Sameer R. Mungre
501

GOA UNIVERSITY

SYLLABUS RELATING TO SEMESTER
I & II IN ENGINEERING
(CIVIL, MECHANICAL, ELECTRICAL,
ELECTRONICS & TELECOMMUNICATION
AND COMPUTER ENGINEERING)

SCHEME OF INSTRUCTIONS AND EXAMINATION
For F. E. (Semester I and II)

Semester I (Civil, Mechanical, Electronics & Tele-Comm. and Computer Engg.)

Sr No.	Subject	Deptartment to teach	Teaching Schedule L	T	P	Duration	Examination Scheme Theory	Practical	TW	Oral	TOTAL
1.	Applied Maths I	Mathematics	3	1	—	3	100	—	—	—	100
2.	Applied Physics	Physics	3	1	2	3	100	—	25	—	125
3.	Applied Chemistry	Chemistry	3	1	2	3	100	—	25	—	125
4.	Communication skills	English	1	—	3	2	75	—	25	—	100
5.	Engineering Graphics I	Mechanical	2	—	6	4	100	—	50	—	150
6.	Basic Electrical Engineering	Electrical	3	1	2	3	100	—	25	—	125
7.	Basic Civil Engineering	Civil	3	1	2	3	100	—	25	—	125
8.	Work Shop Practicals	Mech. Workshop	—	—	5	—	—	—	50	—	50
		Total	18	5	22		675	—	225	—	900

25/2/15

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Go
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of
Farmagudi, Ponda-Goa - 403 401

SCHEME OF INSTRUCTIONS AND EXAMINATION

For F. E. (Semester I and II)

Semester II (Civil, Mechanical, Electrical, Electronics & Tele-Comm. and Computer Engg.)

Sr No.	Subject	Deptartment to teach	Teaching Schedule L	T	P	Dur-ation	Examination Scheme Theory	Practical	TW & or mk	Oral	TOTAL
1.	Applied Maths II	Mathematics	3	1	—	3	100	—	—	—	100
2.	Engg. Mechanics	Civil	3	1	2	3	100	—	25	—	125
3.	Intr. to Computer Programming & Problem Solving	Computer	3	1	3	3	100	—	25	—	125
4.	Basic Mechanical Engg.	Mechanical	3	1	2	3	100	—	25	—	125
5.	Basic Electronics	Electronics & Telecomm.	3	1	2	3	100	—	25	—	125
6.	Engineering Graphics II	Mechanical	2	0	6	4	100	—	50	—	150
7.	Work shop Practice	Mech. workshop	—	0	6	—	—	—	50	—	50
		Total	17	5	21		600	—	200	—	800

25/2/15

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

PROPOSED SYLLABUS FOR ODD & EVEN SEMESTERS

(GOA UNIVERSITY)

Sr. No.	Subjects	Department	* L	T	P	Duration of Theory	Theory	TW Oor rm k	Practical	Viva	TOTAL
Semester III											
1.	Engineering Mathematics	Civil	4	1	0	3	100	---	---	---	100
2.	Applied Thermo-dynamics	Mecha-nical	4	1	3	3	100	—	—	—	100
3.	Engineering Material Science	Mecha-nical	4	—	2	3	100	25	—	—	125
4.	Machine Drawing	Mecha-nical	2	0	8	4	100	25	—	—	125
5.	Electrical Engineering	Elect-rical	4	1	3	3	100	25	—	—	125
6.	Fluid Mechanics	Civil	4	1	3	3	100	25	—	—	125
	Total		22	4	19		600	100	—	—	700
Semester IV											
1.	Numerical methods for Computer Programming	Computer Engg.	4	0	3	3	100	25	—	25	150
2.	Kinematics of Machinery	Mecha-nical	4	4	0	3	100	25	---	25	150
3.	Mechanics of Solids I	Mech-anical	4	1	2	3	100	—	—	—	100

4.	Industrial Electronics	Electro & Telecom.	4	0	3	3	100	25	—	—	125
5.	Energy Conversion I	Mechanical	4	1	3	3	100	25	50	25	200
6.	Manufacturing Tech.. I	Mechanical	4	0	4	3	100	25	50	25	200
			24	6	15		600	125	100	100	925

Semester V

1.	Industrial Economics	Civil	4	1	0	3	100	—	—	—	100
2.	Quality Management	Mechanical	5	2	0	3	100	25	—	25	150
3.	Dynamics of Machinery I	Mechanical	4	2	2	3	100	25	—	25	150
4.	Heat Mass Transfer & Compressible flow	Mechanical	4	1	2	3	100	25	—	25	150
5.	Mechanics of Solids - II	Mechanical	4	1	2	3	100	25	—	25	150
6.	Manufacturing Tech. II	Mechanical	5	0	4	3	100	50	—	25	175
		Total	26	7	10		600	150		125	875

Semester VI

1.	Machine Design I	Mechanical	4	1	4	3	100	25	—	50	175
2.	Manufacturing Tech. III	Mechanical	4	1	2	3	100	25	50	—	175
3.	Dynamics of Machinery II	Mechanical	4	1	2	3	100	25	—	25	150

4.	Industrial Engineering & Management	Mechanical	4	1	2	3	100	—	—	50	150
5.	Energy Conversion II	Mechanical	4	1	4	3	100	25	50	25	200
6.	Engineering Measurments	Mechanical	4	—	2	3	100	25	—	—	125
		Total	24	5	16		600	125	100	150	975

Semester VII

1.	Power Plant Engineering	Mechanical	5	—	3	3	100	25	—	25	150
2.	Operations Management	Mechanical	5	3	—	3	100	25	—	25	150
3.	CAD - CAM	Mechanical.	4	1	3	3	100	25	—	25	150
4.	Machine Design II	Mechanical	4	1	3	3	100	50	—	50	200
5.	Elective I	Mechanical	5	—	3	3	100	25	—	50	175
6.	Project	Mechanical	—	—	5	—	—	—	—	50	50
		Total	23	5	17		500	150	—	225	875

Semester VIII

1.	Mechanical Systems Design	Mechanical	5	1	4	3	100	50	—	50	200
2.	Refrigeration and Air Conditioning	Mechanical	5	1	3	3	100	25	—	50	175
3.	Elective II	Mechanical	5	1	3	3	100	25	—	50	175
4.	Project	Mechnical	—	—	15	—	—	50	—	50	100
		Total	15	3	25		300	150	—	200	650

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)

ELECTIVE I

1. Applied Operations Research
2. Automobile Engineering
3. Synthesis of Mechanisms
4. Advanced Theory of Metal Cutting
5. Maintenance Management
6. Alternative Energy sources
7. Tribology
8. Vibration and Acoustic Design
9. Machine Tool Design
10. Finite Element Method

ELECTIVE II :

1. Computer application in Mechanical Engineering.
2. Earth Moving Machinery
3. Machine Tool Control
4. Advanced Dynamics of Machinery
5. Information Systems
6. Materials Management
7. Industrial Robotics
8. Advanced Metal Forming
9. Energy Management
10. Micro processor and their applications.

25/2/15

Assistant Registrar (Academ
Goa College of Engineering (Govt.
Farmagudi, Ponda-Goa-403 401

Incipal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401

SCHEME OF INSTRUCTIONS AND EXAMINATION
For F. E. (Semester I and II)

Semester I (Civil, Mechanical, Electronics & Tele-Comm. and Computer Engg.)

Sr No.	Subject	Deptartment to teach	Teaching Schedule L	T	P	Dur-ation	Examination Scheme Theory	Practical	TW/Orr mk	Oral	TOTAL
1.	Applied Maths I	Mathematics	3	1	—	3	100	—	—	—	100
2.	Applied Physics	Physics	3	1	2	3	100	—	25	—	125
3.	Applied Chemistry	Chemistry	3	1	2	3	100	—	25	—	125
4.	Commu-nication skills	English	1	—	3	2	75	—	25	—	100
5.	Engineering Graphics I	Mechanical	2	—	6	4	100	—	50	—	150
6.	Basic Elec-trical Engineering	Electrical	3	1	2	3	100	—	25	—	125
7.	Basic Civil Engineering	Civil	3	1	2	3	100	—	25	—	125
8.	Work Shop Practicals	Mech. Workshop	—	—	5	—	—	—	50	—	50
		Total	18	5	22		675	—	225	—	900

30/4/15
Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

30/4/15
Assistant Professor
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

SCHEME OF INSTRUCTIONS AND EXAMINATION

For F. E. (Semester I and II)

Semester II (Civil, Mechanical, Electrical, Electronics & Tele-Comm. and Computer Engg.)

Sr No.	Subject	Teaching Schedule: Deptartment to teach	L	T	P	Dur-ation	Examination Scheme: Theory	Practical	TW or mk	Oral	TOTAL
1.	Applied Maths II	Mathematics	3	1	—	3	100	—	—	—	100
2.	Engg. Mechanics	Civil	3	1	2	3	100	—	25	—	125
3.	Intr. to Computer Programming & Problem Solving	Computer	3	1	3	3	100	—	25	—	125
4.	Basic Mechanical Engg.	Mechanical	3	1	2	3	100	—	25	—	125
5.	Basic Electronics	Electronics & Telecomm.	3	1	2	3	100	—	25	—	125
6.	Engineering Graphics II	Mechanical	2	0	6	4	100	—	50	—	150
7.	Work shop Practice	Mech. workshop	—	0	6	—	—	—	50	—	50
		Total	17	5	21		600	—	200	—	800

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

30/11/15

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

30/11/15

PROPOSED SYLLABUS FOR ODD & EVEN SEMESTERS

(GOA UNIVERSITY)

Sr. No.	Subjects	Department	* L	T	P	Duration of Theory	Theory	TW e o r r m k	Practical	Viva	TOTAL
Semester III											
1.	Engineering Mathematics	Civil	4	1	0	3	100	—	—	—	100
2.	Applied Thermo-dynamics	Mecha-nical	4	1	3	3	100	—	—	—	100
3.	Engineering Material Science	Mecha-nical	4	—	2	3	100	25	—	—	125
4.	Machine Drawing	Mecha-nical	2	0	8	4	100	25	—	—	125
5.	Electrical Engineering	Elect-rical	4	1	3	3	100	25	—	—	125
6.	Fluid Mechanics	Civil	4	1	3	3	100	25	—	—	125
	Total		22	4	19		600	100	—	—	700
Semester IV											
1.	Numerical methods for Computer Programming	Computer Engg.	4	0	3	3	100	25	—	25	150
2.	Kinematics of Machinery	Mecha-nical	4	4	0	3	100	25	—	25	150
3.	Mechanics of Solids I	Mech-anical	4	1	2	3	100	—	—	—	100

30/4/15

Assistant Registrar (Academic)
Goa College of Engineering
Farmagudi, Ponda-Goa-403 401.

30/4/15

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

4	Industrial Electronics	Electro. & Telecom.	4	0	3	3	100	25	—	—	125
5.	Energy Conversion I	Mecha-nical	4	1	3	3	100	25	50	25	200
6.	Manufac-turing Tech. I	Mecha-nical	4	0	4	3	100	25	50	25	200
			24	6	15		600	125	100	100	925

Semester V

1.	Industrial Economics	Civil	4	1	0	3	100	—	—	—	100
2.	Quality Management	Mecha-nical	5	2	0	3	100	25	—	25	150
3.	Dynamics of Machinery I	Mecha-nical	4	2	2	3	100	25	—	25	150
4.	Heat Mass Transfer & Compressible flow	Mecha-nical	4	1	2	3	100	25	—	25	150
5.	Mechanics of Solids - II	Mecha-nical	4	1	2	3	100	25	—	25	150
6.	Manufa-cturing Tech. II	Mecha-nical	5	0	4	3	100	50	—	25	175
		Total	26	7	10		600	150		125	875

Semester VI

1.	Machine Design I	Mecha-nical	4	1	4	3	100	25	—	50	175
2.	Manufa-cturing Tech. III	Mecha-nical	4	1	2	3	100	25	50	—	175
3.	Dynamics of Machinery II	Mecha-nical	4	1	2	3	100	25	—	25	150

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

Assistant
Goa College of Engineering
Farmagudi, Ponda-Goa - 403 401

30/4/15

4. Industrial Engineering & Management — M n
5. Energy Conversion II — M ni
6. Engineering Measurments — M ni

To

Semester VII

1. Power Plant Engineering — M ni
2. Operations Management — M ni
3. CAD - CA — M ni
4. Machine Design II — M ni
5. Elective I — M ni
6. Project — M ni

To

Semester VIII

1. Mechanical Systems Design — Me nic
2. Refrigeration and Air Conditioning — Me nic
3. Elective II — Me nic
4. Project — Me nic

To

4.	Industrial Engineering & Management	Mechanical	4	1	2	3	100	—	—	50	150
5.	Energy Conversion II	Mechanical	4	1	4	3	100	25	50	25	200
6.	Engineering Measurments	Mechanical	4	—	2	3	100	25	—	—	125
		Total	24	5	16		600	125	100	150	975

Semester VII

1.	Power Plant Engineering	Mechanical	5	—	3	3	100	25	—	25	150
2.	Operations Management	Mechanical	5	3	—	3	100	25	—	25	150
3.	CAD - CAM	Mechanical.	4	1	3	3	100	25	—	25	150
4.	Machine Design II	Mechanical	4	1	3	3	100	50	—	50	200
5.	Elective I (Maintenance Management)	Mechanical	5	—	3	3	100	25	—	50	175
6.	Project	Mechanical	—	—	5	—	—	—	—	50	50
		Total	23	5	17		500	150	—	225	875

Semester VIII

1.	Mechanical Systems Design	Mechanical	5	1	4	3	100	50	—	50	200
2.	Refrigeration and Air Conditioning	Mechanical	5	1	3	3	100	25	—	50	175
3.	Elective II (Earth Moving Machinery)	Mechanical	5	1	3	3	100	25	—	50	175
4.	Project	Mechnical	—	—	15	—	—	50	—	50	100
		Total	15	3	25		300	150	—	200	650

30/4/15

Assistant Registrar (Academic)

30/4/15

Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

oÉÑ¥ç

Mech.

Ref No.: GU/III/Dean-Engg/07/52 dated 24/05/07

SUBJECT: Minutes of the meeting of Chairmen of the Board of Studies in faculty of Engineering.

ANNEXURE - I

GOA UNIVERSITY

FIRST YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING (Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER I (Common for all branches of Engineering)

Sub Code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
					Th. Dur (Hrs)	Marks				
		L	T	P		Th.	S	P	O	Total
1.1	Applied Mathematics I	4	-	-	3	100	25	-	-	125
1.2	Applied Sciences - I (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
1.3	Basic Civil Engineering and Engineering Mechanics.	4	-	2	3	100	25	-	-	125
1.4	Basic Electrical Engineering	3	-	2	3	100	25	-	-	125
1.5	Engineering Graphics	2	-	4	4	100	50	-	-	150
1.6	Communication Skills	3	-	-	3	100	25	-	-	125
1.7	Workshop Practice - I	-	-	4	-	-	50	-	-	50
	TOTAL	20		14		600	250			850

L : Lectures, T : Tutorials, P : Practicals.
Th. Dur. : Duration of Theory Paper
Th : Theory, S : Sessional, P : Practical, O : Oral

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Dr. J. A. LAXMINARAYANA
PROFESSOR IN COMPUTER ENGG.
GOA COLLEGE OF ENGG.
FARMAGUDI - PONDA GOA

HCOMD

GOA UNIVERSITY

FIRST YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING (Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER II: (Common for all branches of Engineering)

Sub code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
					Th. Dur (Hrs)	Marks				
		L	T	P		Th.	S	P	O	Total
2.1	Applied Mathematics II	4	-	-	3	100	25	-	-	125
2.2	Applied Sciences - II (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
2.3	Information Technology	4	-	2	3	100	25	-	-	125
2.4	Basic Mechanical Engineering	3	-	2	3	100	25	-	-	125
2.5	Basic Electronic Engineering	3	-	2	3	100	25	-	-	125
2.6	Environmental and Social Sciences	4	-	-	3	100	50	-	-	150
2.7	Workshop Practice - II Modern	-	-	4	-	-	50	-	-	50
	TOTAL	**22**		**12**	-	**600**	**250**	-	-	**850**

L : Lectures, T : Tutorials, P : Practicals.
Th. Dur. : Duration of Theory Paper
Th : Theory, S : Sessional, P : Practical, O : Oral

23/8/15
Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi-Ponda-Goa-403401.

Dr. J. A. LAXMINARAYANA
PROFESSOR IN COMPUTER ENGINEERING
GOA COLLEGE OF ENGINEERING
FARMAGUDI - PONDA - GOA - 403 401

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

SECOND YEAR OF BECHELOR'S DEGREE COURSE IN ENGINEERING
(Revised in 2007-08)
Scheme of instruction and examination (Mech)

SEMESTER III

Sub Code	Subjects	Scheme of Instruction Hrs/week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th	S	P	O	Total
3.1	Engineering Mathematics	3	1	-	3	100	25	-	-	125
3.2	Machine Drawing	1	1	3	4	100	25	-	-	125
3.3	Applied Thermodynamics	3	1	-	3	100	25	-	-	125
3.4	Engineering Material Science	3	1	-	3	100	25	-	-	125
3.5	Fluid Mechanics	3	1	-	3	100	25	-	-	125
3.6	Digital Electronics & Microprocessor Application	3	1	-	3	100	25	-	-	125
3.7	Practical in Applied Thermodynamics	-	-	2	-	-	-	25	-	25
3.8	Practical in Engineering Material Science	-	-	2	-	-	-	25	-	25
3.9	Practical in Fluid Mechanics	-	-	2	-	-	-	25	-	25
3.10	Practical in Digital Electronics & Microprocessor Application	-	-	2	-	-	-	25	-	25
	TOTAL	**16**	**6**	**11**	-	**600**	**150**	**100**	-	**850**

25/8/15

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

THIRD YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION (Mech)

SEMESTER V

Sub. Code	Subject	Scheme of instruction (hours / week)			Scheme of examination					
					Th. Dur (hrs)	Marks				
		L	T	P		Th	S	P	O	Total
5.1	Machine Design I	3		2	3	100	25	-		125
5.2	Engg Economics & Management	3	1	-	3	100	25	-	-	125
5.3	Heat & Mass Transfer	3	1	-	3	100	25	-	-	125
5.4	Manufacturing Technology II	3	1	-	3	100	25	-	-	125
5.5	Theory of Machines II	3	1	-	3	100	25	-	-	125
5.6	Quality Engg. Management	3		-	3	100	25			125
5.7	Practicals in Heat and Mass Transfer	-	-	2	-	-	-	25	-	25
5.8	Practicals in Manufacturing Technology II			2				25		25
5.9	Practicals in Theory of Machines II			2				25		25
5.10	Practicals in Quality Engg. Management			2					25	25
Total		**18**	**04**	**10**	- -	**600**	**150**	**75**	**25**	**850**

L: Lecture, T: Tutorial, P: Practical
Th. Dur. : Duration of theory paper
Th. : Theory, S: Sessional, P: Practical, O: Oral

24/8/15
Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

SECOND YEAR OF BECHELOR'S DEGREE COURSE IN ENGINEERING

(Revised in 2007-08)

Scheme of instruction and examination (Mech)

SEMESTER IV

	Subjects	Scheme of Instruction Hrs/week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th	S	P	O	Total
4.1	Theory of Machines I	3	-	2	3	100	25	-	-	125
4.2	Mechanics of Solids	3	1	-	3	100	25	-	-	125
4.3	Numerical Techniques & Computer Programming	3	1	-	3	100	25	-	-	125
4.4	Electrical Technology	3	-	-	3	100	25	-	-	125
4.5	Manufacturing Technology I	3	1	-	3	100	25	-	-	125
4.6	Energy Conversion	3	1	-	3	100	25	-	-	125
4.7	Practical in Numerical Techniques & Computer Programming	-	-	2	-	-	-	25	-	25
4.8	Practical in Electrical Technology	-	-	2	-	-	-	25		25
4.9	Practical in Manufacturing Technology I	-	-	2	-	-	-	25	-	25
4.10	Practical in Energy Conversion	-	-	2	-	-	-	25	-	25
	TOTAL	18	4	10	-	600	150	100	-	850

L-Lectures T-tutorials P-Practical

Th Dur – Duration of theory paper

Th - Theory, S-sessional O- oral

24/3/15

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

THIRD YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING
(Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER VI

Sub. Code	Subject	Scheme of instruction (hours / week)			Scheme of examination					
		L	T	P	Th. Dur (hrs)	Marks				
						Th	S	P	O	Total
6.1	Industrial Engg.	3	1	-	3	100	25	-	-	125
6.2	Machine Design II	3	-	2	3	100	25	-	25	150
6.3	Gas Dynamics & Turbomachinaries	3	1	-	3	100	25	-	-	125
6.4	Engineering Measurements & Metrology	3	-	-	3	100	25	-	-	125
6.5	Mechatronics	3	1	-	3	100	25	-	-	125
6.6	Operations & Project Management	3	1	-	3	100	25		-	125
6.7	Practicals in Gas Dynamics & Turbomachinaries	-	-	2	-	-	-	25	-	25
6.8	Practicals in Engineering Measurement & Metrology			2				25		25
6.9	Practicals in Mechatronics	-	-	2	-	-	-	25	-	25
Total		**18**	**04**	**8**	-	**600**	**150**	**75**	**25**	**850**

L: Lecture, T: Tutorial, P: Practical
Th. Dur. : Duration of theory paper
Th: Theory, S: Sessional, P: Practical, O: Oral

24/3/11

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401.

GOA UNIVERSITY

FINAL AND/FOURTH YEAR OF BACHELORS DEGREE COURSE IN MECHANICAL ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMISTER VII

Sub Code	Subject	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Marks				
						Th.	S	P	O	Total
7.1	CAD-CAM	3	1	2	3	100	25	25	25	175
7.2	Refrigeration & Air Conditioning	3	1	2	3	100	25	25	25	175
7.3	Manufacturing Technology III	3	1	-	3	100	25	-	-	125
7.4	Elective I	3	1	2*	3	100	25	-	25	150
7.5	Elective II	3	1	2*	3	100	25	-	25	150
7.6	Project	-	-	4	3	-	25**	-	50	75
TOTAL		15	05	12	-	500	150	50	150	850

L-lecture, T: Tutorials, P-Practical
Th.Dur: Duration of the Paper
Th: Theory, S: Sessional, P: Practical, O: Oral

*Practical slots for Elective Subjects are to be decided based on nature of subjects offered and explicitly specified in the Elective list.
A journal containing assignments such as design exercises/or experiments conducted and results obtained to be submitted for assessment.

** Progress Seminar of PROJECT

Elective 4- major groups (thermal, design, manufacturing and industrial) and I-non departmental like Computer, IT and management.

Revised Course (Revised in 2007-08) sem VII (Mech) Elective to be introduced from I term of 2010-2011

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

24/5/11
Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Subject Code	Title
7.4.1	Advanced Mechanic of Solids
7.4.2	Tool Engg. Design
7.4.3	Cryogenics
7.4.4	Engineering Tribology
7.4.5	Management Information System
7.4.6	6-Sigma Management
7.4.7	Analysis & Synthesis of Mechanisms
7.4.8	Artificial Intelligence
7.5.1	Random Vibrations
7.5.2	Advanced material Technology
7.5.3	Rapid Prorotyping
7.5.4	Design of Thermal System
7.5.5	Stochastic Process
7.5.6	Applied O.R.
7.5.7	Automobile Engg.
7.5.8	MEMS

24/3/15

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

FINAL A

SEMISTER

Sub Code	Su
8.1	
8.2	
8.3	
8.4	
8.5	

L-lectu
Th.Du
Th: Tl

*Prac
expli
obta

**

El
lik

GOA UNIVERSITY

FINAL AND/ FOURTH YEAR OF BACHELORS DEGREE COURSE IN ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER VIII

Sub Code	Subject	Scheme of instruction (hours/week)			Scheme of examination					
		L	T	P	Th Dur (hrs)	Marks				
						Th	S	P	O	Total
8.1	Reliability based Design	3	1	-	3	100	25	-	50	175
8.2	Power Plant Engineering	3	1	-	3	100	25	-	50	175
8.3	Elective III	3	1	2*	3	100	25	-	50	175
8.4	Elective IV	3	1	2*	3	100	25	-	50	175
8.5	Project	-	-	8	-	-	50	-	100**	150
Total		12	04	12*	-	400	150		300	850

L: Lecture, T: Tutorial, P: Practical
Th.Dur: Duration of theory paper
Th: Theory, S: Sessional, P: Practical, O:Oral

*Practical slots for Electives subjects are to be decided based on nature of subjects offered and explicitly specified in the Elective list.
A journal containing assignments such as design exercises/or experiments conducted and results obtained to be submitted for assessment during oral examination.

** Seminar, demonstration & Oral

Elective 4- major groups (thermal, design, manufacturing and industrial) and I-non departmental like computer, IT and management.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

24/8/15
Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

BE(M)-Semester VIII

Elective III	
Code	Title
8.3.1	Finite element methods
8.3.2.	Industrial Robotics
8.3.3	Computational Fluid Mechanics
8.3.4	Maintenance Engineering and Management
8.3.5	System simulation
8.3.6	Control System Engineering
8.3.7	Energy management

BE(M)-Semester VIII

Elective IV	
Code	Title
8.4.1	Precision engineering
8.4.2.	Advanced metal forming
8.4.3	Supply chain management
8.4.4	Low cost automation
8.4.5	Fluid power control
8.4.6	Nano Technology

24/3/15

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

Ref No.: GU/III/Dean-Engg/07/52 dated 24/05/07

SUBJECT: Minutes of the meeting of Chairmen of the Board of Studies in faculty of Engineering.

ANNEXURE - I

GOA UNIVERSITY

FIRST YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING (Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER I (Common for all branches of Engineering)

Sub code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
					Th. Dur (Hrs)	Marks				
		L	T	P		Th.	S	P	O	Total
1.1	Applied Mathematics I	4	-	-	3	100	25	-	-	125
1.2	Applied Sciences - I (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
1.3	Basic Civil Engineering and Engineering Mechanics.	4	-	2	3	100	25	-	-	125
1.4	Basic Electrical Engineering	3	-	2	3	100	25	-	-	125
1.5	Engineering Graphics	2	-	4	4	100	50	-	-	150
1.6	Communication Skills	3	-	-	3	100	25	-	-	125
1.7	Workshop Practice - I	-	-	4	-	-	50	-	-	50
	TOTAL	20		14		600	250			850

L : Lectures, T : Tutorials, P : Practicals.
Th. Dur. : Duration of Theory Paper
Th : Theory, S : Sessional, P : Practical, O : Oral

17/11/14
Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

Dr. J. A. LAXMINA...
PROFESSOR IN COMPUTER ...
GOA COLLEGE OF ENG...
FARMAGUDI - PONDA GOA

HCOMD

GOA UNIVERSITY

FIRST YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING (Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER II: (Common for all branches of Engineering)

Sub code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
					Th. Dur	Marks				
		L	T	P	(Hrs)	Th.	S	P	O	Total
2.1	Applied Mathematics II	4	-	-	3	100	25	-	-	125
2.2	Applied Sciences - II (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
2.3	Information Technology	4	-	2	3	100	25	-	-	125
2.4	Basic Mechanical Engineering	3	-	2	3	100	25	-	-	125
2.5	Basic Electronic Engineering	3	-	2	3	100	25	-	-	125
2.6	Environmental and Social Sciences	4	-	-	3	100	50	-	-	150
2.7	Workshop Practice - II Modern	-	-	4	-	-	50	-	-	50
	TOTAL	22		12	-	600	250	-	-	850

L : Lectures, T : Tutorials, P : Practicals.
Th. Dur. : Duration of Theory Paper
Th : Theory, S : Sessional, P : Practical, O : Oral

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

17/11/14

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

15/12/12

Dr. J. A. LAXMINARAYANA
PROFESSOR IN COMPUTER ENGINEERING
GOA COLLEGE OF ENGINEERING
FARMAGUDI - PONDA - GOA - 403 401

GOA UNIVERSITY

THIRD YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING

(Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER III

Sub. Code	Subject	Scheme of Instructions (Hours/Weeks)			Scheme of Examination					
					Dur of Th / Pr Hrs	Marks				
		L	T	P		Th	S	P	O	Total
3.1	Engineering Mathematics	3	1	-	3	100	25	-	-	125
3.2	Machine Drawing	1	1	3	4	100	25	-	-	125
3.3	Applied Thermodynamics	3	1	-	3	100	25	-	-	125
3.4	Engineering Material Science	3	1	-	3	100	25	-	-	125
3.5	Fluid Mechanics	3	1	-	3	100	25	-	-	125
3.6	Digital Electronic and Microprocessor Application	3	1	-	3	100	25	-	-	125
3.7	Practical in Applied Thermodynamics	-	-	2	-	-	-	25	-	25
3.8	Practical in Engineering Material Science	-	-	2	-	-	-	25	-	25
3.9	Practical in Fluid Mechanics	-	-	2	-	-	-	25	-	25
3.10	Practical in Digital Electronic and Microprocessor Application	-	-	2	-	-	-	25	-	25
Total		16	06	11	-	600	150	100	-	850

L: Lecture, T: Tutorial, P: Practical

Th. Dur. : Duration of theory paper

Th. : Theory, S: Sessional, P: Practical, O: Oral

17/11/14

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

THIRD YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING

(Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER IV

Sub. Code	Subject	Scheme of Instructions (Hours/Weeks)			Scheme of Examination					
					Dur of Th / Pr Hrs	Marks				
		L	T	P		Th	S	P	O	Total
4.1	Theory of Machines I	3	-	2	3	100	25	-	-	125
4.2	Mechanics of Solids	3	1	-	3	100	25	-	-	125
4.3	Numerical Techniques & Computer Programming	3	1	-	3	100	25	-	-	125
4.4	Electrical Technology	3	-	-	3	100	25	-	-	125
4.5	Manufacturing Technology I	3	1	-	3	100	25	-	-	125
4.6	Energy Conversion	3	1	-	3	100	25	-	-	125
4.7	Practicals in Numerical Techniques & Computer Programming	-	-	2	-	-	-	25	-	25
4.8	Practicals in Electrical Technology	-	-	2	-	-	-	25	-	25
4.9	Practicals in Manufacturing Technology I	-	-	2	-	-	-	25	-	25
4.10	Practicals in Energy Conversion	-	-	2	-	-	-	25	-	25
Total		18	04	10	-	600	150	100	-	850

L: Lecture, T: Tutorial, P: Practical

Th. Dur. : Duration of theory paper

Th. : Theory, S: Sessional, P: Practical, O: Oral

17/11/14

Assistant Registrar (Academic)
Goa College of [illegible] (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

THIRD YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING

(Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER V

Sub. Code	Subject	Scheme of Instructions (Hours/Weeks)			Scheme of Examination					
					Th. Dur hrs.	Marks				
		L	T	P		Th	S	P	O	Total
5.1	Machine Design I	3	-	2	3	100	25	-	-	125
5.2	Engg Economics & Management	3	1	-	3	100	25	-	-	125
5.3	Heat & Mass Transfer	3	1	-	3	100	25	-	-	125
5.4	Manufacturing Technology II	3	1	-	3	100	25	-	-	125
5.5	Theory of Machines II	3	1	-	3	100	25	-	-	125
5.6	Quality Engg. Management	3	-	-	3	100	25	-	-	125
5.7	Practicals in Heat and Mass Transfer	-	-	2	-	-	-	25	-	25
5.8	Practicals in Manufacturing Technology II	-	-	2	-	-	-	25	-	25
5.9	Practicals in Theory of Machines II	-	-	2	-	-	-	25	-	25
5.10	Practicals in Quality Engg. Management	-	-	2	-	-	-	-	25	25
Total		18	04	10	-	600	150	75	25	850

L: Lecture, T: Tutorial, P: Practical

Th. Dur. : Duration of theory paper

Th. : Theory, S: Sessional, P: Practical, O: Oral

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

17/11/14

Assistant Registrar (Academic)
Goa College of [illegible] Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

GOA UNIVERSITY

THIRD YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING

(Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER VI

Sub. Code	Subject	Scheme of Instructions (Hours/Weeks)			Scheme of Examination					
					Th. Dur hrs.	Marks				
		L	T	P		Th	S	P	O	Total
6.1	Industrial Engg.	3	1	-	3	100	25	-	-	125
6.2	Machine Design II	3	-	2	3	100	25	-	25	150
6.3	Gas Dynamics and Turbomachineries	3	1	-	3	100	25	-	-	125
6.4	Engineering Measurements & Metrology	3	-	-	3	100	25	-	-	125
6.5	Mechatronics	3	1	-	3	100	25	-	-	125
6.6	Operations & Project Management	3	1	-	3	100	25	-	-	125
6.7	Practicals in Gas Dynamics and Turbomachineries	-	-	2	-	-	-	25	-	25
6.8	Practicals in Engg. Measurements & Metrology	-	-	2	-	-	-	25	-	25
6.9	Practicals in Mechatronics	-	-	2	-	-	-	25	-	25
Total		18	04	8	-	600	150	75	25	850

L: Lecture, T: Tutorial, P: Practical

Th. Dur. : Duration of theory paper

Th. : Theory, S: Sessional, P: Practical, O: Oral

17/11/14

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

FINAL AND/ FOURTH YEAR OF BACHELORS DEGREE COURSE IN
ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER VII

Sub Code	Subject	Scheme of instruction (hours/week)			Scheme of examination					
		L	T	P	Th Dur (hrs)	Marks Th	S	P	O	Total
7.1	CAD-CAM	3	1	2	3	100	25	25	25	175
7.2	Refrigeration & Air Conditioning	3	1	2	3	100	25	25	25	175
7.3	Manufacturing Technology III	3	1	-	3	100	25	-	-	125
7.4	Elective I	3	1	2*	3	100	25	-	25	150
7.5	Elective II	3	1	2*	3	100	25	-	25	150
7.6	Project	-	-	4	3	-	25**	-	50	75
	Total	**15**	**05**	**12**	-	**500**	**150**	**50**	**150**	**850**

*Practical slots for Electives subjects are to be decided based on nature of subjects offered and explicitly specified in the Elective list.
A journal containing assignments such as design exercises/or experiments conducted and results obtained to be submitted for assessment.

** Progress Seminar of PROJECT

Elective 4- major groups (thermal, design, manufacturing and industrial) and I-non departmental like computer, IT and management.

L: Lecture, T: Tutorial, P: Practical
Th.Dur: Duration of theory paper
Th: Theory, S: Sessional, P: Practical, O:Oral

Revised Course (Revised in 2007-08) sem VII (Mech) Electives to be introduced from I term of 2010-2011

14/11/14
Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa 403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

Subject Code	Subject Title
7.4.1	Advanced mechanic of solids
7.4.2	Tool Engg. Design
7.4.3	Cryogenics
7.4.4	Engineering Tribology
7.4.5	Management Information system
7.4.6	6-Sigma Management
7.4.7	Analysis & Synthesis of Mechanisms
7.4.8	Artificial Intelligence
7.5.1	Random Vibrations
7.5.2	Advanced material Technology
7.5.3	Rapid Prorotyping
7.5.4	Design of Thermal System
7.5.5	Stochastic Process
7.5.6	Applied O.R.
7.5.7	Automobile Engg.
7.5.8	MEMS

17/11/14

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

FINAL AND/ FOURTH YEAR OF BACHELORS DEGREE COURSE IN ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER VIII

Sub Code	Subject	Scheme of instruction (hours/week)			Scheme of examination					
		L	T	P	Th Dur (hrs)	Marks				
						Th	S	P	O	Total
8.1	Reliability based Design	3	1	-	3	100	25	-	50	175
8.2	Power Plant Enginerring	3	1	-	3	100	25	-	50	175
8.3	Elective III	3	1	2*	3	100	25	-	50	175
8.4	Elective IV	3	1	2*	3	100	25	-	50	175
8.5	Project	-	-	8	-	-	50	-	100**	150
Total		**15**	**04**	**12***	**-**	**400**	**150**		**300**	**850**

L: Lecture, T: Tutorial, P: Practical
Th.Dur: Duration of theory paper
Th: Theory, S: Sessional, P: Practical, O:Oral

*Practical slots for Electives subjects are to be decided based on nature of subjects offered and explicitly specified in the Elective list.
A journal containing assignments such as design exercises/or experiments conducted and results obtained to be submitted for assessment during oral examination.

** Seminar, demonstration & Oral

Elective 4- major groups (thermal, design, manufacturing and industrial) and I-non departmental like computer, IT and management.

17/11/14
Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa - 403 401

BE(M)-Semester VIII

Elective III	
Code	Title
8.3.1	Finite element methods
8.3.2.	Industrial Robotics
8.3.3	Computational Fluid Mechanics
8.3.4	Maintenance Engineering and Management
8.3.5	System simulation
8.3.6	Control System Engineering
8.3.7	Energy management

BE(M)-Semester VIII

Elective IV	
Code	Title
8.4.1	Precision engineering
8.4.2.	Advanced metal forming
8.4.3	Supply chain management
8.4.4	Low cost automation
8.4.5	Fluid power control
8.4.6	Nano Technology

17/11/14

Assistant Registrar (Academic)
Goa College of Engineering (Govt. of Goa)
Farmagudi, Ponda-Goa-403 401.

Principal
Goa College of Engineering (Govt. of Go
Farmagudi, Ponda-Goa - 403 401

GOA UNIVERSITY

B. E. (MECHANICAL)

SEM. III TO VIII

PROPOSED SYLLABUS FOR ODD & EVEN SEMESTERS

(GOA UNIVERSITY)

Sr. No.	Subjects	Department	* L	T	P	Duration of Theory	Theory	TW Oor rm k	Practical	Viva	TOTAL
Semester III											
1.	Engineering Mathematics	Civil	4	1	0	3	100	—	—	—	100
2.	Applied Thermo-dynamics	Mecha-nical	4	1	3	3	100	—	—	—	100
3.	Engineering Material Science	Mecha-nical	4	—	2	3	100	25	—	—	125
4.	Machine Drawing	Mecha-nical	2	0	8	4	100	25	—	—	125
5.	Electrical Engineering	Elect-rical	4	1	3	3	100	25	—	—	125
6.	Fluid Mechanics	Civil	4	1	3	3	100	25	—	—	125
	Total		22	4	19		600	100	—	—	700
Semester IV											
1.	Numerical methods for Computer Programming	Computer Engg.	4	0	3	3	100	25	—	25	150
2.	Kinematics of Machinery	Mecha-nical	4	4	0	3	100	25	—	25	150
3.	Mechanics of Solids I	Mech-anical	4	1	2	3	100	—	—	—	100

4	Industrial Electronics	Electro. & Telecom.	4	0	3	3	100	25	—	—	125
5.	Energy Conversion I	Mecha-nical	4	1	3	3	100	25	50	25	200
6.	Manufac-turing Tech. I	Mecha-nical	4	0	4	3	100	25	50	25	200
			24	6	15		600	125	100	100	925

Semester V

1.	Industrial Economics	Civil	4	1	0	3	100	—	—	—	100
2.	Quality Management	Mecha-nical	5	2	0	3	100	25	—	25	150
3.	Dynamics of Machinery I	Mecha-nical	4	2	2	3	100	25	—	25	150
4.	Heat Mass Transfer & Compressible flow	Mecha-nical	4	1	2	3	100	25	—	25	150
5.	Mechanics of Solids - II	Mecha-nical	4	1	2	3	100	25	—	25	150
6.	Manufa-cturing Tech. II	Mecha-nical	5	0	4	3	100	50	—	25	175
		Total	26	7	10		600	150		125	875

Semester VI

1.	Machine Design I	Mecha-nical	4	1	4	3	100	25	—	50	175
2.	Manufa-cturing Tech. III	Mecha-nical	4	1	2	3	100	25	50	—	175
3.	Dynamics of Machinery II	Mecha-nical	4	1	2	3	100	25	—	25	150

4.	Industrial Engineering & Management	Mecha-nical	4	1	2	3	100	—	—	50	150
5.	Energy Conversion II	Mecha-nical	4	1	4	3	100	25	50	25	200
6.	Engineering Measurments	Mecha-nical	4	—	2	3	100	25	—	—	125
		Total	24	5	16		600	125	100	150	975

Semester VII

1.	Power Plant Engineering	Mecha-nical	5	—	3	3	100	25	—	25	150
2.	Operations Management	Mecha-nical	5	3	—	3	100	25	—	25	150
3.	CAD - CAM	Mecha-nical.	4	1	3	3	100	25	—	25	150
4.	Machine Design II	Mecha-nical	4	1	3	3	100	50	—	50	200
5.	Elective I	Mecha-nical	5	—	3	3	100	25	—	50	175
6.	Project	Mecha-nical	—	—	5	—	—	—	—	50	50
		Total	23	5	17		500	150	—	225	875

Semester VIII

1.	Mechanical Systems Design	Mecha-nical	5	1	4	3	100	50	—	50	200
2.	Refrigeration and Air Conditioning	Mecha-nical	5	1	3	3	100	25	—	50	175
3.	Elective II	Mecha-nical	5	1	3	3	100	25	—	50	175
4.	Project	Mech-nical	—	—	15	—	—	50	—	50	100
		Total	15	3	25		300	150	—	200	650

ELECTIVE I

1. Applied Operations Research
2. Automobile Engineering
3. Synthesis of Mechanisms
4. Advanced Theory of Metal Cutting
5. Maintenance Management
6. Alternative Energy sources
7. Tribology
8. Vibration and Acoustic Design
9. Machine Tool Design
10. Finite Element Method

ELECTIVE II :

1. Computer application in Mechanical Engineering.
2. Earth Moving Machinery
3. Machine Tool Control
4. Advanced Dynamics of Machinery
5. Information Systems
6. Materials Management
7. Industrial Robotics
8. Advanced Metal Forming
9. Energy Management
10. Micro processor and their applications.

S.E. (Mechanical)

Semester III

ENGINEERING MATHEMATICS

Instruction			Examination			
L	T	P	Theory	TW	Pract	Viva
4	1	0	100	—	—	—

1. Matrices: Characteristic Equation, Eigen Value, Eigen Vectors, Caley-hamilton theorem. Diagonalisation to function of square matrices.

2. Laplace Transforms : Existency condition, transorms of $t^n e^{at}$, cos (at), sin(at), sinh (at), Cosh (at), F(t)*e, D^n f(t), integral of F(t) between 0 and 1. First and second shifting Theorems, Inverse transforms, Convolution theorem, solution of Linear ordinary and simulataneous Equations, Applications to Mechanical engineering.

3. Fourier Series : Trignometric and Fourier Series, Dirichlet's conditions, Fourier coefficients. Expansion of functions, Even and odd function. Half Range series. Expansion over the range (-n, +n) (0 ,2n), and (a, a+2L).

4. Partial Differential Equations : Formulation of partial differential equations, elimination of arbitary constant, arbitary functions, equations governing transverse vibrations of strings. Solution using Fourier series, derivation and solution of Heat equation in one, two and three dimensions, Variable heat flow.

TEXT AND REFERENCES

1. P. N. and J. N. Wartikar, Applied Mathematics.

2. I. S. and E. S. Sokolnikoff, Higher Mathematics for Engineers and Physicists.

3. Kreysig, Advanced Engineering Mathematics.

4. Frank Aryes, Theory and problems of Matrices, Schaum's Outline Series.

APPLIED THERMODYNAMICS

L	T	P	Theory	TW	Pract	Viva
4	1	3	100	—	—	—

1. Thermodynamic Concepts :

1.1 System, Surroundings, State, Paths, Processes and Property. Thermal Equilibrium and Zeroth Law, Temperature and Temperature scales.

1.2 First Law of thermodynamics for cyclic and non-cyclic processes, the proportionality factor J, energy - stored and internal energy, enthalpy. First law applied to open systems steady flow and general formulations.

1.3 Second law : Equivalence of Kelvin Planck and Clausius statements, Perpetual motion machines, reversibility and irreversibility in processes and cycles. External and internal mechanical and thermal and chemical irreversibilities.

Carnot's principle, thermodynamic scale of temperature, inequality of Clausius.

1.4 Entropy as a property : Calculation of entropy changes in various processes, entropy as coordinate. Principle of increase of entropy, entropy and disorder, entropy flow.

1.5 Cycles of operation : Power and refrigeration cycles.

1.6 Physical Properties : Phase and property diagrams of pure substances. Ideal gases and vapours. Equations of state. Internal energy and enthalpy of ideal gases. Real gases - compressibility factor, Van der Waals and Beattie Bridgeman equations of state. Virial equations of state.

1.7 Thermodynamic Relationships : Maxwell's equations, Joule Thompson coefficient, Clayperon equation, P-V-T, H-P-S, U-V-S surfaces, Mollier diagram, availability and irreversibility, Maximum work in flow processes.

1.8 Mixtures of gases and vapours : Gibbs's, Dalton's laws, properties of ideal gas mixtures, mixing of ideal and real gases, mixtures of gases & vapours, psychrometric principles.

1.9 Chemical Thermodynamics : Fuels, Combustion, reaction, enthalpy of formation, heat of combustion, first law applied to chemical reactions, adiabatic flame temperature, second law applied to chemical reactions, combustion analysis, phase equilibrium, equilibrium constant, variation of equilibrium constant with temperature, fugacity and phase rule.

TEXT AND REFERENCES

1. Spalding and Cole, Engineering Thermodynamics.

2. Reynolds, Williams and Henry Jerkins, Engineering Thermodynamics.

3. Wan Wylen Gordon J and Sonntag, fundamental of classical Thermodynamics.

ENGINEERING MATERIALS SCIENCE

L	T	P	Theory	TW	Pract	Viva
4	0	2	100	25	—	—

1. Introduction : Fundamentals of the Structure of Atom - Bohr Model and the Wave Mechanics Model. The Periodic Table, Chemical Bination and Valen.

2. Molecular Bonds : Types of Bonds in Solids, Comparison of Bonds - Mixed Bonds, Bond Strength and Melting Point.

3. Crystal Structure & Defects : Introductory concepts, Study of BBC, FCC and CPH Structures, The Crystal Systems, Polymorphism, Allotropy, Crystallographic Planes and Miller Indices, Crystallographic Electron Microscopy, Crystal Defects, Dislocation, Berger's Vector, Dislocation energy.

4. Plastic Deformation : Mechanism of Slip, Deformation by Slip, Deformation by Twinning, Slip vs Twinning, Fatigue, Fracture, Comparison of Slip, Fracture and Twinning, Cold Working, Annealing - Recovery, Recrystallization, Grain Growth, Hot working, Hot working vs. Cold working.

5. Study of Microstructure and Properties : Ceramics, Composites and Glass.

6. Introduction to Engineering Metallurgy : Structure of Metals and Alloys, iron-Carbon Phase Diagrams, Classification and Properties of Steels, Principles of Heat Treatment of Steels.

   Properties and Industrial Applications of Alloy Stells, Tool Steels, Stainless Steels and Cast irons, Properties and Uses of Non-Ferrous Materials like Brasses, Bronzes, Aluminium and its Alloys.

   Matallurgical Aspects of Casting and Welding.

   Non-Destructive Testing Techniques.

TERM WORK

Minimum 10 assignments and Practicals based on the above Syllabus.

TEXT AND REFERENCES

1. Dieter, Mechanical Metallurgy, McGraw Hill Publication.

2. Higgins, Engineering Metallurgy, Mc Graw Hill Publication.

3. Bricks Gordon & Phillips, Structure and Properties of Alloys.

4. Reed and Hill, Physical Metallurgy Principles.

MACHINE DRAWING

L	T	P	Theory	TW	Pract	Viva
2	0	8	100	25	—	—

1. Working Drawing : Engineering procedure in Design - Drawing Office, Definition of working Drawing, Different Manufacturing Processes and their effect on Component drawing, Assembly drawing, Detail Drawing. Process Planning, Manufacturing precision in different Processes.

2. Limit Dimension : Introduction, Definitions of Limits and Fits, Tolerances, Allowance, Mechining Grades, Types of fits, Selection of fits, Interchangeability, Tolerance for Form and Position.

3. Dimensioning and Tolerancing : Selection of Dimensions, Functional dimensions, Conventional practice for Dimensioning and Tolerancing of common Features, Importance of Datum Line, Tolerance build-up.

4. Conventional Representations : Conventional representations of common features Sectioning.

5. Assembly and working Drawing :

a) Assembly drawing : Simple Units not having more than eight parts (excluding fasteners etc.)

b) Details Drawing : From Assemblies mentioned para 6.

6. Free hand Sketching :

a) Cottor Joint, Knuckle Joint.

b) Pipe Joints : Common types of joint for Wrought Iron and Cast Iron Pipes and Mild Steel Steam Pipes, Expansion Joints.

c) Valves : Foot Valves, Gate Valves, Globe Valves and Non-Return Valves.

d) Keys and Couplin's : Split-Muff, Protected type Flanged Couplings, Flexible and Universal Couplings.

e) Bearings : Simple Solid, Bushed, Pedestal Footstep Bearings, Conventional Representations of Ball and Roller Bearings, Brackets of different types.

f) Pulleys : Flat belt, V-Belt, Rope pulleys.

g) Involute gear teeth profile

h) Simple steam and I.C. Engines parts such as Pistons, Piston Rods, Connecting Rod, etc.

TERM WORK

Minimum 5 assembly drawings, two dis-assembly drawings, 1 Gear drawing and 1 working drawing.

TEXT AND REFERENCES

1. N. Sidheshwar et al, Machine Drawing, Tata McGraw Hill-New Delhi.

2. N. D. Bhatt, Machine Drawing, Charotar Publishers.

3. P. S. Gill, A test book of Machine Drawing, Katson Publishing House, New Delhi.

4. I. S. I. Code - No. SP 56

5. Parkinson A. C., Intermediate Engineering Drawing, wheeler & Company.

ELECTRICAL ENGINEERING

L	T	P	Theory	TW	Pract	Viva
4	1	3	100	25	—	—

1. DC Machines : EMF Equations; Construction, Excitation methods and load characteristics of DC Machines.

   Starting and Running Characteristics, speed Control of DC Series and Shunt Motors.

2. AC Machines and asynchronous 3 phase induction Motors: Starting and Running Characteristics, Speed Torque Curve and Speed Control.

3. Synchronous Motors : Construction, Theory of Operation and Applications.

4. Economic Aspects : Economic aspects of Utilization of Electrical Energy, Capitalization of Losses.

5. Electrical Heating : Resistance Furnances, Arc Furnances, Induction Furnances.

6. Measuring Instruments : Elementary Principles and Description of the following types of Meters : Permanent Magnet Moving Coil, Moving iron, Dynamometer, Dynamometer

type of Wattmeters. Measurement of Power and energy in 3 Phase Circuits (Balanced Load Only).

Basic Principle of Measurement of non Electrical quanities like Temperature, Light Intensity, Pressure, Force, Strain, Fluid Level, PH and Velocity by Electrical Methods.

TERM WORK

Assignments and Practicals based on the above Syllabus

TEXT AND REFERENCES

1. H. Cotton, Electrical Technology.
2. Partab H., Art and Science of Utilisation of Electrical Power, Dhanpat Rai and Sons Publication.
3. Sawhney A. K., A course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai and Sons Publication.

FLUID MECHANICS

L	T	P	Theory	TW	Pract	Viva
4	1	3	100	25	—	—

1. Basic Concepts : Physical properties of fluids Principle of continuum.
2. Statics : Centre of pressure, gauge pressure, measurement of pressure - manometers - gauges.
3. Fluid Dynamics : Continuity equation - energy equation with and without heat transfer, Transportation theorem. Pipe flow, Equivalent pipe - series and parallel pipes.

4. Boundary Layer : Boundry layer - laminar and turbulent. Separation and control. Drag and lift. Aerofoils and induced drag. Turbulent flow. Universal velocity distribution.
5. Compressible Flow : Basic thermodynamic laws, flow processes, energy equations, stagnation properties, Mach number and compressibility.
   Isentropic Vs. Adiabatic flow, Mach number variation, stagnation and critical properties, flow through nozzle and diffusers, use of gas tables.
6. Measurement Techniques : Flow rarte - velocity measurements, pitot tube, hot wire anemometer - viscosity measurements, Schlieren techniques.

TERM WORK

Assignments and Practical based on the above Syllabus.

TEXT AND REFERENCES

1. James E. A. and William L Haberman, Introduction to Fluid Mechanics.
2. Gupta and Gupta, Fluid Mechanics
3. Ditzworth, Fluid Mechanics.

S.E. (Mechanical)

Semester IV

NUMERICAL METHODS FOR COMPUTER PROGRAMMING

L	T	P	Theory	TW	Pract	Viva
4	0	3	100	25	—	25

1. Finite Differences and Interpolation : Finite Differences of First and Higher Order, Forward and Backward, Central and Divided Differences. Difference tables. Taylor's Operator - D, Shift operator - E, Averaging Operator U.
   Differences of Polynomials. Factorial Polynomial. Newton's Forward and backward difference Interpolation. Sterling's and Bessel's Interpolation formulae, Lagrangian and Newton's Divided Difference Interpolation.

2. Solution Of Equations : Non-Linear Equations : Solutions of non-linear equations of Single, Variable using-Bisection Method, False Position method Secant Method, Newton - Ralphason's Method. Order of Convergence of these methods.

3. Numerical Differentiation and Intergration : Numerical differentiation : Solution of Intial Valued Problems of Differential Equations using - Euler's Method, Predictor - Corrector Methods, Taylor's Series Method, Picard's Methods Runge - Kutta Methods.
   Numerical Intergration : Trapefuidal Rule, Simson's Rules, Weddele's Rule, Richardson's Intra and Extra - polation.
   Compariosn of above Methods and their Error Estimation.

4. Linear Algebraic system of equations : Solution of Linear Algebraic Equations System using Gaussian Elimination Methods, Jacobi's Method, Gauss's Iterative Method, Concept of ill conditioned and well conditioned system.

5. Computer Programming : Implementation of Computer Programe in FORTRAN 77 for Numerical Interpolation, Solution of non-Linear Equations, Solution of Linear System of Equations, Numerical Differentiation and Integration using various Methods listed above.

TERM WORK

The Term Work consists of minimum 15 Assignments and practicals based on above Syllabus.

TEXT AND REFERENCES

1. V. Rajaraman, Computer Oriented Numerical Methods.

2. Mc. Crackan and Dorn. Numerical Methods and Fortran Programming.

KINEMATICS OF MACHINERY

L	T	P	Theory	TW	Pract	Viva
4	4	0	100	25	—	25

1. Basic Concepts : Introduction, Terminology, Kinematic components of Mechanisms, Constrained System Mobility Criterion, Inversions, Mechanism with Lower Pairs.

2. Analysis of Linkages : Position, Displacement, Velocity and acceleration Analysis of Four and Six Link Machanisms (Including Complex Mechanisms) by Graphical, Analytical and Graphical - Analytical Techniques, Computer Aided analysis of Simple Mechanisms.

3. Synthesis of Linkages : Introduction, Kinematic Synthesis of Mechanisms with Lower Pairs, Number Synthesis, Analytical and Graphical Methods of Three-Position Synthesis for

Function Generation, path Generation and Rigid Body Guidance.

4. Direct Contact Mechanisms : Kinematics of Higher - Pair Mechanisms :

   Gears : Introduction, Law of Gearing, Synthesis of Gear Tooth Profile.

   Cams : Introduction, Nomenclature, Follower Motion, Graphical and Analytical Methods of Synthesis of Cam Profile, Cams having specified Contours.

5. Drives : Kinematics of Belts, Chain and Variable Speed Friction Drives.

TERM WORK

Minimum five drawing sheets based on the above syllabus.

TEXT AND REFERENCES

1. Shigley J. E. Theory of Machines and Mechanisms, McGraw Hill publications.

2. Martins, Kinematics of machinery, McGraw hill Publication.

3. Mobile H H and Virk F. W., Mechanisms and Dynamics of machinery, John Wiley & Sons.

4. Ghosh and Mallick, Theory of Mechanisms and Machines, East West Press.

MECHANICS OF SOLIDS - I

L	T	P	Theory	TW	Pract	Viva
4	1	2	100	—	—	—

Concept of Stress :

Uniaxial Tension and compression, Shear Concept of Strain, Strain under Uniaxial Tension and Compression, Shear Strain, Stress - Straon relations under Uniaxial Tension and Compression, Poisson's Ratio, Stress - Strain relation for Biaxial State, Shear Stress - Strain relation. Relation between Young's Modulus and Bulk Modulus, Strain energy under Uniaxial Tension and Compression, Statistically Indeterminate Plane Structure, Biaxial state of Stress, Stresses in Pressure Vessels, Stresses on an Oblique plane, Principal Stresses and Principal Planes, Principal Shear, Mohr's Circle of Stress, Linear Strain in an arbitrary direction, Torsion of circular Bars, Torsion of thin walled Tubes, Bending of Beams, Bending moment and Shear force diagrams, Stresses due to Symmetrical Beams. Combined Stresses due to symmetrical Beams. Combined Stresses due to Bending and Axial forces, Stresses due to Shearing forces, Compound Stresses in Beams, Deflection of Beams by various methods, Special problems in Beams, Buckling of Columns Elementary treatement, ~~Energy methods — Castigliano's Theorem~~.

~~Failure Theories : Yield Theories.~~

TEXT AND REFERENCES

1. E. P. Popov, Mechanics of Materials, SI Version, Prentice Hall Publications.

2. Timoshenko and Young, Strength of Materials, Van Nostrand.

3. Kazimi, Solid Mechanics, Tata McGraw Hill Publications.

4. Benham and Warnock, Mechanics of Solids and Structures, Pitman Publications.

5. Horne, Mechanics of Materials, Pergamon Publications.

INDUSTRIAL ELECTRONICS

L	T	P	Theory	TW	Pract	Viva
4	0	3	100	25	—	—

1. Gaseous Devices : Gas filled diodes, Thyratron, ignitron - Characteristics, Welding Control Circuits - Applications.

2. Thyristors : SCR - Characteristics, Firing, Series and Parallel Connections, Controlled Rectifiers, Applications - SCR Motor control (DC & AC), Phase Control, Chopper firing Circuits.

3. Photoelectric Devices : Photo Emission, Photo-Voltaic Cells, Photosensitive Control Circuits, Applications.

4. Timing Circuits : Timing circuits using Transistors and SCRs, Auto Ignition System using SCR, Furnace Heating Control.

5. Welding and Induction Heating : Intrared and Microwave Heating.

6. Electronic Motor Control : Electronic Motor Control using Power Transistors with and without Feedback, Digital control (Basic Principles using Block Diagrams).

7. Servomechanisms : Position Control using Potentiometers, Servomotors, Tachogenerators, Synchros, Stepper Motors.

TERM WORK

Minimum five assignments based on the above syllabus.

TEXT AND REFERENCES

1. Chute and Chute, Electronics in industry

2. M. Ramamurthy, Thyristors and their Applications.

3. R. Ramshaw, Power Electronics

4. John Ryder, Engineering Electronics.

5. Cage, Industrial electronics.

ENERGY CONVERSION I

L	T	P	Theory	TW	Pract	Viva
4	1	3	100	25	50	25

1. Actual Cycles of IC Engines : General Indicator diagrams of four and two-stroke engines - petrol and diesel.

2. Admission : Admission parameters, Pressure in a cylinder during charging, Quantity of residual gases, Charge heating temperature, Temperature at the end of admission, Coefficient of admission, Residual gas coefficients - four stroke and two-stroke engines, Factors affecting admission coefficient, Charging an engine at constant speed and variable load, Flow of fresh charge.

3. Compression : General, Parameters after compression, Factors affecting compression, Movement of mixture during compression.

4. Combustion : General, Self-ignition, Turbulent ignition. Diffusion Combustion, Combustion in SI engines, Factors

affecting combustion in SI engines (composition of mixture, load, compression ratio, speed, turbulence and shape of combustion chamber). Detonation, Premature ignition, Subsequent self ignition, Precombustion chamber ignition.
Combustion of CI engines, Factors affecting combustion in CI engines (compression ratio, injection, advance angle, atomization of fuel and duration of delivery, speed).
Thermodynamics of combustion process

5. Expansion and Exhaust : Expansion, Effect of various factors on polytropic expansion, Heat balance of expansion process. Exhaust, composition of exhaust gases and methods of detoxication.

6. Characteristics of Working Cycle : General, Indicated characteristics, Relationship between the principal parameters characterizing the working cycle.

   Brake Characteristics : Factors affecting indicated characteristics of SI engines - compression ratio, design parameters and shape of combustion chamber, cylinder dimension, mixture composition, etc.

   Factors affecting indicated characteristics of CI engines - mixture formation, type of combustion chamber, compression ratio, injection advanced angle, etc.

   Effect of cycle parameters on indicated power and mean indicated pressure, factors affecting the mechanical losses and methods used to determine them. Factors affecting the brake characteristics of an engine (full load and variable speed - SI and CI engines).

7. Characteristics of SI and CI Engines : General, Speed characteristics, Load characteristics, Special characteristics, Stable operation and torque reserve.

8. Supercharging : General, Supercharging systems, Turbocharging, Characteristics of supercharged engines, Inertia supercharging.

9. Heat balance and thermal calculations

10. Reciprocating Compressors : Theory of compression, Types of compressors-single and multi-stage, multi-stage with intercooling, Calculation of minimum work done, Efficiencies.

11. Gas Turbines and Jet Propulsion : Open and closed cycles, Cycle characteristics of gas turbines, Momentum, thrust, Performance characteristics, use of regeneration, Preheat and Reheat, Effect of parameters on power output and efficiency. Types of jet engines : Turboprop, Turbofan, Turbojet, and Ramjet engines, their comparison and characteristics, rocket and missile propulsion.

TERM WORK

The term work will consists of minimum 10 Assignments and Practicals based on above syllabus.

TEXT AND REFERENCES

1. Mathur M. L. and Sharma R. P., A course in Internal Combustion Engines, Dhanpat Rai & Sons, Delhi, 1984.
2. Taylor, The Internal Combustion Engines, Vol I & II.
3. Rogers and Saravanamutto, Gas Turbine theory.

MANUFACTURING TECHNOLOGY I

L	T	P	Theory	TW	Pract	Viva
4	0	4	100	25	50	25

1. Foundry Technology : Solidification of metals and alloys, design of patterns and pattern making.

   Moulding : Moulding sand - properties, control and testing,

moulding machines, core and core making. Moulding processes, study of various types.

Casting : Steps in casting process and advantages, types of casting processes, sand casting, die casting centrifugal casting, vacuum casting, shell moulding, investment casting, etc. Casting design-pouring and feeding, design of sprues, gatings, runners and risers. Study of special casting processes.

Foundry furnances : Cupola and calculation of its charge, crucible, reverberatory and air furnances.

Cleaning, finishing and heat treating of castings.

Casting defects and remedies.

Inspection and testing of castings.

Foundry mechanization.

2. Welding Technology : Advantages and limitations of welding as a manufacturing process.

Weldability of Ferrous and non-ferrous metals and alloys.

Revision of concepts of metallurgical aspects of welding. Typical joints in welding and joint preparation.

Welding Processes : Principles, applications and process capabilities of different methods of arc welding, gas welding and resistance welding. Study of special welding processes. Study of welding equipments. Principles and various methods of weld inspection and testing. Selection of electrodes.

Soldering and Brazing Technology.

3. Metal Forming Technology : Basic Principles of Hot and Cold Working, Classification of forming processes.

Rolling : Rolling Equipments, Forces and Geometrical Relationship, Torque and HP calculation.

Forging : Classification, Equipments in forging, force calculation.

Extrusion : Classification, Equipments in Extrusion, Force calculation.

Drawing : Wire, Rod and Tube Drawing.

TERM WORK

Practical work and minimum ten assignments based on the above syllabus.

TEXT AND REFERENCES

1. HMT, Production Technology

2. Campbell J. S. Principles of manufacturing Materials and Processes, Tata Mc Graw Hill, 1974.

3. Belley P. R. Foundry Technology, Butterworths.

T.E. (Mechanical)

Semester V

INDUSTRIAL ECONOMICS

L	T	P	Theory	TW	Pract	Viva
4	1	0	100	—	—	—

1. Introduction : Scope of Engineering Economics, Demand theory and forecasting, Economics of scale, Market structure, Production function, Output and pricing decisions.

2. Costing : Cost classification, Cost accounting, Cost absorption, Design of standard costing system, Overhead cost control.

3. Financial Accounting : Preparation and interpretation of profit and loss accounts, Balance sheets, Preparation of financial statements.

4. Capital Budgeting : Capital borrowing and bank financing, Working capital management.

5. Economic Analysis : Discounted cash flow analysis, Depreciation, Replacement analysis, analysis of risk and uncertainty, Cost-Benefit analysis.

TEXT AND REFERENCES

1. Riggs, R. L., Engineering Economics, McGraw Hill Intl.

2. Sepulveda, et al, Schaum's Outline of Engineering Economics, 1984.

QUALITY MANAGEMENT

L	T	P	Theory	TW	Pract	Viva
5	2	0	100	25	—	25

1. Probability and Distributions : Basic concepts, Baye's theorem, Discrete Distributions : Binomial, Geometric, poisson. Continuous Distributions : Uniform, Exponential, Normal, Erlang. Central Limit Theorem, Testing of Hypothesis.

2. Statistical Quality Control : Process Control Charts for Variables and Attributes, Process Capabilities.
   Acceptance Sampling, Sampling Plans : Single, Double, Multiple, Sequential, Dodge - Roming Tables. MIL - STD.
3. Reliability : Basic Concepts, Component and System reliability, Series, Parallel and Complex Systems, Availability and Maintainability.
4. Total quality control :
   — Concepts
   — Quality Improvement
   — Quality circles
   — Zero Defects Programme

TERM WORK

Minimum 10 assignments based on the above syllabus.

TEXT AND REFERENCES

1. Grant E. L. and Leavenworth R S, Statistical Quality Control, 6th edition, McGraw Hill, 1988.

2. Juran J M and Gyrna F M Quality planning and Analysis from Product Developmet through usage, 2nd edition, Mc Graw Hill, 1980.

3. Ishikawa Kaoru, Guide to Quality Control, Asian Productivity Organisation, 1982.

4. Ross, Taguchi Techniques for Quality Engineering.

DYNAMICS OF MACHINERY - I

L	T	P	Theory	TW	Pract	Viva
4	2	2	100	25	—	25

1. Gears : Types of Gears, Conjugate, Profiles, Involute and Cycloid as Gear Tooth Profile, their Comparison.
   Super Gears : Terminology, Length of Path of Contract, Arc of Contact, Contact Ratio. Standard Gears, Interference and Undercutting, Involumetry, Gear Tooth Correction for Interference and Center Distance Modification, Internal Gears, Secondary Interference.
   Helical Gears : Terminology, tooth Action, Contact Ratio, Application, crossed helical gears
   Worm and Worm Gears : Terminology and applications.
   Bevel Gears : Terminology, Tooth Action, Tregold's Approximation.
   GEAR TRAINS : Simple, Compound and Epicyclic gear trains.

2. Force Analysis : Static Force Analysis and Dynamic Force Analysis in Link Mechanisms and Direct Contact Mechanisms (not more than four links), Efficiency of worm and Spiral Gears.

3. Clutches : Single Plate, Multiplate and Clone Clutches, Constant Wear and Constant Pressure consideration, Power transmitted and power lost.

4. Breaks and Dynamometers : Shoe Brake - internal and External, Band and Block Brakes, Absorption and Transmission, Types of Dynamometers.

5. Flywheels :Turning Moment Diagrams, Fluctuation of Energy, Fluctuation of Speed, Determination of Flywheel Inertia.

6. Governors : Static Force Analysis, Characteristics.

7. Gyroscopes : Gyroscopic Effects, Stabilization of Ships, Stability of Four Wheelers and Two Wheelers.

TERM WORK

Practical experiments and minimum twenty Problems based on the above syllabus.

TEXT AND REFERENCES

1. Shigley J. E., Theory of Machines and Mechanisms, Mc Graw Hill Publications, 1990.

2. Morrison and Crossland, Dynamics of Machinery.

3. Mobie H. H. and Oc-Vivrk F. W. Mechanisms and Dynamics of Machinery, John Wiley & sons, 1978.

HEAT MASS TRANSFER AND COMPRESSIBLE FLOW

L	T	P	Theory	TW	Pract	Viva
4	1	2	100	25	—	25

A Heat Transfer

1. Introduction : Importance of heat transfer and insulation in engineering, three modes of heat transfer. Units and dimensions used in heat transfer (for thermal conductivity, thermal diffusivity, convection, heat transfer coefficient, Stefan - Boltzman's constant, viscocity - Absolute and kinematic etc.)

2. Conduction : Mechanism of heat transfer by conduction. Fourier's three dimensioanl differential equation for heat flow with heat generation in unsteady state.

   Solution of Fourier's equation for dimensional steady state conduction through homogenous and isotropic materials of various configurations - plane wall, plane composite wall, radial heat flow through cylindrical and spherical composite walls, critical thickness of insulation, unsteady state, one dimensional heat conduction through a plane wall of isotopic, homogenous material, concept of thermal diffusivity, variation in temperature, distribution at various points in the wall with time.

   Solution of Fourier's equation - conduction through plane wall of isotropic, homogenous materials. Concept of thermal diffusivity.

3. Convection : Mechanism of convection, free and forced convection heat transfer coefficients (film coefficient) for convection. Effect of various parameters like physical properties of the fluid, system geometry, fluid flow, etc. on heat transfer coefficient.

   Application of dimensional analysis to deduce the relationship with various dimensionless groups.

   Nusselt number, Grashof's number, Reynold's number, Prandtl's number.

4. Radiation : Mechanism of heat transfer by radiation. thermal emission. Absorptivity, reflectivity and transmissivity. Concept of black body. Emissivity and Absorptivity of metallic and non-metallic surfaces.
Kirchoff's law, Planck's law of monochromatic radiation of a black body, Wien's displacement law.
Stefan - Soltzman's law of total radiation, Intensity of radiation - Lambert's cosine law.
Radiant heat exchange between surfaces of various geometric configurations and emissivities, gas radiation.

5. Heat Exchangers : Types of heat exchangers, Logarithmic mean temperature difference, Overall heat transfer coefficient, Condensers and evaporators.
Effectiveness of heat exchangers, effectiveness as a function of number of transfer units and heat capacity, flow ratio of hot and cold fluids. Fouling factor. Pressure drop in fluids across heat exchangers.

6. Mass Transfer
Importance of mass transfer in engineering, Mass transfer accompanied by heat transfer.

Fick's law of diffusion for isothermal diffusion of gases, Equimolal diffusion. Diffusion coefficients of various gases and vapours in air. Isothermal evaporation of water into air at constant total pressure.

Lewis number. Mass transfer coefficient, Gillil and empirical relationship, Sherwood number, Reynold's number, Schmidt's number.

C. Compressible Flow :

1. Revision : Isentropic flow through nozzles, diffusers, area of cross section, variation of parameter.

2. Flow with normal shock : Development of shock, governing equation, Mach number variation, changes in static and

stagnation pressure, temperature, density and entropy across the shock. Use of gas tables.

3. Flow with oblique shock wave : Development, Prandtl's equation, Variation of flow parameters across the shock, Prandtl - Meyer's equation, Mach waves. Use of gas tables and charts.

4. compressible flow with friction : Fanno lines, flow equations in constant area ducts, variation of parameters, duct lengths - isothermal flow with friction, Duct length for isothermal flow with friction, variation of parameters for isothermal flow. Use of gas tables and charts.

5. Compressible flow with heat transfer : Rayleigh lines, Flow equations in constant area ducts with heat transfer, variation of parameters, shock flow, maximum heat transfer, heating and cooling. Use of gas tables and charts.

TERM WORK

Minimum ten assignment based on the above syllabus.

TEXT AND REFERENCES

1. Sukhatme S. P., Heat and Mass Transfer

2. Jackob and Hawkins, Heat and Mass Transfer.

3. Yahya S. M., Fundamentals of Compressible Flow, Wiley Eastern Ltd., 1982.

4. Holman J. P., Heat Transfer, 7th Edition, 1990.

MECHANICS OF SOLIDS - II

L	T	P	Theory	TW	Pract	Viva
4	1	2	100	25	—	25

Analysis of Stress in three Dimensions, Analysis of Strain in three Dimensions, Stress-Strain Relations, theories of Failure of Yield Criteria, Bending of Beams, Asymmetrical Bending, Shear Centre, Curved Beams, Deflection of Thick Curved Beams, Energy Methods - First and Second Theorem of Castigliano, Statically Indeterminate Structures, Torsion of General Prismatic Bars, Torsion of Circular and Symmetrical Bars. Membrane Anology, Torsion of Thin Walled Tubes, Axisymmetrical Problems involving Thick walled cylinders, Stresses in Composite Tubes, Rotating Disks of uniform Thickness and variable thickness, Rotating Shafts and Cylinders, Introduction to Thermal Stresses Thermoelastic, stress-strain relations, strain displacement relations, Thin Circular disks, long Cylinders, Long Beams, Straight and Curved Beams, Columns, Energy Methods for Columns.

Introduction to the Theory of Plasticity and beyond Elastic Region.

Contact Stresses and Stress Concentration.

TERM WORK

Minimum 10 Assignments based on the above syllabus.

TEXT AND REFERENCES

1. L. S. Srinath, Advanced Mechanics of Solids, Tata McGraw Hill Publications.
2. Seely and Smith, Advanced Mechanics of Materials, John Wiley & Sons.
3. C T Wang, Applied Elasticity, Mc Graw Hill Publications.

MANUFACTURING TECHNOLOGY -II

L	T	P	Theory	TW	Pract	Viva
5	0	4	100	50	—	25

A Machining

1. Turning : Forces in Turning, Cutting Tool Materials, Cutting Fluids, Tools Geometry, Effect of Tool Parameters on Tool Life, Merchant's Theory, Economics of Machining, Design of Simple turning fixtures, Measurement of Turning forces, Turning of Ferrous and Non-Ferrous Materials, types of Turning Operations.

2. Milling : Forces in Milling, Milling Dynamometers, Design of Cutters, Milling Fixtures, Selection of cutters, Gear Milling, Types of Milling Operations.

3. Drilling : Analysis of Force and Torque in Drilling Operations, Drilling Dynamometers, Design of Drills for Cutting Ferrous and Non-Ferrous Materials, Design of Jigs and Bushes, Reaming, types of Drilling operations.

4. Grinding : Forces in Grinding, Economics of Grindings, Fixtures for Grinding, Selection of Grinding Wheels, Type of Grinding, Lapping, Honing and Superfinishing.

5. Miscellaneously Machining Operations : Miscellaneous Operations such as Shaping, Broaching, and Planing.

B. Sheet Metal working :

1. Theory of Sheet Metal Working : Analysis of forces in sheet metal working, effect of clearance.

2. Study of Press Working Operations :

Shearing, Blanking, Punching, Slotting, Notching, Trimming, Bending, Drawing, Embossing, etc.

3. Die Construction and Design : Study of simple, compound, combination, progressive and transfer dies.
   Design of blanking, shearing, forming & deep drawing dies.

4. Classification and Selection of Presses.

5. Methodology of Stock Layout.

TERM WORK

1. Study of Constructional Features, operations, Attachments and Work Holding Devices of Lathes, Drilling Machines, Milling Machines and Grinding Machines.

2. Composite Job Manufacturing.

3. Minimum Five assignments based on the above syllabus.

TEXT AND REFERENCES

1. Eary F Donald and Reed Edward, Techniques of Pressworking sheet metal, end edition, Prentice Hall, Inc.

2. Donaldson, Tool Design, Tata Mc Graw hill publishing Company.

3. ASTME Tool Design.

4. HMT, Production Technology.

T.E. (Mechanical)
Semester VI

MACHINE DESIGN - I

L	T	P	Theory	TW	Pract	Viva
4	1	4	100	25	—	50

1. Revision : Materials and their heat treatment, Stress-strain and their relationship, Fatigue, Fracture, Creep, Modes of Failure, Theories of failure, Selection of limits, fits, tolerances and surface finish.

2. Design Principles : Standardization, Use of data books and design handbooks, IS and other standards.
   Design methodology, Basic criteria of design, types of loading - static, dynamic, impact, alternating, etc. Endurance diagram, Goodman and Soderberg lines, Factor of safety allocation.

3. Design of the various components subjected to direct loading - cotter joint, knuckle joint, turn buckle, etc.

4. Design of joints for axial and eccentric loading like bolts, rivets, welds, etc.

5. Elastic analysis for threaded fasterers with gasket and washer for static and variable loading.

6. Design of machine members subjected to pure bending levers, columns, etc.

7. Design of press fitting, shrunk fitting, for stationary and rotating parts.

8. Design analysis and selection of standard components s jected to torsional loading - couplings, splines etc.

9. Design of shafts, axles, for motion, force and power tra mission and as a supporting member.

10. Design of helical, leaf, torsional and other springs application such as energy storage, providing predetermi force, suspension, etc.

TERM WORK

Design and drawing of typical engineering compone based on the above syllabus.

TEXT AND REFERENCES

1. Deutschman, A. et. al., Machine Design : Theory a Practice, Macmillan International Edition.

2. Faires V. M. Design of Machine Elements, Macmillan Co pany.

3. Shigley F. E. Mechanical Engineering Design, McGraw H Publication.

4. Phelan R. M. Fundamentals of Mechanical Design, T McGraw Hill publications.

MANUFACTURING TECHNOLOGY - III

L	T	P	Theory	TW	Pract	Viva
4	1	2	100	25	50	—

1. Gear Manufacturing : Gear materials, Gear milling and its limitation, Gear hobbing, Gear shaping, Gear broaching, Gear finishing - grinding, lapping and shaving.

2. Powder Metallurgy : Manufacture of metal powder, Processes, of manufacture, Application of Powder metallurgy.

3. Jigs and Fixtures : Elements of jigs and fixtures, Types of jigs and fixtures, Fixtures for turning, Fixtures for grinding, milling, welding and assembly.

4. Modern Machining Processes : Description and process characteristics of : ultrasonic machining, abrassive and water jet machining, electrochemical machining, electrical discharge machining electron and laser beam machining.

5. Modern Manufacturing : Introduction to NC system, NC system : features, advantages and economics. Basics of CAM, NC tooling.
Concepts of GT and its importance. Strategic approach to GT, Areas of application to GT and its benefits to industry. Basics of FMS, FMS components, Cells and Transfer lines, Robots in Manufacturing.

6. Trends in Manufacturing Technology : Introduction to JIT system and CIM system.

7. Manufacturing Planning :
Part print analysis, Processing sequence, Machine capacity. Machine selection, Manufacturing errors and methods of obtaining specified dimensions, Choice of datum surface, Application of tolerance chart, Selection of processing parameters, Introduction to CAPP.

TERM WORK

Laboratory experiments and assignments based on the above syllabus.

TEXT AND REFERENCES

1. Patel, R. C., and Gupte C. G. Production Technology, Vol. I, G. Jamanadas and Co. 1986.

2. Dalela S. Manufacturing Science and Technology, Vol III Umesh Publication, New Delhi, 1991.

3. Grover M. P. and Zimmers E. W. CAD/CAM. Prentice Hall of India, 1986.

4. Every Donald F. and Johnson Gerald E. Process Engineering for Manufacturing, Prentice Hall International, 1962.

DYNAMICS OF MACHINERY - II

L	T	P	Theory	TW	Pract	Viva
4	1	2	100	25	—	25

1. Balancing of Machinery : Static and dynamic balancing of multi rotor systems, balancing of reciprocating masses, primary and secondary balancing, application to locomotive balancing, in-line, V, and opposed piston engines.

2. Vibration in machinery : Fundamentals of vibration, single degree of freedom system, undamped and damped free vibration, forced vibration, support induced and unbalanced reciprocating and rotating mass induced vibration magnification factor, transmissibility, vibration isolators, accelerometer and vibrometer, whirling of single and multi rotor shafts.

CAM DYNAMICS

Two degree of freedom system, normal modes, vibration, absorbers.

Multi degree freedom system, matrix methods, decoupling with and without damping.

Experimental methods in vibration analysis.

3. Dynamics of Linear Feedback Control System : Definition, response of first order and second order linear system to standard inputs like step, ramp and harmonic.

TERM WORK

Laboratory experiments and assignments based on above syllabus.

TEXT AND REFERENCES

1. Seto, Schaum's Outline of Mechanical Vibrations.

2. Morrison and Crossland, Dynamics of Machinery.

3. Phelan, Dynamics of Machinery, Mc Graw Hill International.

4. Ravan, Automatic Control, Mc Graw Hill Publications.

INDUSTRIAL ENGINEERING AND MANAGEMENT

L	T	P	Theory	TW	Pract	Viva
4	1	2	100	—	—	50

1. Scope and Definitions of IE Functions : Productivity, Factors affecting productivity, Method study - Recording technique, Principles of motion economy, Concepts of normal time and Standard time, work measurements : time study, work

sampling, PMTS and standard data, MTM System, Learning curves.

2. Ergonomics : Physiological basis of human performance, Biomechanics, Psychology of work and work load perception, Physical work environment, Ergonomic design of work system - case studies.

3. Job Evaluation and Incentive Scheme :
Job description, Job analysis, Methods of job evaluation, Incentive schemes : individual and group.

4. Value Engineering : VE concept, Principles, Methodology and scope, VE case studies.

5. Principles of Management : Different approaches to management, Organisations and human behaviour, Organization structure and design, Group dynamics, Theories of motivation, Leadership style, Principles of effective communication, Management of changes, Management by objectives, Social values and responsibilities, Management of quality of work life, Business ethics, Introduction to technology management, Management controls.
Factory legislation in India : Settlement of industrial disputes, factory acts, payment of wages act, workmen compensation. Employees State Insurance.

TEXT AND REFERENCES

1. Saunders M S and Mc Cormick E J, Human Factors Engineering and Design, Mc Graw Hill, NY, 1987.

2. Mundel Marvin E. Improving Productivity and Effectiveness, Prentice Hall, 1983.

3. Tufty G Harold, Compendium on Value Engineering, Indo American Society, Bombay, 1983.

4. Koontz, O'Donnel, Management : A systems, Analysis of Managerial Functions, Mc Graw Hill, 6th Edn.

ENERGY CONVERSION - II

L	T	P	Theory	TW	Pract	Viva
4	1	4	100	25	50	25

1. Fundamentals of Turbomachines : Introduction, Positive displacement machines and turbomachines, Static and stagnation states, Application of first and second laws to turbomachines, Efficiency of turbomachines.

2. Energy Exchange in Turbomachines : Energy transfer expression, Impulse and reaction turbines, Utilization factor, Compressors and Pumps.

3. Flow through nozzles and Blade Passages : Steady flow, Variation of area in one-dimensional isentropic flow, Friction, Nozzle characteristics, Flow of wet steam through nozzles, Diffusers.

4. Steam and Gas Turbines : Impulse staging, Velocity and pressure compounding, Blade and nozzle losses, Reaction staging, Reheat factors, Performance characteristics of steam turbines.

5. Rotary Fans, Blowers and Compressors : Centrifugal blowers- Types, Vane shapes and their characteristics, Slip coefficient.

Fans - fan laws and characteristics.

Compressors - centrifugal compressors and its performance, compressibility and prewhirl.

Axial flow compressors - cascade and performance, preheat in compressors.

6. Hydraulic Turbines : Hydraulic power, Classification turbines, Velocity triangles, Efficiencies, Pelton wheel, Fran and Kaplan turbines, Application of aerofoil theory propeller blades.

7. Pumps : Centrifugal pumps, Output and efficiency, Mul stage centrifugal pumps, Axial flow pumps.

8. Characteristics of Hydraulic Turbomachines : Main chara teristics, Operating characteristics, Constant efficiency curve Cavitation.

9. Power Transmitting Turbomachines : Principle, Fluid co pling, Torque converter.

10. Wind Turbines : Available energy in a wind stream, Ho zontal axis wind turbines. Power, Thrust and efficien Vertical axis wind turbines.

11. Reciprocating Pumps : Principle of working, Classificatio work done by single acting and double acting reciprocati pumps, Slip and coefficient of discharge, Air Vessel, Mul cylinder pumps, Operating characteristics of reciprocati pumps.

TERM WORK

Minimum of ten assignments based on the above syllabu

TEXT AND REFERENCES

1. Kadambi and Prasad, Energy conversion Vol III, An intr duction to Turbomachinery, Affliated East West Press.

2. Yahya, S. M. Turbines, Fans and Compressors, Tata McGra Hill, 1985.

3. Shephards, Turbomachines.

4. Jagdish Lal, Hyrdaulic Machines, Metropolitan Book Company, Delhi.

ENGINEERING MEASUREMENTS

L	T	P	Theory	TW	Pract	Viva
4	0	2	100	25	—	—

Performance Characteritics of Instruments :

Static Chararacteristics : Generalized Mathematical Model of Measurement Systems, Operational Transfer Functions, Servo, First and Second Order System, Step - Ramp, Sinusoidal, Parabolic, and Impulse Responses of above Systems, General Form of Instruments, Periodic and Transient Inputs, Measurement and Analysis of Errors.

Measurement of following Engineering Quantities by various methods : Force, Pressure, Torque, Shaft Power, Displacement, Velocity, Acceleration, Stress and Strain, Thermal Conductivity, Radiation, Temperature, Humidity.

Operational Amplifiers, Applications and use in Simulation, Computerized Data Acquisition Systems.

Factors Affecting Instrument Selection like Accuracy, Cost, Reliability, Environmental Effects, etc.

Metrology : Line, End and Wavelength Standards, Linear and Angular Measurements, Comparators, optical Instruments, Flatness and Straightness Testing, Surface Roughness Measurement, Screw and Gear Measurement, Limit Gauging.

TERM WORK

Minimum ten assignments and laboratory experimentatio based on the above syllabus.

TEXT AND REFERENCES

1. Doeblin, Measurement Systems McGraw Hill Publications 1990.

2. Backwith and Buck, Engineering Measurements, 3rd Ed Addison Wesley, 1982.

3. Holman, Jack P., Experimental Methods for Engineers, 2nd Ed. 1989, McGraw Hill Publications.

SEMESTER VII

POWER PLANT ENGINEERING

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	25

1. Power Generation System : Electric power, Energy source for power plants, power systems and utility demand patterns, modern electric generating systems, economics o electric power production.

2. Fossil-fuel steam power plant : Power plant layout and components, fuels, properties of petroleum fuels, Natural gas, Coal, Coal cleaning and processing. Fuel handling system, types of steam generators, steam generator anlaysis, steam seperation, economizer, superheater, reheaters, condenser, feed water heater, Deaerator, attememperator, steam generator control. Air circulation and heating system, water treatment systems, cooling towers, Emission control, system

waste disposal, Steam turbine, turbine configuration, turbine analysis, turbine control.

Nuclear Power Plant : Principles of nuclear fission, power reaction systems, thermal analysis, Nuclear fuel cycle.

Gas turbine power plant : Combind cycle, off design turbine analysis.

Hydro-electric power plant : Hydraulic turbines, pumped storage system, turbine control.

TERM WORK

Minimum eight practicals covering the syllabus.

TEXT AND REFERENCES

Joel Weisman and L. E. Eckart, Modern Power Plant Engineering.

Wakil, Power Plant Engineering.

PERATIONS MANAGEMENT

L	T	P	Theory	TW	Pract	Viva
5	3	0	100	25	—	25

Concepts in operations planning and concepts for various operational systems in manufacturing and service sectors.

Forecasting techniques.

Aggregate planning and master production scheduling.

— Dependent and independent demand, MRP and Invento control.

— Sequencing and Scheduling - single processor, two processo and multi-processor systems.

— Flow-shop and job-shop systems - heuristic algorithms.

— Concepts and quanititative methods in plant location, pla layout, materials handling, and assembly line balancing.

— Project planning and control.

TERM WORK

Assignments and excercises based on the above syllalbu

TEXT AND REFERENCES

1. Monks J. G., Operations Management : Theory and Practi McGraw Hill, 1985.

2. Martin K Starr, Operations Management, Prentice Hall.

3. Vollman Thompson et al., Manufacturing Planning a Control Systems.

4. Fogarty Donald W and Hoffman Thomas R, Production a Inventory Management, South Western Publishing Com

5. Montgomery D C and Johnson L A Operations Research Production Planning and Control.

D - CAM

T	P	Theory	TW	Pract	Viva
1	3	100	25	—	25

Fundamentals of Computer Technology, Fundamentals of D - CAM.

Computer Graphics : Hardware - Input & Output devices, ractive graphics, Scan conversion, 2D Graphic Transforma- s, windowing & clipping, Hidden line & Hidden - Surface oval. Elementary computer graphics algorithms.

Geometric Modelling : Introduction to curves & surfaces, mentary curve & surface design, Fundamentals of solid delling.

Introduction to finite Elements Method.

Automation, NC, CNC, DNC & Adaptive control systems d in manufacturing, NC part programming for drilling, ling & turning, ATP part programming.

Robotics : Configuration, selection programming methods & plications.

Computer Aided process control.
FMS : overview of FMS, Design of FMS, GT, CAPP, Com- ter Assisted Testing & Inspection, Automated Material Han- g System, Automated Storage & Retrieval Systems.

REFERENCES

Groovers & Zimmers : CAD - CAM, Prentice Hall.

Groover : Automation, Production system and Computer Integrated Manufacturing Prentice Hall.

S. P. Dalela : Manufacturing Science & Technology.

MACHINE DESIGN - II

L	T	P	Theory	TW	Pract	Viva
4	1	3	100	50	—	50

Design of the following mechanical components : Helic springs - closed and open, Spiral Spring, Leaf spring ar other energy storing devices.

Anti friction bearings - ball, roller and tapered.
Theory of hydrodynamic lubrication, types of lubricatio design of journal bearings, aerostatic bearings.
Clutches and brakes.

Gears - Spur, Helical, Bevel and Worm and gear trains; Cams.

Machine frames, housings, beds guideways, slideways, co umns and arms.
Morphology of design.

TERM WORK

Design excercises based on the above syllabus.

TEXT AND REFERENCES

1. A. D. Deutschman, Machine Design Theory and Practi MacMillan, 1975.

2. R. E. Merit, Gears, Pitman 1954.

APPLIED OPERATIONS RESEARCH

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

— Introduction to operations research and modelling, role of OR in problem solving and decision making, formulation of decision problem as LP.
— Simplex method.
— Duality.
— Post optimality analysis and their applications.
— Transportation and assignment models.
— Game theory, Queuing Models.
— Integer programming, Dyanamic Programming
— Network Analysis.

TERM WORK

Mathematical programming and problem solving excercises based on the above syllabus.

TEXT AND REFERENCES

1. Hiller F S and Lieberman G. J. Introduction to Operations Research, 2nd edition, Holden Day, Inc. London, 1974.

2. Taha H. A., Operations Research, 3rd edition, MacMillan Publishing Company, 1982.

3. Loomba N Paul, Management : A Quantitative Perspective, MacMillan Publishing Company, 1978.

4. Ravindran A., Philips Don T, and Solberge James J Operations Research : Principles and Practice, John Wiley, NY, 1988.

5. Krajewski Lee J and Thompson Howard E, Management Science - Quantitative Methods in Context, John Wiley & sons Inc., NY, 1981.

AUTOMOBILE ENGINEERING

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

Power Plant : Constructional features of different types of engines used in automobiles, their characteristics.

Vehicle Performance : Resistance to the motion of vehicles - air rolling gradient resistances, power requirement for acceleration and grade ability, selection of suitable rear axle and gear ratio.

Gear Boxes : Necessity of gear box, sliding mesh, constant mesh, and synchromesh and epicycle type, overdrives. Hydrodynamic torque converter.

Clutches : Friction clutches, clutch meterial, torque carrying capacity. Requisite of modern passenger car clutches, centrifugal clutches and car couplings.

Propeller Shafts and Universal joints : Whirling speed of propeller shafts, different types of universal joints and constant velocity Universal joints.

Rear Axle Claasification : Live axles, semi-three quarters, full floating, swinging axle and De-Dion types. Torques and thrust members - single and two speed. Double reduction and tandem axles. Hotchiss drive, torque tube and radial rods. Final drive spiral, bevel, hypoid and worm drives. Differentials.

Wheels and tyres : tyre-constructional features and characteristics.

Frames : function and loading, types, unitised construction, location of power plant and drive, front wheel drive, four wheel drive and rear engine construction.

Steering and front axles : Steering geometry, steering gear requirement, types of steering gears, steering for suspension, types of front axles and their construction.

Suspension : Pitching, bouncing, and rolling. types of springs. Independent suspensions.

Brakes : Theory of shoe brakes, shoe factors, weight transfer.

Brake power ratio. Hydraulic and power brakes.

Electrical equipment : Electric circuits, wiring system, ignition system - magnetic, electronic and coil. Dynamo, battery, regualators, starting motors, lighting and auxilliary circuits.

Principles of maintainence and servicing of vehicles. Lubrication.

TERM WORK

Laboratory practicals, study projects and field visits.

TEXT AND REFERENCES

1. Heitner, Automotive Technology.
2. Newton Steads, Motor Vehicles.

SYNTHESIS OF MECHANISMS

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

1. Definitions : Links, Pairs and joints, kinematic chain - open and closed kinematic mechanism, degree of freedom of planar and spatial mechanisms, fixed and moving bodies.

2. Type Numbering and Dimensional Synthesis of Plana Mechanisms. Selection of types of mechanisms (link, ca and gear) for specified motion requirement, number synth sis for single degree of freedom mechanisms.

3. Dimensional Synthesis of Planar Link Mechanisms : Graphi cal and analytical techniques for synthesis of planar mecha nisms - inflection circle, cubic of stationary curvature fo infinitesimally separated positions and their use in synthesi Pole triangle and opposite pole quadrilateral for finitel separated positions and their use in synthesis, algebraic an complex number techniques for synthesis.

4. Gears : Number synthesis of gear trains, fixed and chang gear boxes, tooth modification, epicyclic gear train synthes of low ratio - restricted to two stage gear trains.

5. Cams : Synthesis of cam profiles for specified motions, us of polynomials and trignometric curves, polydyne cams Application of above to machine tools and other machines

TERM WORK

Excercises on above syllabus in the form of design, drawin and numerical or critical review of literature.

TEXT AND REFERENCES

1. Ghosh and Mallik, Theory of Mechanisms and Machines Affiliated Last West Press, 2nd edition.

2. A. S. Hall (Jr.) Kinematics and Linkage Design, Prentice Hal Publishers.

3. J. Hirshhom, Kinematics and Dynamics of Machinery, M Graw Hill Publishing Company.

ADVANCED THEORY OF METAL CUTTING

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

Importance and capabilities of metal machining. Nomenclature of single-point cutting tool and multi-point cutting tools. Geometric model of machine process, types of chip formation, Shear Plane and Merchant's Model, Finite Zone Model calculation of Metal Cutting Strain, cutting forces and tool stresses. Models for force, temperature and tools life of single-point and multiple-point machining. Cutting fluids and their selection. Tool wear, tool life and tool failure.

Tool materials. Design of single-point cutting tools, form tools, mills, drills, boring tools, broaches, taps, hobs and gear cutting tools. Tool holders, Indexable inserts, NC tooling.

TERM WORK

Assignments and excercised based on the above syllabus.

TEXT AND REFERENCES

1. Aarmarego E J A and Brown R H, The machining of Metals, Prentice Hall, Inc., 1969.

2. Sen G C and Bhattacharya A, theory of Metal Cutting, New Central Book Agency, 1969.

3. Juneja B L Mechaning Processes : Theory and Practice, Sehgal Educational Publishers, 1973.

MAINTENANCE MANAGEMENT

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

Reliability : Definition and basic concepts, reliability calculatio for series, parallel and parallel-series systems, failure data, failu modes. Reliability in terms of hazard rates and failure densit Hazard model and bath tub curve. Application of Weibu distribution, reliability and availability calculation for maintaine and standby system, reliability allocation.

Maintainability : definition and basic concepts, relationshi between reliability, availability and maintainability. Correctiv maintenance time distribution. Maintainability allocation, mai tainability, demonstration, design consideration of maintainabi ity. Introduction to life testing, estimation of parameters fo exponential and Weibull distribution.

Types of maintenance, emergency/break-down maintenanc planned maintenance, preventive maintenance and correctiv maintenance. Prediction of corrective maintenance times, produ tion maintenance integration, application of simulation tech niques. Design, implementation and operation of an integrate maintenance system.

TERM WORK

Assignments and excercises based on the above syllabus

TEXT AND REFERENCES

1. Blanchard B S, Maintainability Principles and Practices, M Graw Hill, NY, 1969.

2. Carder A S, Maintenance Management, Mc Graw Hill NY 1976.

ALTERNATIVE ENERGY SOURCES

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

Conventional sources of commercial energy : fossil fuels, nuclear and hydroelectric.

Solar energy - direct and indirect applications, availability of solar energy collection and concentration for photothermal applications, thermal storage.

Introduction to photovoltaic and thermoelectric conversion. Wind energy, types of wind mills, elementary design principles, ocean thermal energy conversion.

Biomass as a source of energy, energy plantation, production of fuel from wood, animal and agricultural wastes, bioconversion processes, biogas, its generation and utilisation.

The nuclear energy - fission and fussion technology fundamentals, thermal and fast reactors, state of-the-art, breeder reactors, prospects and limitations, economics.

Geothermal energy systems, extent of available resources, heat transfer in geothermal systems, introduction to tidal and wave energy, MHD power, fuel cells.

Biochemical engineering : Introduction to chemicals of life, enzymes, kinetics and Michaelis - menten equation, introduction to microorganism growth requirement, growth kinetics, Monode equation.

TERM WORK

Assignments and excercises based on the above syllabus.

TEXT AND REFERENCES

1. T. N. Veziroglu, Alternative Energy Sources, Vol. V & V McGraw Hill, 1978.

2. J. E. Bailey and D F Ollis, Biochemical Engineering Fundamentals, Mc Graw Hill, 1977.

3. S. Aiba, A E Humpherey, N F Mills, Biochemical Engineering, Academic Press, 1973.

TRIBOLOGY

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

1. Lubrication, Lubricants, physical properties, the fundamentals of friction properties, the fundamentals of friction and wear, boundary lubrication and the fundamentals of hydrodynamic lubrication, hydrostatic lubrication elastohydrodynamic lubrication, compressible and thermal effects, non-Newtonian lubrication.

2. Bearing materials, its selection and design, contacting and non-contacting seals, roughness effects, magnetic and hydrodynamic effects, lubrication in metal forming.

3. Hydrodynamics thrust and journal bearing, dynamic loading of journal bearing, fluid instability.

4. Lubrication of ball and roller bearings, gears, etc.

TERM WORK

Assignments and excercises based on the above syllabus.

TEXT AND REFERENCES

1. Hailing J., Principles of Tribology.

2. Moore D. F., Principles and Application of tribology, Pergamon, 1975.

VIBRATION AND ACCOUSTIC DESIGN

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

1. Electro mechanical Analogy - Force - Voltage and force-current analogical systems-methods for constructing equivalent electrical systems-mobility methods. Use of Analog Computer and modelling for the Analog Computer.

2. Non Linear Vibrations, Superposition principle - Phase plane Trajectories - method of direct integration - amplitude frequency curves, subharmonic resonance.

3. Vibration control - methods of control by isolation and absorption vibration dampers - damping materials - constructional details of vibration dampers for absorption of linear and angular vibrations.

4. Acoustics - Foundamentals of sound. Measurement of sound and Decibel pressure level and intesity levels. Octave bands - microphone - anechoice and reverberent chambers.

5. Human apparatus for sound detection - subjectives response-Fletcher - Munsen curves - Noise levels in various environments - perceived noise level - Weighting networks in noise level - measurement - effect of noise on people - hearing loss - permissible limits for exposure to steady state noise.

6. Reverberation time - use of sound absorption materia acoustical specifications of acoustic spaces - sound diffus

7. Machinery noise measurement - typical levels of machi noise created by fluid flow in pipes, air conditioning du air compressors, pumps, noise in rotating machinery, g and bearings, noise reduction and control.

TERM WORK

Assignments and excercises based on the above syllab

TEXT AND REFERENCES

1. Douglas D Reynolds, Engineering Principles of Acous (Noise and vibration control).

2. Allan D. Pierce, Acoustics, Mc Graw Hill, 1961.

MACHINE TOOLS DESIGN

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

Criteria for the selection of capacity and design parameter Analysis of formative motions and preparation of layouts. Co cept of standardization and Preferred numbers. Designs machine tool elements - gears & gear boxes; worms; clutch brakes and gear shifting devices; spindle and spindle bearin friction and anti-friction power screws; friction, anti-friction a hydrostatic and aerostatic slideways; etc. for strength, rigidity a life.

Selective and preselective mechanisms, Protective and safe devices. Concept of aesthetics and ergonomics in machine t design.

TERM WORK

Assignments and excercises based on the above syllabus.

TEXT AND REFERENCES

1. Aacherkan, Machine Tool Design, Vol I to IV, Mir Publishers, Moscow.

2. Johnson R C, Optimum Design of Mechanical Elements, John Wiley & Sons, 1961.

3. Merit R E, Gears, Pitman 1954.

4. Deutschman A et al., Machine Design : Theory and Practice, MacMillan 1975.

FINITE ELEMENT METHOD

L	T	P	Theory	TW	Pract	Viva
5	0	3	100	25	—	50

Introduction to finite element method, relation to other methods, solution of problems in structural mechanics using 2D elements, plane stress; plane strain and axisymmetrical stress analysis, three dimensional stress analysis using tetrahedron and prismatic elements.

Solution of heat transfer, fluid flow, vibration, stability and buckling and non-linear problems.

Solution of large scale systems, covergence studies in finite elements approximations, applications to the analysis of mechanical linkages; composite structures and machine tools.

TERM WORK

Assignments and excercises based on the above syllabus.

TEXT AND REFERENCES

1. O. C Zienkiewicz The Finite Element Method, McGraw Hill Publications.
2. Desai and Abel, Finite Elements Method, CBS Publishers.
3. R. D. Cook, Concepts and Applications of FEA.

SEMESTER VIII

MECHANICAL SYSTEMS DESIGN

L	T	P	Theory	TW	Pract	Viva
5	1	4	100	50	—	50

Characteristics of mechanical systems, Selection of optimum configuration, recent developments in design techniques.

Optimisation in design : need for optimisation and historical developments, classification and formulation of optimisation problems, classical optimisation methods, unconstrained minimisation techniques, one-dimensional minimisation, multidimensional minimisation, constrained minimisation, application of various methods of optimisation.

Reliability based design : methods for the determination of reliability, reliability based design of mechanical and structural components, reliability analysis of weakest-link and fail-safe systems, statistical theory of the fatigue curve, damage accumulation and reliability estimate under stochastic loadings, application of statistical methods to stability problems reliability engineering in production and manufacturing systems, dynamic reliability, availability, maintainability, servicability, replacement strategies.

Large scale systems.

TERM WORK

Design excercises based on the above syllabus.

TEXT AND REFERENCES

1. Mautousek R. Engineering Design.
2. Shigley J. E. Mechanical Systems Design.
3. R. L. Fox, Optimisation Methods for Engineering Design.

REFRIGERATION AND AIR CONDITIONING

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

Refrigeration : Theory of refrigerating machines. Reversed Carnot cycle cold air refrigerating machine. Coefficient of performance. Applications of Air cycles for cooling air craft cabins. Vapour compression machines. Refrigerating effects per Kg of working substance - primary and secondary refrigerants, their properties. Comprison of different working substances. Multistage compression and expansion systems with flash intercooling, cascade systems of refrigeration. Vapour absorption machines. Commercial Ice making plants. Household refrigerators, Cryogenics. Liquifaction of gases, manufacturing of Dry Ice.

Thermodynamic properties of air-water vapour mixture Psychrometry Use of psychrometric charts of various types, stud of heating, Cooling, humidification and dehumification process of air-water-vapour mixtures. Adiabatic mixing of air, stream Reheating and bypassing of air, room apparatus dew point fact Inside and Outside Design comfort air conditioning. Comfo chart, comfort zone, effective temperature, air conditioning loa calculations.

Air distribution - high and low velocity Ducts. Duct desig Fans and blowers.

Cold storages - load calculations. Optimum insulation. Desig conditions for storage of various commodities, air circulatio types of evaporators, defrosting, Controls in air-conditionin plants, Refrigerant feed control safety controls, h.p. and l.p.v Switches, oil pressure failure switch interlocking control, humi ity and temperature measurement and control air velocity me surements. Electric, pneumatic circuits for refrigeration plant use in air conditioning.

Construction, layouts, operation and maintenance of a conditioning plants. Noise and vibration control. Fault locatio - causes and remedies preventive maintenance.

Applications of summer, winter and all weather air con tioning plants Testing of air conditioning plants.

TERM WORK

Laboratory practicals, assignments and excercises.

TEXT AND REFERENCES

1. C P. Arora, Refrigeration and Air Conditioning, Tata McGraw Hill, 1981.
2. Stocker W. F. and Jones J. W. Refrigeration and Air Conditioning, Tata Mc Graw Hill, 1983.
3. ASHRAE Handbook 1983.

COMPUTER APPLICATIONS IN MECHANICAL ENGINEERING

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

The subject deals with the various Computer applications in the field of Mechanical Engineering.

Design :

1. Analysis of beams for static loads , Reactions, Shear Force and Bending Moments.
2. Analysis of beams for dynamic loads (Rolling Loads analysis), Reactions, Shear Force, Bending Moments, Maximum Shear Force and Bending Moments at the given section, Determination of absolute maximum Shear Force and Bending Moment.
3. Design of Gears, Joints and Couplings. Analysis of effects of various design parameters on the machine coponents.
4. Analysis of shafts deflection, critical speed determination for simple and step shafts using various numerical methods.

Thermal :

1. Effect of various parameters on the efficiency of Diesel and Otto engines.
2. Study of performance of engines.
3. Analysis of Exhaust gas in I.D. engines.

4. Simulation of gas Turbines.
5. Heat Transfer Analysis.

Industrial Engineering :

1. Analysis of multiproduct situation.
2. Optimal batching and Sequencing.
3. Forecasting Techniques.
4. Statistical Analysis of real life situation.

TERM WORK

Term work will consists of minimum eight programm assignments based on above syllabus.

TEXT AND REFERENCES

1. Shigley J. E., Engineering Design, Second edition.
2. S. V. Palankar, Numerical Heat Transfer and Fluid Flo Hemisphere Publishing Company, 1980.
3. V. Rajaraman, Computer Programming in FORTRAN

EARTH MOVING MACHINERY

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

1. General applications of earth moving machinery in open mining and other places. Operations involved in applications.
2. Description and specification of different types of ea moving machineries such as drills, rippers, shovels, w loaders, excavators, dozers, crushers, feeders and comp sors.
3. Study of the working principles of different systems volved in earth moving machinery : power system, tra mission, final drive, electrical, lubrication, pneuma hydraullic, braking, etc.

4. Study of the instrumentation applied to such machinery.
5. General principles of maintenance :
   a) Operational maintenance
   b) Schedule major repair
   c) Periodic overhauls.
6. Principle of preventive maintenance.
7. General maintenance of facilities, tools and tackles required for maintenance.

TERM WORK

Laboratory practicals, assignments and excercises.

TEXT AND REFERENCES

1. Jagmohan Singh, Art of Earth Moving.
2. Nicholas Jr. Earth Moving Machinery.
3. J. D. Patton, Prefentive Maintainance.

MACHINE TOOLS CONTROLS

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

Functions of machine tool control. Types of controls on on-off systems, feeding and clamping, setting, copying timers and limit switches. Rigid systems with pneumatic, hydraulic, electrical and electrohydraulic controls.

Elements of hydraulic systems(Pumps, valves, accumulators, seals, etc.) Study of their functions, types and design characteistics. Analysis and study of typical hydraulic circuits in machine tools.

Design of control circuits for specific requirements. Introducti to servo systems. Maintenance of hydraulic systems.

Elements of Pneumatic control systems. Design of pneuma circuits.

Hydro pneumatic circuits.

Introduction to Numerical Control, applications of N machines, types of numerical control, programming in manu and computer assisted modes. Study of APT language a programming exercises.

Economics of NC applications. Principles of adaptive cont in machining.

TERM WORK

Assignments and excercises based on the above syllabu

TEXT AND REFERENCES

1. Puckle O S and Arrowsmith J R, An Introduction to NC C Machine Tools, Chapman and Hall, 1964.
2. Blackburn J F, Rechfort and Shearer J L, Fluid Power Contr MIT, 1960.
3. Anderson B W, The Analysis and Design of Pneuma Systems, Wiley, 1967.

ADVANCED DYNAMICS OF MACHINERY

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

1. Dynamics of vibratory systems of two degree of freedo principal and normal modes, coupling coefficients, effect mass ratio, principle of vibration isolator.

2. Dynamics of Vibratory Systems of more than two degrees of freedom : Analytical and numerical methods, matrix iteration techniques, calculation of amplitudes and natural frequencies, Duckerley's equation.

3. Dynamics of rotating shafts : Whirling of shafts including elementary treatment of half speed whirl, dynamic balancing of stepped shafts with single and multiple drives, balancing of shafts mounted on stepped and flexible bearings.

4. Practical Balancing Techniques : Balancing in the field of rotors and rotating assemblies, balancing of flexible shafts on flexible bearings.

5. Dynamics of Mechanical Drives and Mechanisms : Bearings using Newtonian fluids restricted to one dimensional infinitely long and infinitely flat journal bearing.

TERM WORK

Excercises on above syllabus in the form of design, drawing and numerical or critical review of literature.

TEXT AND REFERENCES

1. Ghosh and Mallik theory of Machanisms and Machines, Affiliated Last West Press, 2nd edition.
2. C. S. Rao, Rotor Dynamics, Wiley Eastern Publishers.
3. W. T. Thomson, Theory of Vibration and Applications, Macmillan Publishing Company.
4. A. R. Hollowenko, Dynamics of MAchinery, Wiley International.

INFORMATION SYSTEMS

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

This course is aimed at providing an understanding concepts of MIS, tools and methodologies for structural anal and design of information systems, and the management persp tives namely, project planning of MIS, pitfalls in developm of MIS, information audit system and long term MIS planni etc.

The students are expected to acquire competence in desi of MIS in various functional areas of management through c discussions and project assignments.

Topics :
Concepts of MIS :

— Meaning and role of MIS in an organisation Analysis a design of information systems.
— Conceptual modeling of data and process in organizatio
— Tools for modeling and analysis of data
— data flow diagrams
— data dictionary
— Tools for modelling and analysis of processes
— flow charts
— structured English and pseudocode
— Structured design of data processes :
— Structured design of data (file design)
— Structure chart
— transform analysis
— transaction analysis

— semi structured problems and DSS
— Management perspectives :
— Evolution of MIS in an organization (Nolan's stage model)
— System development life cycle model.
— Contingency approach to information requirement analysis.
— Pitfalls in MIS development
— Information system audit
— Long term MIS planning.

Applications :

— MIS in various functional areas.
— Case studies and project assignment.

TERM WORK

Assignments and excercises based on the above syllabus.

TEXT AND REFERENCES

1. Murdick Ross and Clagget, Information Systems for Modern Management, Prentice Hall, New Delhi, 1985.
2. Gordon Davis, Management Information Systems Conceptual Foundations, McGraw Hill, NY, 1985.
3. Youtrdon E and Constantine, Structured Design, McGraw Hill, NY, 1979.

MATERIALS MANAGMENT

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

— Advanced forecasting techniques using Box-Jenkins.
— Materials requirements, explosion and levels.
— Classification and inventory analysis.
— Codification, standardization and variety reduction.
— Make or buy decision.
— Inventory control techniques.
— Materials requirement planning, phasing.
— Materials functions including budgeting, purchasing a vendor development.
— Spare parts management.
— Stores and materials accounting.
— Import export policies, legal aspects of purchasing.
— Evaluation of materials management performance.

TERM WORK

Assignments and excercises based on the above syllabu

TEXT AND REFERENCES

1. Ammer Dean S, Materials Management, Richard D Irw Illinois, 1962.
2. Bailey Peter and Farmer David, Managing Materials Inventory, Gower Press, London, 1972.
3. Tersine Richard J, Principles of Inventory and Mater Management, 2nd edition, North Holland, 1983.
4. McRoble Max, Purchasing and Quality.

INDUSTRIAL ROBOTICS

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

Introduction to robots and manipulators; Classification of robots; kinematic principles; Analysis and design aspects; Resolution, Accuracy and Repeatability in robotic systems; Robot motions and work envelope; Pneumatic, hydraulic, and electrical actuation; End effectors and grippers; Sensors and advances in sequence control; Feedback control, servo control, PTP and CP control; Programming of industrial robots and programming exercises; Matching robots to the working place and conditions; Reliability, maintenance and safety of robotic systems; Applications studies in manufacturing processes like, casting, welding, painting, loading/unloading of workparts on machine tools, heat treatment, assembly, etc. synthesis and evolution of geometric configurations.

Advances in robotic systems.

TERM WORK

Assignments and excercises based on the above syllabus.

TEXT AND REFERENCES

1. Fu K S, Gonzales C S and Lee C S G, Robotics, McGraw Hill, 1987.
2. Craig J. J. Robotics, Addison Wesley, 1986.

ADVANCED METAL FORMING

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

Introduction to analysis of the metal forming processes a its usefulness in the industry. Introduction to the theory plasticity. Stress and its components, Stress - Strain and Stre Strain analysis, Plane-Strain and Plane-Stress analyis and applications. Axisymmetric Compression.

Introduction to metal forming processes. Cold and forming.

Rolling : Layouts of typical rolling mills, Sequence operations, time cycles, productivity, Economic indices. Defe in rolling, Main parameters in rolling, Rolling mills equipme

Forging : Forging operations and the technology of hamm forging presses. Inspection and tolerances in forging. Forg equipments.

Extrusion : Parameters in hot and cold extrusion, metal flo selection of presses, extruction equipment.

Wire Drawing : Principles and parameters, Technology various operations.

TERM WORK

Assignments and excercises based on the above syllabu

TEXT AND REFERENCES

1. Rawe G W, introduction to the principles of Metal Worki Edward Arnold Publishers, London.
2. Avitzur B, Metal forming Processes and analysis, McGr Hill, New York, 1958.
3. Johnson W and Mellor P b, Plasticity for Mechanical en neers, Van Nostrant, London, 1972.

Energy Management

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

The objective of this course to impact awareness as regards nergy demand management at plane level.

opics :

Elements of energy management; national energy scene with articular reference to industry sector in India; nergy-economy elationships; future energy supply and demand scenario and ntegrated energy planning.

Physical aspects of energy : Classification of energy, effi- ency and effectiveness of energy uitlisation in industry, energy nd energy analysis.

Energy demand management at plant level : Creation of nergy management structure within plant management hierar- hy; role of an energy manager. Energy demand management - s scope, methodology and data base. Selected modes of energy vings. Energy auditing formsise and aggregative, plant energy nd utility systems and energy conservation opportunities with articular reference to waste heat recovery, congeneration and tional operation of production processes.

TEXT BOOKS

- Reay "Industrial energy Conservation", Pergamon Press, 1977.
- Murphy and Mckay. "Energy Management", Butterworths, 1982.
- Wilbur (Ed), "Energy System Engineering", wiley - Inter - Science, 1985.

ICROPROCESSORS AND THEIR APPLICATIONS

L	T	P	Theory	TW	Pract	Viva
5	1	3	100	25	—	50

Introduction and tole of microprocessors.
Internal architecture, memory addressing, execution of in- ructions, instruction sets.

Programming in assembly language for simple applications

Different techniques of I/O interfacing with microprocessor simple examples, programmable peripherals, interface clip (PPI) A/D converters.

Data acquisition and control using transducers like fo position, velocity, pressure and temperature measurement and actuators like stepper motor, pneumatic and hydraulic actuators limt switches etc.

TERM WORK

Experiments/ Assignments based on the above syllabu using Processor Intel 8085/8086.

RECOMMENDED BOOKS

1. Microprocessor Architecture :

   Programming & Applications, by R. Gaonkar, Wiley Eastern

2. Microprocessors System : The 8086/88 Family, Architectur Programming and Design by Ye-Cheng Lin and Glenn A Cibson, PHI.

3. Introduction to Microprocessor by Aditya Mathur, Thir edition, Tata McGraw Hill.

4. Microprocessor and Microcomputer Based System by, T. M Rafiguzzaman, Harper and Row.

5. Microprocessor and Interfacing : Programming and Hard ware by D. V. Hall, McGraw Hill.