descriptions

PHM 0103 Engineering Chemistry

Preparatory Year: General Engineering (1st Term)

Hrs/Week: [(3+2) + (0+0)]

Marks:[(75+25+25) + (0+0+0)] = 125

Course Contents

Physical chemistry: Gases, Liquid state, Thermo chemistry, Thermodynamics, Solutions, Ionic equilibrium. **Applied chemistry**: Electrochemistry, Corrosion of metals, Water treatment, Chemistry of cements, Chemistry of polymers, Fuels combustion, Pollution and its control.

Laboratory:
Chemistry Lab

- Acidic radicals
- Basic radicals
- Scheme for identification of simple inorganic salt
- Acid Base Titrations
- Total alkalinity of water samples
- Total hardness of water samples
- Properties of lubricating oils (Study of some instruments for characterization of physical data of lubricating oils)
- Experiments of applied chemistry

PHM 1004 Engineering Mathematics (2)

1st Year: Mechanical Engineering. (Cont.)

Departmental Course Descriptions

Hrs/Week: [(3+2) + (3+2)]
Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Functions of several variables including limits, continuity, partial derivatives, Chain rule, extreme values and applications of partial derivatives, **Integrals**: double, triple, line and surface integrals, Green's theorem. **Infinite series** and its tests of convergence. **Ordinary differential equations:** Including basic concepts, method of solving separable, Homogeneous, Exact and linear equations of first order, some applications, ordinary differential equations of higher orders and their solutions. **Partial differential equations:** Including basic concepts, types and different methods for solving heat, wave and Laplace equations. **Fourier series** and its applications for solving partial differential equations. **Laplace transform** and its use in solving differential and integral equations.

PHM 1205 Engineering Physics (2)

1st Year: Mechanical Engineering. (2nd Term)

Hrs/Week: [(0+0) + (2+2)]
Marks:[(0+0+0) + (60+20+20)] = 100

Course Contents

Modern physics: Plank's theory of quantization of energy of radiation, Photo- electric effect, x-rays and compton's effect, Wave properties of matter and wave function, Principles of quantum mechanics and Schrodinger equation, Atomic structure and study of the tunnelling phenomenon. **Vibrations and waves**: Simple, Damped and forced vibrations, Wave motion and acoustics, Interference, Diffraction and polarization of light.

Departmental Course Descriptions

Laboratory:
Physics Lab

- Stefan's fourth power law of radiation
- Photo cell
- Thermocouple
- Meld's experiment
- Measuring of wave length by diffraction grating
- Newton rings
- Hall effect in metals
- The cathode ray oscilloscope to investigate the superposition principle
- Forced mechanical oscillation
- The inverse square and Stefan - Boltzmann's law of radiation

PHM 1006 Engineering Mathematics (2)

1st Year: Electrical Engineering. (Cont.)

Hrs/Week: [(4+2) + (4+2)]
Marks:[(100+50+0) + (100+50+0)] = 300

Course Contents

Functions of several variables including limits, continuity, partial derivatives, Chain rule, extreme values and applications of partial derivatives, **Integrals**: double, triple, line and surface integrals, Green's theorem. **Infinite series** and its tests of convergence. **Ordinary differential equations:** Including basic concepts, method of solving separable, Homogeneous, Exact and linear equations of first order, some applications, ordinary differential equations of higher orders and their solutions. **Partial differential equations:** Including basic concepts, types and different methods for solving heat, wave and Laplace equations.

Departmental Course Descriptions

Fourier series and its application for solving partial differential equations. **Laplace transform** and its use in solving differential and integral equations. **Vector analysis**.

PHM 1107 Engineering Physics (2)

1st Year: Electrical Engineering. (1st Term)

Hrs/Week: [(4+2) + (0+0)]

Marks:[(90+30+30) + (0+0+0)] = 150

Course Contents

Modern physics: Plank's theory of quantization of energy of radiation, Photo- electric effect, x-rays and compton effect, Wave properties of matter and wave function, Principles of quantum mechanics and schr?dinger equation, Atomic structure and study the tunnelling phenomenon, Quantum theory of the free electrons in metals, Statistical distribution laws, Lattice vibrations and thermal properties of solids, Super conductivity. **Vibrations and waves**: Simple, Damped and forced vibrations, Wave motion and acoustics, Interference, Diffraction and polarization of light.

Laboratory:
Physics Lab

- Stefan's fourth power law of radiation
- Photo cell
- R-C circuit
- Thermocouple
- Meld's experiment
- Measuring of wave length by diffraction grating
- Newton rings
- The cathode ray oscilloscope to investigate the superposition principle

Departmental Course Descriptions

- Forced mechanical oscillation
- The inverse square and Stefan - Boltzmann's law of radiation

PHM 1008 Engineering Mathematics (2)

1st Year: Civil Engineering. (Cont.)

Hrs/Week: [(4+2) + (4+2)]

Marks:[(100+50+0) + (100+50+0)] = 300

Course Contents

Functions of several variables including limits, continuity, partial derivatives, Chain rule, extreme values and applications of partial derivatives, **Integrals**: double, triple, line and surface integrals, Green's theorem. **Infinite series** and its tests of convergence. **Ordinary differential equations:** Including basic concepts, method of solving separable, Homogeneous, Exact and linear equations of first order, some applications, ordinary differential equations of higher orders and their solutions. **Partial differential equations:** Including basic concepts, types and different methods for solving heat, wave and Laplace equations. **Fourier series** and its applications for solving partial differential equations. Introduction to **probability** theory including basic concepts, discrete and continuous random variables and probability distributions.

PHM 2009 Engineering Mathematics (3)

2nd Year: Electrical Engineering. (Cont.)

Hrs/Week: [(3+2) + (3+2)]

Marks:[(90+35+0) + (90+35+0)] = 250

Course Contents

Departmental Course Descriptions

Functions of a complex variable including Cauchy-Riemann conditions, complex series, complex integral, integration by residues and its application to real integrals. **Series solution** of differential equations. **Special functions**: Including gamma, Beta, Bessel and Legendre functions, Bessel and legendre series. **Numerical analysis** including the solution of nonlinear algebraic equations, Systems of linear and nonlinear equations, solution methods of ordinary and partial differential equations. **General topology** and its different applications**. Fuzzy sets theory** including basic concepts and its different application fields.

PHM 3110 Engineering Mathematics (4)

3rd Year: Electrical Engineering, Electrical Power and Machines. (1st Term)

Hrs/Week: [(2+2)+(0+0)]

Marks:[(70+30+0)+(0+0+0)] = 100

Course Contents

Probability and statistics including discrete and random variables, probability functions and distributions, Statistical inference and testing of statistical hypotheses. **Rough sets theory**: including basic concepts and its applications in different information systems, classification of information, reduction of information and decision making.

PHM 3111 Engineering Mathematics (4)

3rd Year: Electrical Engineering, Communications and Electronics. (1st Term)

Departmental Course Descriptions

Hrs/Week: [(2+2)+(0+0)]
Marks:[(70+30+0)+(0+0+0)] = 100

Course Contents

Probability and statistics including discrete and random variables, probability functions and distributions, Statistical inference and testing of statistical hypotheses. **Rough sets theory**: including basic concepts and its applications in different information systems, classification of information, reduction of information and decision making.

PHM 3112 Engineering Mathematics (4)

3rd Year: Electrical Engineering, Computers and Systems. . (1st Term)

Hrs/Week: [(2+2)+(0+0)]
Marks:[(70+30+0)+(0+0+0)] = 100

Course Contents

Probability and statistics including discrete and random variables, probability functions and distributions, Statistical inference and testing of statistical hypotheses. **Rough sets theory**: including basic concepts and its applications in different information systems, classification of information, reduction of information and decision making.

Departmental Course Descriptions