Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 1ST YEAR (SEMESTER – I) (Common for all branches)
Credit Based Scheme w.e.f. 2012-13

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	HUM 101B	COMMUNICATIVE ENGLISH	3	1		25	75	-	100	4	3
2	MATH 101B	MATHEMATICS-I	3	1		25	75	-	100	4	3
3	PHY 101B	ENGINEERING PHYSICS-I	3	1		25	75	-	100	4	3
4	ME101B	MANUFACTURING PROCESSES **(Gr-A)**	3	1		25	75	-	100	4	3
	CH101 B	**OR** ENGINEERING CHEMISTRY (**Gr-B**)	3	1		25	75				
5	EE101B	PRINCIPLES OF ELECTRICAL ENGINEERING **(Gr-A)**	3	1		25	75	-	100	4	3
	CSE101B	**OR** INTRODUCTION TO COMPUTERS & PROGRAMMING (**Gr-B**)	3	1		25	75	-	100		
6	ME103B	ENGINEERING GRAPHICS & DRAWING **(Gr-A)**	1	-	4	40	-	60	100	3	3
	ME105B	OR ELEMENTS OF MECHANICAL ENGINEERING (**Gr-B**)	3	1	-	25	75		100	4	
7	PHY103B	PHYSICS LAB-I	-	-	2	20		30	50	1	3
8	ME 107B	WORKSHOP PRACTICE **(Gr-A)**	-	-	4	40		60	100	2	3
	CH103B	OR CHEMISTRY LAB (**Gr-B**)	-	-	2	20		30	50	1	
9	EE103B	PRINCIPLES OF ELECTRICAL ENGINEERING LAB **(Gr-A)**	-	-	2	20		30	50	1	3
	CSE103B	**OR** COMPUTER PROGRAMMING LAB (**Gr-B**)	-	-	2	20		30	50	1	
10	ME109B	ELEMENTS OF MECHANICAL ENGINEERING LAB (**Gr-B**)	-	-	2	20		30	50	1	3
Total		**Gr-A**	**16**	**5**	**12**	**245**	**375**	**180**	**800**	**27**	
		Gr-B	**18**	**6**	**8**	**230**	**450**	**120**	**800**	**28**	

Note:

1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.
2 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3 Electronics gadgets including Cellular phones are not allowed in the examination.
4 All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 1ST YEAR (SEMESTER – II) (Common for all branches)
Credit Based Scheme w.e.f. 2012-13

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1.	MATH102B	MATHEMATICS-II	3	1		25	75	-	100	4	3
2	PHY102B	ENGINEERING PHYSICS-II	3	1		25	75	-	100	4	3
3	ME101 B **OR** CH101 B	MANUFACTURING PROCESSES (**Gr-B**) ENGINEERING CHEMISTRY **(Gr-A)**	3 3	1 1		25 25	75 75	-	100	4	3
4	EE101B **OR** CSE101B	PRINCIPLES OF ELECTRICAL ENGINEERING (**Gr-B**) INTRODUCTION TO COMPUTERS & PROGRAMMING **(Gr-A)**	3 3	1 1		25 25	75 75	- -	100	4	3
5	ECE102B BT102B **OR** HUM102 B CE102 B	BASICS OF ELECTRONICS ENGINEERING **OR** BASICS OF BIO TECHNOLOGY **OR** ORAL COMMUNICATION SKILLS **OR** BASICS OF CIVIL ENGINEERING	3	1		25	75	-	100	4	3
6	ME103B **OR** ME105B	ENGINEERING GRAPHICS & DRAWING (**Gr-B**) ELEMENTS OF MECHANICAL ENGINEERING **(Gr-A)**	1 3	- 1	4 -	40 25	- 75	60 -	100 100	3 4	3
7	PHY104B	PHYSICS LAB-II	-	-	2	20		30	50	1	3
8	ME 107B **OR** CH103B	WORKSHOP PRACTICE (**Gr-B**) CHEMISTRY LAB **(Gr-A)**	- -	- -	4 2	40 20		60 30	100 50	2 1	3
9	EE103B **OR** CSE103B	PRINCIPLES OF ELECTRICAL ENGINEERING LAB (**Gr-B**) COMPUTER PROGRAMMING LAB **(Gr-A)**	- -	- -	2 2	20 20		30 30	50 50	1	3
10	ME109B	ELEMENTS OF MECHANICAL ENGINEERING LAB **(Gr-A)**	-	-	2	20		30	50	1	3
11	GP 102B	GENERAL PROFICIENCY & ETHICS	1			-		50	50	2	
Total		**Gr-B** **Gr-A**	**17** **19**	**5** **6**	**12** **8**	**245** **230**	**375** **450**	**230** **170**	**850** **850**	**29** **30**	

Note:

1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency& Ethics Syllabus.
2. Each student has to undergo a workshop atleast 4 weeks (80-100 hours) at the end of II semester during summer vacations. **Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline/ department** The evaluation of this training shall be carried out in the III semester.
3. The students will be allowed to use non-programmable scientific calculator. However, sharing/ exchange of calculator is prohibited in the examination.
4. Electronics gadgets including Cellular phones are not allowed in the examination.
5. All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/ college, so that there is an equitable distribution of teaching load in odd and even semesters.
6. The elective course HUM102 B ORAL COMMUNICATION SKILLS is deleted with effect from the session 2013 -14.

SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 2nd YEAR (SEMESTER – III) MECHANICAL ENGINEERING
Credit Based Scheme w.e.f. 2013-14

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	MGT 201 B GES 201 B	ENGINEERING ECONOMICS **(Common for all branches Except BT & BME) (Gr-A)** **OR** ENVIRONMENTAL STUDIES **(Common for all branches) (Gr- B)**	4 3	- -		25 -	75 **75***	-	100 **75***	4 -- 3	3 3
2	ME 201B	THERMODYNAMICS (ME, AER)	3	1		25	75	-	100	4	3
3	ME 203B	STRENGTH OF MATERIALS-I (ME, AER)	3	1		25	75	-	100	4	3
4	ME205B	ENGINERING MECHANICS (ME, AE & AER)	3	1		25	75	-	100	4	3
5	ME207B	FLUID MECHANICS (ME, AER)	3	1		25	75	-	100	4	3
6	ME209B	MACHINE DRAWING	1	-	4	40	60	-	100	3	3
7	ME211B	STRENGTH OF MATERIALS-ILAB (ME, AER)	-	-	2	20		30	50	1	3
8	ME 213B	COMPUTER AIDED DRAFTING LAB	-	-	2	20		30	50	1	3
9	ME 215B	FLUID MECHANICS LAB (ME, AER)	-	-	2	20		30	50	1	3
10	GES 203B	ENVIRONMENTAL STUDIES FIELD WORK **(Common for all branches) Gr- B)**	-	-	-	-	-	**25***	**25***	-	
11	ME 217B	WORKSHOP **(Common for all branches Except BT, AE)**	--	--	2	50	--	--	50	2	3
		Total Gr-A	**17**	**4**	**12**	**275**	**435**	**90**	**800**	**28**	
		Gr-B	**16**	**4**	**12**	**250**	**360**	**90**	**700**	**24**	

Note:

1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.

2 *The Environmental studies (GES-201 B & Environment Studies Field work (GES-203B) are compulsory & qualifying courses only.

3 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

4 Electronics gadgets including Cellular phones are not allowed in the examination

5 All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 2nd YEAR (SEMESTER – IV) MECHANICAL ENGINEERING
Credit Based Scheme w.e.f. 2013-14

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	MGT 201 B GES 201 B	ENGINEERING ECONOMICS **(Common for all branches Except BT & BME) (Gr- B)** **OR** ENVIRONMENTAL STUDIES **(Common for all branches) (Gr-A)**	4 3	- -		25 -	75 75*	-	100 75*	4 --	3
2	ME 202B	MANUFACTURING TECHNOLOGY	3	1		25	75	-	100	4	3
3	ME 204B	MATERIAL SCIENCE	3	1		25	75	-	100	4	3
4	ME 206B	STRENGTH OF MATERIALS –II	3	1		25	75	-	100	4	3
5	ME 208B	FLUID MACHINES	3	1		25	75	-	100	4	3
6	ME 210B	ENERGY CONVERSION	3	1		25	75	-	100	4	3
7	ME 212B	MATERIAL SCIENCE LAB	-	-	2	20	-	30	50	1	3
8	ME 214B	FLUID MACHINES LAB	-	-	2	20	-	30	50	1	3
9	ME 216B	ENERGY CONVERSION LAB	-	-	2	20	-	30	50	1	3
10	ME 218B	MANUFACTURING PRACTICE (ME, AER)	-	-	3	20	-	30	50	1.5	3
11	GES 203 B	ENVIRONMENTAL STUDIES FIELD WORK **(Common for all branches) (Gr-A)**	-	-	-	-	-	25*	25*	-	
12	GPME 202B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	75	75	2	3
Total		**Gr-B** **Gr-A**	**20** **19**	**5** **5**	**9** **9**	**230** **205**	**450** **375**	**195** **195**	**875** **775**	**30.5** **26.5**	

Note:

1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency & Ethics Syllabus.

2 *The Environmental studies (GES-201 B & Environment Studies Field work (GES-203B) are compulsory & qualifying courses only.

3 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

4 Electronics gadgets including Cellular phones are not allowed in the examination

5 Each students has to undergo Professional Training of at least 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carries out in the V semester

6 All the branches are to be divided into group 'A' and 'B' as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.

SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 3rd YEAR (SEMESTER – V) MECHANICAL ENGINEERING
Credit Based Scheme w.e.f. 2014-15

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ME301B	KINEMATICS OF MACHINES	3	1		25	75	-	100	4	3
2	ME303B	MACHINE DESIGN-I	3	2		25	75	-	100	5	3
3	ME305B	QUALITY ENGINEERING	3	1		25	75	-	100	4	3
4	ME307B	INTERNAL COMBUSTION ENGINES & GAS TURBINES (ME, AER)	3	1		25	75	-	100	4	3
5	ME309B	MANUFACTURING SCIENCE	3	1		25	75	-	100	4	3
6	ME311B	APPLIED NUMERICAL TECHNIQUES & COMPUTING	3	1		25	75	-	100	4	3
7	ME313B	KINEMATICS OF MACHINES LAB	-	-	2	20	--	30	50	1	3
8	ME315B	INTERNAL COMBUSTION ENGINES LAB (ME, AER)	-	-	2	20	---	30	50	1	3
9	ME317B	COMPUTER AIDED MANUFACTURING PRACTICES	1	-	2	40	---	60	100	2	3
10	ME319B	APPLIED NUMERICAL TECHNIQUES & COMPUTING LAB	-	-	2	20	--	30	50	1	3
11	ME321B	PROFESSIONAL TRAINING-I	-	-	2	50	-	-	50	2	3
Total			**19**	**7**	**10**	**300**	**450**	**150**	**900**	**32**	

Note:

1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.

2 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3 Electronics gadgets including Cellular phones are not allowed in the examination

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. 3rd YEAR (SEMESTER – VI) MECHANICAL ENGINEERING
Credit Based Scheme w.e.f. 2014-15

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ME 302B	DYNAMICS OF MACHINES	3	1		25	75	-	100	4	3
2	ME 304B	MACHINE DESIGN-II	3	2		25	75	-	100	5	3
3	ME 306B	HEAT TRANSFER (ME, AER)	4	1		25	75	-	100	5	3
4	ME 308B	AUTOMATIC CONTROL	3	1		25	75	-	100	4	3
5	ME 310B	MEASUREMENTS & INSTRUMENTATION	3	1		25	75	-	100	4	3
6	ME 312B	INDUSTRIAL ENGINEERING (ME, AER)	3	1		25	75	-	100	4	3
7	ME 314B	DYNAMICS OF MACHINES LAB	-	-	2	20		30	50	1	3
8	ME 316B	HEAT TRANSFER LAB (ME, AER)	-	-	2	20		30	50	1	3
9	ME 318B	MEASUREMENT & INSTRUMENTATION LAB	-	-	2	20		30	50	1	3
10	HUM 302 B	REPORT WRITING SKILLS **(Common for all branches)**	1	-	-	25	50		75	1	2
11	HUM 304 B	ORAL PRESENTATION SKILLS **(Common for all branches)**	-	-	2	20	-	30	50	1	2
12	GPME 302B	GENERAL PROFICIENCY & ETHICS	1	-	-	-	-	75	75	2	-
Total			**21**	**7**	**8**	**255**	**500**	**195**	**950**	**33**	

Note:

1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.

2 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3 Electronics gadgets including Cellular phones are not allowed in the examination

4 Each students has to undergo Professional Training of at least 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carries out in the VII semester

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)
SCHEME OF STUDIES & EXAMINATIONS
B.Tech. Final YEAR (SEMESTER – VII) MECHANICAL ENGINEERING
Credit Based Scheme w.e.f. 2015-16

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ME 401B	AUTOMOBILE ENGG.	4	-	-	25	75	-	100	4	3
2	ME 403 B	REFERIGERATION & AIR CONDITIONING (ME, AER)	3	1	-	25	75	-	100	4	3
3	ME 405 B	OPERATIONS RESEARCH (ME, AER)	4	0	-	25	75	-	100	4	3
4		*OPEN ELECTIVE	4	0	-	25	75	-	100	4	3
5	ME 407 B	POWER PLANTS ENGINEERING	3	1	-	25	75	-	100	4	3
6	ME 409 B	AUTOMOBILE ENGG. LAB	-	-	2	20		30	50	1	3
7	ME 411 B	R.A.C.LAB (ME, AER)	-	-	2	20		30	50	1	3
8	ME 413 B	PROJECT	-	-	4	100	-	-	100	4	-
9	ME 415 B	PROFESSIONAL TRAINING-II	-	-	2	50	-	-	50	2	-
Total			**18**	**2**	**10**	**315**	**375**	**60**	**750**	**28**	

*** List of Open Electives**

1	MEI 623B	ENTREPRENEURSHIP	6	BT401B	BIOINFORMATICS
2	BME451B	MEDICAL INSTRUMENTATION	7	AE417B	MODERN VEHICLE TECHNOLOGY
3	ECE305B	CONSUMER ELECTRONICS	8	CE451B	POLLUTION & CONTROL
4	EE451B	ENERGY AUDIT	9	CSE411B	MANAGEMENT INFORMATION SYSTEM
5	EEE457B	ENERGY RESOURCES & TECHNOLOGY	10	IT413B	CYBER SECURITY

Note:

1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.

2 Students will be permitted to opt for any one elective run by the other department. However, the department shall offer those elective for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. **The minimum strength of the students should be 20 to run an elective course.**

3 Assessment of Professional Training-II, undergone at the end of VI semester, will be based on seminar, viva-voce, report and certificate of Professional Training obtained by the student from the industry, institute, research lab, training center etc

4 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

5 Electronics gadgets including Cellular phones are not allowed in the examination.

6 Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

B.Tech. Final YEAR (SEMESTER – VIII) MECHANICAL ENGINEERING
Credit Based Scheme w.e.f. 2015-16

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ME 402B	COMPUTER AIDED DESIGN	3	1		25	75	-	100	4	3
2	ME 404B	MECHANICAL VIBRATION	3	1		25	75	-	100	4	3
3		ELECTIVE I	4	-		25	75	-	100	4	3
4		ELECTIVE II	4	-		25	75	-	100	4	3
5	ME 406B	COMPUTER AIDED DESIGN LAB	-	-	2	20		30	50	1	3
6	ME 408B	SEMINAR	-	-	2	50			50	2	-
7	ME 413B	PROJECT	-	-	8	75	-	125	**200**	8	3
8	GFME 402B	GENERAL FITNESS FOR THE PROFESSION	1	-	-		-	100	100	4	3
Total			**15**	**2**	**12**	**245**	**300**	**255**	**800**	**31**	

Elective – I		**Elective -II**	
ME 432B	Optimization Methods for Engineering Systems	ME442B	Robotics Engineering
ME 434B	Automobile Design	ME444B	Ergonomics and Work Place Design
ME 436 B	Mechatronics	ME446B	Modern Manufacturing Processes
ME 438B	Flexible Manufacturing System	ME448B	Emerging Automotive Technologies
ME 440B	Manufacturing Management	ME450B	Reliability Engineering

Note:

1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Fitness For The Profession Syllabus.

2 The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. **The minimum strength of the students should be 20 to run an elective course.**

3 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

4 Electronics gadgets including Cellular phones are not allowed in the examination

5 Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

HUM 101B COMMUNICATIVE ENGLISH							
B. Tech. Semester - I (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

Objective

The course aims at developing the desired language (English) skills of students of engineering and technology so that they become proficient in communication to excel in their professional lives. The course has been designed so as to enhance their linguistic and communicative competence.

Course Content

UNIT I

Communicative Grammar:

A) Spotting the errors pertaining to tenses, conditional sentences, Concord – grammatical concord, notional concord and the principle of proximity b/w subject and verb

B) Voice, Reported Speech.

UNIT II

Langauge through Literature:

Linguistic Reading of the following texts

A) 'Kabuliwallah' by Rabindranath Tagore*

B) 'Am I Blue?' by Alice Walker*

C) 'If You are Wrong, Admit It' by Dale Carnegie*

D) 'Engine Trouble' by R.K. Narayan*

The prescribed texts will be used as case studies for various components of the syllabus. * the Source is given in the list of Texts Books given below.

UNIT III

Group Communication:

A) Communication: concept, Process and Barriers
B) Communicating using Standard Pronunciation with the help of IPA
C) Formal Speaking with peers (e.g. discussion, talks on current issues in a class)
B) Writing official letters on issues concerning students and social life

C) Writing small reports on scientific issues, IT issues, University fests/programmes

C) E-mail writing and writing for web

UNIT IV

Communicative Creativity:

A) Comprehension: Extracting, interpreting, summarizing, reviewing and analyzing the prescribed texts.

B) Composition: Developing themes and situations through role play activities or dialogue writing.

Contd.

TEXT BOOKS

1. Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech & Jan Svartvik. *A Comprehensive Grammar of the English Language*. London: Longman, 1989
2. Communicative English for Engineers and Professionals by Nitin Bhatnagar & Mamta Bhatnagar New Delhi: Pearson / Longman
3. Crystal, David. Rediscover Grammar. London: Longman/Pearson, 1988.
4. *Tagore, Rabinder. "Kabuliwallah" , *Famous Indian Stories*. Ed. M.G.Narsimha Murthy .Mumbai: Orient Blackswan, 2009. (Web source: www.angelfire.com)
5. * Walker, Alice. "Am I Blue" , *An Anthology of Short Stories* . Ed. Usha Bande .New Delhi: OUP , 2004. (Web source- www.old.li.scru.edu)
6. *Narayanan .K.R. "Engine Trouble", *Contemporary English Prose* .Ed. K.P.K.Menon. New York: OUP,1976. (Web Source- www.scribd.com)
7. *Carnegie, Dale. "If you are wrong admit it", *An Anthology of Modern Prose*. Ed Manmohan K.Bhatnagar.Delhi :Macmillan India Ltd,2006.

SUGGESTED READING

1. Pink, M.A. and S.E. Thomas. *English Grammar, Composition and Correspondence.* Delhi: S. Chand and Sons
2. McRae, John and Roy Boardman. *Reading Between the Lines.* Delh: Foundation Books (Cambridge University Press)
3. Sharma, Sangeeta and Binod Mishra. *Communication Skills for Engineers and scientists*. Delhi: PHI, 2009
4. Fitikides, T.J. *Common Mistakes in English.* Essex: Pearson Education, 1936, 6th edition 2000.

SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST)

Theory

1. The duration of the exam will be 3 hours.
2. The Question Paper for this theory course shall have seven questions in all covering all the units of the syllabus..
3. The student is required to attempt all the seven questions.
4. Questions No. 1 based on Unit I is of **15** marks. It may be in the form of 'Do as directed: trace the error, choose the correct alternative, supply the correct alternative/ s, change the voice, convert the speech from direct to indirect or vice-versa'.
5. Question no 2 and 3 based on prescribed texts in Unit II. Question no 2 of **10 m**arks is to evaluate the comprehension of the text through short answer questions or a long answer question to assess

the students' reading comprehension, interpretative and analytical abilities. Question no 3 of **15** marks will judge the linguistic aspect of the text such as using a particular word in its various syntactic forms like noun, adjective, verb etc.; matching the lists of words and their explanation; providing opposite/ similar meanings and other grammar components prescribed in Unit I of the syllabus.

6. Question no 4 based on Unit III is of **10** marks. It may be in the form of transcription of words given, describe an event, classmate, discuss an issue etc.

7. Question no 5 based on Unit III is of **10** marks. It requires the student to frame either a small report on a topic given or write the given official letter, or e-mail a message.

8. Question no 6 based on unit IV is of **10** marks. It evaluates the Comprehension and Interpretation of the texts prescribed in Unit II. The vocabulary, general understanding and interpretation of the content may be evaluated in the form of question answer exercise, culling out important points, suggesting a suitable topic/title, summarising and interpreting.

9. Question No. 7 based on unit IV is of **5** marks. It requires the student to develop a hypothetical situation in a dialogue form, or to develop an outline, key expression, for role play activity.

MATH 101B MATHEMATICS - I							
B. Tech. Semester - I (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

INFINITE SERIES : Convergence and divergence, Comparison, D' Alembert's ratio, Integral, Raabe's, Logrithmic and Cauchy root tests, Alternating series, Absolute and conditional convergence.

Applications of Differentiation : Taylor's and Maclaurin's series, Asymptotes, Curvature Asymptotes.

UNIT-II

PARTIAL DIFFERENTIATION & ITS APPLICATIONS : Functions of two or more variables; partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobians, Higher order partial derivatives.

Homogeneous functions, Euler's theorem, Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Differentiation under integral sign.

UNIT-III

APPLICATIONS OF SINGLE & MULTIPLE INTEGRATION : Applications of single integration to find volume of solids and surface area of solids of revolution. Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.

Triple integral, volume of solids, change of variables, Beta and gamma functions and relationship between them.

UNIT-IV

VECTOR CALCULUS : Differentiation of vectors, scalar and vector point functions Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations.

Integration of vectors, line integral, surface integral, volume integral, Green, Stoke's and Gauss theorems (without proof) and their simple applications.

TEXT BOOKS :

1. Advanced Engineering Mathematics : F. Kreyszig.
2. Higher Engineering Mathematics : B.S. Grewal.

REFERENCE BOOKS :

1. Engineering Mathematics Part-I : S.S. Sastry.
2. Differential and Integral Calculus : Piskunov.
3. Advanced Engineering Mathematics : R.K. Jain and S.R.K.Iyengar
4. Advanced Engg. Mathematics : Michael D. Greenberg

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

PHY 101B ENGINEERING PHYSICS - I							
B. Tech. Semester - I (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

PHYSICAL OPTICS:

Interference: Division of wave front-Fresnel's Biprism, Division of amplitude – Newton's rings, Michelson interferometer, applications.

Diffraction : Difference between Fraunhofer and Fresnel diffraction, Fraunhofer diffraction through a slit, Plane transmission diffraction grating and its spectra, dispersive and resolving powers.

Polarization : Polarised and unpolarized light, double refraction, Nicol prism, quarter and half wave plates, Plane, Elliptically & circularly polarised light, Polarimetry: Biquartz and Laurent's half-shade polarimeters.

UNIT-II

LASER & FIBRE OPTICS: Introduction, Spontaneous and stimulated emissions, Laser action, characteristics of laser beam, Ruby laser, He-Ne, Nd-Yag and semiconductor lasers, applications of laser.
Introduction, Propagation of light in fibres, Types of fiber (pulse & continuous), numerical aperture, Modes of propagation in optical fibre, application of optical fibre.

ACOUSTIC OF BUILDINGS: Introduction, Reverberation, Sabine's formula for reverberation time, Absorption coefficient and its measurements, factors affecting the architectural acoustics and their remedy, Sound absorbing materials.

UNIT-III

TRANSMISSION OF HEAT AND THERMAL RADIATION

Modes of transmission of heat, Thermal conductivity, Rectilinear flow of heat through a rod, Radial flow of heat through a spherical shell, determination of Thermal conductivity of good and bad conductors.
Black body, Emissive and Absorptive Powers, Wein's Displacement Law, Kirchhoff's Law, Stefan's Law, Determination of Stefan's Constant.

UNIT-IV

NUCLEAR & ELEMENTARY IDEA OF PARTICLE PHYSICS

Outline of interaction of charged particles and of Gamma-rays with matter. Counters: Gas filled counters (Ionization Chamber, Proportional Counter and G M Counter). Detector: Scintillation detector, Semiconductor detectors (p-n junction detector), Biological effects of nuclear radiation.

Introduction to elementary particles, Interaction in particle physics: strong, electromagnetic, weak and gravitational.
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TEXT BOOKS :

1. A text book of Optics – Brij Lal and Subramanyam
2. Perspectives of Modern Physics - Arthur Beiser (TMH)
3. Modern Engineering Physics – A.S. Vasudeva (S. Chand)
4. Engineering Physics by R.K. Gaur and S.L. Gupta
5. Engineering Physics by H.K Malik and A.K. Singh (Tata McGraw Hill).
7. Engineering Physics by S.P. Taneja (Chand Pub.)

REFERENCE BOOKS:

1.. Physics Vol-I & II – Resnick & Halliday (Wiley Eastern)
2. Heat and Thermodynamics – M.N. Saha & B.N. Srivastava
3. Nuclear Physics Principles and Applications by John Lilley(Wiley-India).

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ME 101B MANUFACTURING PROCESSES

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	**:**	**25 Marks**
				Examination	**:**	**75Marks**
				Total	**:**	**100 Marks**
				Duration of Examination	**:**	**3 Hours**

UNIT-I

INTRODUCTION: Introduction to Manufacturing Processes and their Classification , automation in manufacturing**,** Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, Electric Safety Measures, First Aid.

Plant Layout, Principles of Plant Layout, Objectives of Layout, Types of Plant and shop layouts and their Advantages.

UNIT-II

ENGINEERING MATERIALS: General Properties and Applications of Engineering Materials, Mild Steel, Medium Carbon Steel, High Carbon Steel, High Speed Steel and Cast Iron, Non-Ferrous Materials, Shop's Tools Materials, Super Alloys or High Temperature Materials

Foundry: Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern allowances, Risers, Runners, Gates, Molding Sand and its composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting (Cupola) and Pouring, Fettling, Casting Defects and Remedies. Testing of Castings

UNIT-III

COLD WORKING (SHEET METAL WORK): Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining - Advantages and Limitations. Hot Working

Processes: Introduction to Hot Working, Principles of Hot Working Processes, Forging, Rolling, Extrusion, Wire Drawing.

INTRODUCTION TO MACHINE TOOLS: Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Shaper, Planer, Milling, Drilling, Slotter, Introduction to Metal Cutting. Nomenclature of a Single Points Cutting Tool and Tool Wear, Mechanics of Chips Formation, Type of Chips, Use of Coolants in machining.

UNIT-IV

WELDING: Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding; Spot and Seam Welding, Arc Welding: Metal Arc, TIG & MIG Welding, Welding Defects and Remedies, Soldering & Brazing, Comparisons among Welding, Brazing and Soldering

Surface Finishing Processes, Introduction to Heat Treatment Processes, Estimating of Manufacturing Cost

Text Books:

1. Workshop Technology Vol. I & II - Hazra & Chaudhary, Asian Book Comp., New Delhi.
2. Process and Materials of Manufacture -- Lindberg, R.A. Prentice Hall of India,New Delhi.
3. Principles of Manufacturing Materials and Processes - Campbell, J.S.- McGraw- Hill.

Reference Books:

1. Manufacturing Science - Amitabha Ghosh & Ashok Kumar Malik, - East-West Press.
2. Manufacturing Process and Systems - Ostwald, Munoz , John Wiley.
3. Workshop Technology, Vol. 1, 2 & 3 – Chapman, WAJ, Edward Arnold.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

CH 101B ENGINEERING CHEMISTRY **B. Tech. Semester – I/II (Common for all Branches)**							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

THERMODYNAMICS –Second law, concept of entropy ,entropy change for ideal gas, free energy and work functions, free energy change ,chemical potential, Gibb's Helmholtz equation, Clausius –Clapeyron equation. Related numerical problems with above topics.

PHASE-RULE- Terminology, Derivation of Gibb's Phase Rule equation ,One component system(water system), Two components systems, system with Eutectic point (Pb-Ag), system with congruent melting point (Zn-Mg),

system with incongruent melting point (Na-K), Applications of above systems. Elementary idea of Zone refining and Zone levelling

UNIT-II

WATER AND ITS TREATMENT- Hardness of water and its determination, units of hardness, alkalinity of water and its determination, related numerical problems ,water softening, Ion-exchange process, mixed bed demineralisation, desalination of water by using different methods.

CORROSION AND ITS PREVENTION: Galvanic & concentration cell, dry and wet corrosion, Electrochemical theory of corrosion, Galvanic corrosion, Pitting corrosion , differential aeration corrosion, water line corrosion, stress corrosion, factor effecting corrosion, Preventing measures, electroless Plating of Ni and Cu.

UNIT-III

POLYMERS AND POLYMERIZATION: Organic polymers, polymerisation, various types of polymerisation, effect of structure on properties of polymers, preparation properties and technical applications of thermoplastics (PE, PVC, PVA, Teflon), thermosets (PF, UF & MF) and elastomers (Synthetic Rubber including SBR, Buna-S, Buna-N, Thiokol & Polyurethanes) , Inorganic polymers (general properties) , Glass transition temperature, silicones

COMPOSITE MATERIALS & THEIR APPLICATION: optical fibres, Fullerenes ,organic electronic material ,composite materials & their classification, constituents of composites, role of interface in composite performance and durability, fiber –Reinforced composite, advantage and applications of composites.

UNIT-IV

LUBRICANTS AND FUELS: Friction, mechanism of lubrication, classification and properties of lubricants and selection of Lubricants, Definition and classification of fuel, Calorific value and methods of its determination.

Analytical methods: Thermal methods; Principle, method and application of TGA,DTA & DSC, interaction of E.M radiation with a molecule and origin of spectrum, Vibrational & electronic spectra (Experimental details are excluded), spectrophotometry, , conductometeric titrations, elementary discussion on Flame-photometery.

TEXT/ REFERENCE BOOKS:

1. Physical Chemistry, P.W. Atkins (ELBS, Oxford Press).

2. Physical Chemistry, W.J. Moore (Orient-Longman).

3. Instrumental methods of Chemical Analysis, MERITT & WILLARD (East-West Press).

4. Chemistry in Engineering & Tech., Vol.I& II, Rajaram, Kuriacose (TMH)

5.Engineering Chemistry ,ShashiChawla (DhanpatRai and co.)

6. Engineering Chemistry, P.C. Jain, Monica Jain (DhanpatRai& Co.).

7.Engeenring chemistry ,S.S Dara (S.chand&co.)

Note:

In the semester examination, the Examiners will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit.

EE 101B PRINCIPLES OF ELECTRICAL ENGINEERING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits		Class Work	:	25 Marks
3	1	--	4		Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT-I

D.C. CIRCUIT ANALYSIS: Basic concepts of electric circuits, Ohm's Law, Independent energy sources, Dependent energy sources, passive elements, circuit properties, Kirchoff's laws, applications of Kirchoff's laws, Nodal and Loop methods of Analysis, , Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Maximum Power Transfer Theorem, Millman's Theorem, Star-Delta or delta-star transformation, Applications of network theorems P-spice for DC circuit analysis.

UNIT-II

A.C. CIRCUITS: Sinusoidal signal, Phasors, polar & rectangular, exponential & trigonometric representations, Resistance, Inductance & Capacitance components, behavior of these components in A.C. circuits, Phasor relationship for circuit elements, Impedance & Admittance, instantaneous & peak values, average and RMS values, active power, reactive power, apparent power, power factor, complex power, behavior of AC series , parallel circuits, RL, RC & RLC A.C. circuits (series and parallel), Resonance-series and parallel R-L-C Circuits, Q-factor, cut-off frequencies & bandwidth.

UNIT-III

THREE PHASE CIRCUITS: Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by two wattmeter method.

Measuring Instruments: Principle, Construction & working of moving coil type voltmeter & ammeter, moving iron type voltmeter & ammeter, Electrodynamic type wattmeter, single-phase induction type energy meter.

UNIT- IV

TRANSFORMERS: Ampere's law, Mutual Inductance, Construction, Working principle and phasor diagrams of Single-phase Transformer, Emf equation, Equivalent circuit, testing, efficiency and regulation of single-phase transformer, Auto transformer.

ROTATING MACHINES: Construction and working principle of dc motor and generator and its characteristics. Construction and working principle of 3-phase Induction machines & 3-phase synchronous machines, torque-speed characteristics.

TEXT BOOKS:

1. Basic Electrical Engg (2nd Edition) : Kothari & Nagarath, TMH
2. Electrical Technology (Vol-I): B.L Theraja & A K Theraja, S.Chand
3. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
4. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
5. Basic Electrical Engineering, S.N. Singh, PHI

REFERENCE BOOKS:

1. Electrical Engineering Fundamentals: Deltoro, PHI

2. Basic Electrical Engineering (TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH
5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

Note: In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

CSE 101B INTRODUCTION TO COMPUTERS AND PROGRAMMING							
B. Tech. Semester – I/II (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

AN INTRODUCTION OF COMPUTER SYSTEM: Anatomy of a digital Computer, Different Units of Computer System, Classification of Computer Systems, Radix Number systems. Binary codes: BCD, Gray, EBCDIC, ASCII
OPERATING SYSTEM: Operating System Concepts, Operating System services, Types of Operating Systems. Introduction to PC Operating Systems: Unix/Linux, DOS, Windows.

UNIT-II

PROGRAMMING LANGUAGES AND ALGORITHMS: Machine, Assembly and High Level Language; Assembler, Linker, Loader, Compiler, Interpreter, debuggers, Programming fundamentals: problem definition, algorithms, flowcharts and their symbols
COMPUTER NETWORKS: Basic concepts of Computer Networks, Working of Internet and its Major features. Network Topologies: Bus, Star, Ring, Hybrid, Tree, Complete, Irregular; Types of Networks: LAN, MAN and WAN. Electronic Mail: advantages and disadvantages, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Newsgroups, mailing lists, chat rooms.

UNIT-III

BASICS OF 'C' LANGUAGE
C Fundamentals, Basic data types, local and external variables and scope, formatted input/ output, expressions, selection statements, loops and their applications; arrays, functions, recursive functions, pointers and arrays. Strings literals, arrays of strings; applications, Structures, Unions and Enumerations.

UNIT-IV

ADVANCED FEATURES OF 'C' LANGUAGE
preprocessor directives, macro definition, conditional compilation, storage classes, type's qualifiers, Low level programming (Bitwise operators, Bit fields in structures, other low level techniques), error handling, file operations(low level/high level).

BOOKS

1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.
2. Fundamentals of Computing and C Programming, R. B. Patel, Khanna Publications, 2010, New Delhi.
3. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998, TMH

4. Theory and problem of programming with C, Byron C Gottfried, TMH
5. Using Computers and Information by Jack B. Rochester, 1996, Que Education & Training.
6. C Programming – A modern approach by K.N. King, 1996, WW Norton & Co.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ME 103 B ENGINEERING GRAPHICS AND DRAWING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
1	--	4	3	Class Work	:	40 Marks
				Examination	:	60Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT I

BASICS OF ENGINEERING GRAPHICS AND DRAWING – Drawing Papers, Minidrafter, Pencils. Drawing Paper Layout, Title Block, Types of Lines, Lettering, Dimensioning, types of Projections; First and Third Angle systems of Orthographic Projections. Projection of Points in different Quadrants.

PROJECTIONS OF STRAIGHT LINES – Contained by both Reference Planes, Contained by one and inclined to other Reference Plane, Contained by one and Parallel to other Reference Plane, Parallel to both Reference Plane, Perpendicular to one of the Reference Planes, Inclined to one Plane but Parallel to the other Reference Planes, Inclined to both the Reference Planes, True Length of a Line and its Inclination with Reference Planes, Traces of a Line.

UNIT II

PROJECTIONS OF PLANES – Parallel to one Reference Plane, Inclined to one Plane but Perpendicular to the other, Inclined to both Reference Planes.

PROJECTIONS OF POLYHEDRAL SOLIDS AND SOLIDS OF REVOLUTION- in simple positions with axis perpendicular to a Reference Plane, with axis parallel to both Reference Planes, with axis parallel to one Reference Plane and inclined to the other Reference Plane, Projections of sections of Prisms, Pyramids, Cylinders and Cones. True Shape of Sections of Solids.

UNIT III

DEVELOPMENT - Development of Surfaces of various Solids objects.

FREE HAND SKETCHING - Orthographic Views from Isometric, Views of Simple Machine Components such as Brackets, Bearing Blocks, Guiding Blocks and Simple Couplings and Pipe Joints.

UNIT IV

ISOMETRIC PROJECTIONS - Introduction, Isometric Scale, Isometric Views and Drawing of various Plane and Solids objects. Perspective drawing and oblique view.

Orthographic Drawings - Screw Threads, Bolts, Nuts and Washers, Bolted, Riveted and Welded Joints

Text Books:

1. Engineering Drawing: MB Shah and BC Rana, Pearsons
2. Engineering Graphics and Drafting: P.S. Gill, S.K. Kataria and Sons.

Reference Books:

1. A Text Book of Engineering Drawing: RK Dhawan, S Chand & Company
2. Engineering Drawing Plane and Solid Geometry : N.D. Bhatt, Charotar Publishing House.

Note:

1. For class work, the students shall be assigned to prepare at least ten drawing sheets covering all units and each topic of the syllabus.
2. For practical examination, the examiner will set a question paper containing total eight questions, two questions from each unit covering each topic of the syllabus; students are required to attempt five questions at least one from each unit.

ME 105 B ELEMENTS OF MECHANICAL ENGINEERING

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**25 Marks**
				Examination	:	**75Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

THERMODYNAMICS- Elementary definitions in thermodynamics, fundamentals of first and 2nd law of thermodynamic- concept of internal energy, enthalpy and entropy, heat pump and refrigerator, elementary numerical problems.

PROPERTIES OF STEAM & BOILERS: properties of steam, use of steam tables and mollier diagram, measurement of dryness fraction of steam, Carnot and Rankin cycle, elementary numerical problems. Classification of boilers, Comparison of water and fire tube boilers mounting and accessories with their functions, Constructional and operational details of Cochran and Babcock and Wilcox boilers, elementary numerical problems.

STEAM TURBINES AND CONDENSERS: Classification of turbines and their working principles, Types of condensers and their uses.

UNIT-II

I.C. ENGINES AND GAS TURBINES: Introduction, Classification, Constructional details and working of two-stroke and four-stroke diesel and petrol engines, Efficiency of Otto & Diesel cycles , Working principle of gas turbine, elementary numerical problems.

REFRIGERATION AND AIR CONDITIONING- rating of refrigeration machine, coefficient of performance, simple vapor compression cycle, fundamentals of air conditioning, use of Psychrometric charts.

UNIT-III

WATER TURBINES AND PUMPS : Introduction, Classification, Construction details and working principle of Pelton, Francis and Kaplan turbines, Classification of water pumps and construction detail & working principle of centrifugal pump.

SIMPLE LIFTING MACHINES: Definition of machine, Velocity ratio, Mechanical advantage, Efficiency, Laws of machines, Reversibility of machine, Wheel and axle, Differential pulley block, Single, double and triple start worm and worm wheel, Single and double purchase winch crabs, Simple and compound screw jacks, elementary numerical problems.

UNIT-IV

INTRODUCTION TO POWER TRANSMISSION AND DEVICES: Belt drive, Rope drive, Chain drive, Types of gear and Gear train, Types and function of clutches, Types and function of brakes.

STRESSES AND STRAINS: Introduction, Concept & types of Stresses and strains, Poison's ratio, stresses and strains in simple and compound bars under axial loading, Stress-strain diagrams, Hooks law, Elastic constants & their relationships. Concept of shear force and bending moments in beams, elementary numerical problems.

TEXT BOOKS:

1. Hydraulic and Fluid Mechanics – Modi and Seth, Pub. – Standard Book House, New Delhi
2. Engineering Thermodynamics – C.P. Arora, Pub. - TMH, New Delhi
3. Thermal Engineering – A.S. Sarad, Pub. - Satya Prakashan, New Delhi.
4. Engineering Mechanics – K.L. Kumar, Pub. - TMH, New Delhi.
5. Theory of Machines – S.S. Rattan, Pub. – TMH, New Delhi.

REFERENCE BOOKS:

1. Strength of Materials – Popov, Pub. - PHI, New Delhi.
2. Hydraulic Machines – Jagdish Lal, Pub.- Metropolitan, Allahbad.
3. Thermal Science and Engineering – D.S. Kumar, Pub. – Kateria & Sons, New Delhi.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

PHY 103B PHYSICS LAB – I							
B. Tech. Semester - I (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

Note: Students will be required to perform 10 experiments in a semester.

LIST OF EXPERIMENTS

1. To find the wavelength of sodium light by using Newton's rings experimental setup.
2. To find the wavelength of sodium light by Fresnel's biprism experimental setup
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and Cauchy's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by using Michelson interferometer.
6. To find the resolving power of a telescope.
7. To find the pitch of a screw using He-Ne laser.
8. To find the specific rotation of sugar solution by using a polarimeter.
9. To compare the capacitances of two capacitors by De'sauty bridge.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown capacitor.
11. To study the photo conducting cell and hence to verify the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and Callender and Griffith bridge.
13. To find the frequency of A.C. mains by using sonometer.
14. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
15. To determine the value of Stefan's constant.
16. To find the coefficient of thermal conductivity of a good conductor by Searle's method.
17. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton method.

RECOMMENDED BOOKS :

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)

2. Practical Physics – S.L.Gupta & V.Kumar (Pragati Prakashan).
3. Advanced Practical Physics Vol.I & II – Chauhan & Singh (Pragati Prakashan).

ME 107B WORKSHOP PRACTICE							
B. Tech. Semester – I/II (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**40 Marks**
--	**--**	**4**	**2**		**Examination**	**:**	**60Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS / JOBS

1. To study different types of measuring tools/instruments used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools (lathe, shaper, planer, slotter, milling, drilling machines).
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable for butt welding and lap welding.
7. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
8. To prepare simple engineering components/ shapes by forging.
9. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
10. To prepare horizontal surface/ vertical surface/ curved surface/ slots or V-grooves on a shaper/ planner.

11. To prepare a job involving side and face milling on a milling machine.

12. To study of CNC lathe, CNC Milling and EDM Machines.

Note: 1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester.

2. At least 8 experiments/ jobs should be performed / prepared from the above list, remaining two may either be performed/ prepared from the above list or designed and set as per the scope of the syllabus of Manufacturing Processes.

CH 103B CHEMISTRY LAB.							
B. Tech. Semester – I/II (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS

1. Determination of Ca++ and Mg++ hardness of water sample using EDTA solution.
2. Determination of alkalinity of water sample.

3. Determination of dissolved oxygen (DO) in the given water sample.
4. To find the melting and eutectic point for a two component system by using method of cooling curve.
5. Determination of viscosity of lubricant by red wood viscometer(No. 1 & No. 2).
6. To determine Flash point & Fire point of an oil by Pensky-Marten's flash point apparatus and by Abel's closed cup apparatus..
7. To prepare Phenol-formaldehyde and urea- formaldehyde resin.
8. To find out saponification No. of an oil..
9. Determination of concentration of KMnO4 solution spectrophotometerically.
10. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
11. To determine amount of sodium and potassium in a given water sample by flame photometer
12. Estimation of total iron in an iron alloy.

Suggested Books:

1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
3. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula(New Age).

Note:

1. The student will be required to perform 10 experiments/ exercises from the above list and any other two experiments designed by the department based on the theory course (course code101B Course Name Chemistry)
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/ exchange of calculator are prohibited in the examination.
3. Electronic gadgets including Cellular phones are not allowed in the examination.

EE 103B PRINCIPLES OF ELECTRICAL ENGINEERING LAB

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	**:**	**20 Marks**
				Examination	**:**	**30Marks**
				Total	**:**	**50 Marks**
				Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS

1. To verify KCL and KVL.
2. To verify Thevenin's & Norton's Theorems.
3. To verify maximum power transfer theorem in D.C. Circuit.
4. To verify reciprocity theorem.
5. To verify Superposition theorem.
6. To study frequency response of a series R-L-C circuit and determine resonant frequency & Q- factor for various Values of R, L, C.
7. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q -Factor for various values of R, L, C.
8. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
9. To perform direct load test of a D.C. shunt generator and plot load voltage Vs load current curve.
10. To study various type of meters.
11. .Measurement of power by three voltmeters / three ammeters method.
12. Measurement of power in a three phase system by two watt meter method.

Note:

1. **At least 10 experiments are to be performed by students in the semester.**
2. **At least 8 experiments should be performed from the above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of EE101B.**

CSE 103B COMPUTER PROGRAMMING LAB							
B. Tech. Semester – I/II (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	--	**2**	**1**		**Examination**	**:**	**30Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF PRACTICAL PROBLEMS

1. Write a program to find the largest of three numbers. (if-then-else)
2. Write a program to find the largest number out of ten numbers (for-statement)
3. Write a program to find the average mail height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statements.
5. Write a program using arrays to find the largest and second largest no. out of given 50 nos.
6. Write a program to multiply two matrices.
7. Write a program to sort numbers using the Quicksort Algorithm.
8. Represent a deck of playing cards using arrays.
9. Write a program to check that the input string is a palindrome or not.
10. Write a program to read a string and write it in reverse order.
11. Write a program to concatenate two strings.
12. Write a program which manipulates structures (write, read, and update records).
13. Write a program which creates a file and writes into it supplied input.
14. Write a program which manipulates structures into files (write, read, and update records).

Note: At least 5 to 10 more exercises to be given by the teacher concerned

ME 109 B ELEMENTS OF MECHANICAL ENGINEERING LAB.

B. Tech. Semester – I/II (Common for all Branches)

L	T	P	Credits			
--	--	2	1	**Class Work**	**:**	**20 Marks**
				Examination	**:**	**30Marks**
				Total	**:**	**50 Marks**
				Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS

1. To study Cochran & Babcock & Wilcox boilers.
2. To study the working & function of mountings & accessories in boilers.
3. To study 2-Stroke & 4-Stroke diesel engines.

4. To study 2-Stroke & 4-Stroke petrol engines.

5. To calculate the V.R., M.A. & efficiency of single, double & triple start worm & worm wheel.

6. To calculate the V.R., M.A. & efficiency of single & double purchase winch crabs.

7. To draw the SF & BM diagrams of a simply supported beam with concentrated loads.

8. To study the simple & compound screw jacks and find their MA, VR & efficiency.

9. To study the constructional features & working of Pelton Turbine.

10. To prepare stress-strain diagram for mild steel & cast iron specimens under tension and compression respectively on a Universal testing machine.

Note: 1. Total ten experiments are to be performed in the Semester.

2. At least eight experiments should be performed from the above list. Remaining three experiments should be performed as designed & set as per the scope of the syllabus of ME105B: Elements of Mechanical Engineering.

MATH 102B MATHEMATICS – II

B. Tech. Semester - II (Common for all Branches)

L	T	P	Credits			
3	1	--	4	**Class Work**	:	**75 Marks**
				Examination	:	**75 Marks**
				Total	:	**100 Marks**
				Duration of Examination	:	**3 Hours**

UNIT-I

ORDINARY DIFFERENTIAL EQUATIONS & ITS APPLICATIONS : Exact differential equations. Equations reducible to exact differential equations. Applications of Differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, heat flow and orthogonal trajectories.

LINEAR DIFFERENTIAL EQUATIONS OF SECOND AND HIGHER ORDER. Complete solution, complementary function and particular integral, method of variation of parameters to find particular Integral, Cauchy's and Legender's linear equations, simultaneous linear equations with constant co-efficients.

UNIT-II

LAPLACE TRANSFORMS AND ITS APPLICATIONS : Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivaties, transforms of integrals, multiplication by t^n, division by t. Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.

UNIT-III

FUNCTIONS OF COMPLEX VARIABLE : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues

UNIT-IV

FOURIER SERIES AND FOURIER TRANSFORMS : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

TEXT BOOKS :

1. Advanced Engg. Mathematics F Kreyszig
2. Higher Engg. Mathematics B.S. Grewal

REFERENCE BOOKS:

1. Differential Equations – H.T.H. Piaggio.
2. Elements of Partial Differential Equations – I.N. Sneddon.
3. Advanced Engineering Mathematics – R.K. Jain, S.R.K.Iyengar.
4. Advanced Engg. Mathematics – Michael D. Greenberg.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

PHY 102B ENGINEERING PHYSICS – II							
B. Tech. Semester - II (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

ELECTRODYNAMICS & QUANTUM PHYSICS

Introduction, Displacement current, Equation of continuity, Gauss's Law in dielectric, applications of Gauss's law, Maxwell's equations (both differential and integral form), plane e.m. wave equations in free space, dielectric and conducting medium; Poynting vector.

Difficulties with Classical physics, Introduction to quantum mechanics-simple concepts, Black Body radiations, Planck's Law of radiation and its limitations, Group velocity and phase velocity, Schrodinger wave equations, Application of Schrodinger Equations (Particle in a box).

UNIT-II

CRYSTAL STRUCTURE

Space Lattice, unit cell and translation vectors, Miller indices, Bravis lattice structure in 3D, simple crystal structure (NaCl, ZnS and CsCl2), Elementary idea of reciprocal lattice, Ewald Construction, Experimental x-ray diffraction method, Laue method, powder Method.

FREE ELECTION THEORY

Elements of classical free electron theory , Drude's Theory of Conduction and its limitations, quantum theory of free electrons, Fermi level, Density of states, Fermi-Dirac distribution function, Thermionic emission, Richardson's equation.

UNIT-III

BAND THEORY OF SOLIDS

Origin of energy bands, Kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Concept of effective mass and holes, Classification of solids into metals, Semiconductors and insulators, Fermi energy and its variation with temperature, Conduction in Intrinsic and Extrinsic Semiconductors. Hall Effect and its Applications.

UNIT-IV

SUPERCONDUCTIVITY & NANOSCIENCE

Introduction to superconductivity, Critical temperature, Meissner Effect, Types of Superconductor, London Equations, penetration depth and coherence length, BCS Theory(qualitative ideas), High temperature superconductors.

Concept of Nano-materials, Size dependence of band gap, Top-down and bottom-up approach for preparing nano-materials, MEMS & NEMS, Properties and applications of Fullerene, Graphene, CNT, Nanowires, Nano-composites, Quantum dots..

TEXT BOOKS :

1. Solid State Physics – S.O.Pillai (6th Edition, New Age).
2. Quantum Mechanics – Ghatak & Loknathan.
3. Fundamentals of Solid State Physics – B.S.Saxena, R.C.Gupta & P.N.Saxena (Pragati Prakashan).
4. Solid State Physics by H. Ibach & H. Luth, Springer, Berlin.
5. Engineering Physics by H.K Malik and A.K. Singh (Tata McGraw Hill).
6. Engineering Physics by S.P. Taneja (Chand Pub.)

REFERENCE BOOKS :

1. Introduction to Solid State Physics (VII Ed.) - Charles Kittel (John Wiley).
2. Quantum Mechanics – Powell and Crasemann (Oxford & IBH)
3. Classical Electrodynamics by S.P. Puri (Narosa)
4. Nano-technology- Molecularly Designed Materials: G. M. Chow & K. E. Gonsalves (American Chemical society).

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ECE 102B BASICS OF ELECTRONICS ENGINEERING							
B. Tech. Semester - II (OPTIONAL- Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

SEMICONDUCTOR PHYSICS, DIODES AND APPLICATIONS: Basic concepts, intrinsic and extrinsic semiconductors, diffusion and drift currents ,Hall effect and its applications-pn junction under open circuit, reverse bias and forward bias conditions, p-n junction in the breakdown region, ideal diode, types of diodes –zener diode, varactor diode, LED and photodiode. Rectifier (half wave and full wave).

AMPLIFIERS: Introduction of different types of BJT amplifiers & their characteristics.

UNIT II

OPERATIONAL AMPLIFIERS: OP-amps, its characteristics, inverting, non-inverting, summing, averaging, scaling ,difference, integrator and differentiator amplifiers.

POWER SUPPLIES: Introduction and working of switched mode power supply (SMPS), voltage regulator.

UNIT III

DIGITAL ELECTRONICS: Binary, Octal and Hexadecimal number system and conversion, Boolean algebra, truth tables of logic gates AND, OR,NOT,EX-OR,EX-NOR, NAND, NOR AND their implementation using diodes transistors, switches and lamps, Universal gates.

ELECTRONIC INSTRUMENTS: Transducers, Role, importance and applications of general purpose test instruments viz. multi meter (digital and analog), cathode ray oscilloscope (CRO), function/ signal generator.

UNIT IV

COMMUNICATION SYSTEM: Modulation, need of modulation, Block diagram of basic communication system, overview of AM, FM and PM.

MICROPROCESSOR: Basics of 8085 & its architecture. Instruction set, Interrupts, Addressing modes.

Reference Books:

1. Sedra A S and Smith K C. “Microelectronic Circuits” New York.Oxford University Press, New York
2. Tocci R J and widner N S “Digital Systems” – Principles and Applications”, Pearson Education India , new Delhi .
3. Cooper and Helfric, “Modern Electronic Instrumentation and Measuring Techniques”. Prentice Hall of India, New Delhi.
4. Boylestad and Nashelesky, “Electronic Devices and Circuit Theory”, Pearson Education India, New Delhi
5. Millman and Grabel, “Microelectronics”, Tata McGraw Hill
6. Millman and Halkias, “Electronics Devices and Circuits”. Tata McGraw Hill
7. Kennedy and Davis, “Electronic Communication Systems”, Tata McGraw Hill
8. Ramesh S. Gaonkar, “Microprocessor Architecture,Programming,and Applications with the 8085”,Penram International Publishing.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

BT 102B BASICS OF BIOTECHNOLOGY							
B. Tech. Semester – II (OPTIONAL- Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT – I

INTRODUCTION: Nature and scope of Biotechnology.
CELL STRUCTURE AND FUNCTION: Prokaryotes and Eukaryotes- cell wall, cell membrane, nucleus, mitochondria, chloroplast, ribosome, vacuoles, bacteria and viruses: brief descriptions.
Biomolecules: A brief account of structure and functions of carbohydrates, lipids, proteins.

UNIT– II

CELL DIVISION: Mitosis and meiosis
GENES AND CHROMOSOMES: Classical- Mendel's laws and chromosomes, nature of genetic material, DNA and RNA as genetic material, concept of organization of genetic material into chromosomes.
DNA replication: DNA polymerases, replication mechanism.

UNIT-III

GENE EXPRESSION: Central dogma, genetic code, gene expression-a brief account of transcription and translation, housekeeping genes, mutations and their molecular basis.
GENETIC ENGINEERING: An introduction to genetic engineering: cloning (vectors, enzymes), DNA and genomic libraries, transgenics, DNA fingerprinting, genomics.

UNIT – IV

APPLICATIONS OF BIOTECHNOLOGY : Bioprocess and fermentation technology, cell culture, enzyme technology, biological fuel generation, single cell protein, sewage treatment, environmental biotechnology, biotechnology and medicine, biotechnology in agriculture & forestry industry, food and beverage technology, production of biological inventions, safety in biotechnology.

TEXT/ REFERENCE BOOKS:

- Biotechnology, Smith, Cambridge Press.
- Modern Concepts of Biotechnology, H. D. Kumar, Vikas Publishing House (P) Ltd.
- Elements of Biotechnology, P. K. Gupta, Rastogi Publications.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

HUM 102B ORAL COMMUNICATION SKILLS							
B. Tech. Semester – II (OPTIONAL- Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

OBJECTIVE

To train students to have proficiency in oral communication through interpersonal communicative situations.

COURSE CONTENT

UNIT I

ESSENTIALS OF SPEAKING SKILLS:

Familiarity with phonetic sound symbols; Transcription of simple words using International Phonetic Alphabet; Use of dictionary to cultivate standard pronunciation and develop phonetic discrimination

UNIT II

SPEAKING SKILLS:

Need and Significance of Effective Oral Communication; Practice of Conversation – Interpersonal and Telephonic Conversation; Formal Group Discussion

UNIT III

NON-VERBAL ELEMENTS IN ORAL COMMUNICATION SKILLS:

Reading Face, eyes, gesture and body posture, time, space and culture in communicative situations; practicing verbal and non-verbal communication (Body Language) to acquire effective Oral communication;

UNIT IV

LISTENING SKILLS:

Essentials of Good Listening, Types of Listening, Barriers in Effective listening, Exercises in

Listening to Talk Shows, Speech Reviews; Practice in English Sounds and

Speech using RP/MRP

RECOMMENDED READING

1. Buck, Gary. *Assessing Listening.* Delhi: Foundation Books (Cambridge University Press), 200.
2. Balasubramanian, T. *A Textbook of English Phonetics for Indian Students.* Chennai: MacMillan,1981 (rpt 2007).
3. Gangal, J.K. *A Practical Course in Spoken English*. New Delhi: PHI, 2011
4. Raman, Meenakshi and Sangeeta Sharma. Communication Skills. Delhi: OUP, 2011
5. Ribbens, Geoff and Richard Thompson. *Body Language*. New York: Hodder & Stoughton, 2007.

CE 102B BASICS OF CIVIL ENGINEERING							
B. Tech. Semester – II (OPTIONAL- Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT - I

MATERIALS FOR CONSTRUCTION: Stones, Sands, Lime, Bricks, Timber, Steel their Classification and Properties. Different Types of Cement and their Properties, manufacturing of Cement, Concrete, and properties of Concrete, Ingredient of Concrete and Their Functions

Component parts of a Building, Foundation, Masonry Works, Doors and Windows, Floors, Roofs, DPC, Building Services

UNIT - II

SURVEYING : Introduction to Surveying: Definition, importance, classification of surveys, Principle, Leveling: definitions of terms used in leveling, different types of levels, Contours, Definition, representation of reliefs, horizontal equivalent, contour interval, characteristics of contours, methods of contouring, contour gradient, uses of contour maps, Introduction to GIS, GPS and Remote sensing.

UNIT - III

TRANSPORTATION: Various modes and means of transportation, Different types of transport systems, Importance of road transport, History of Road Development, Indian Road Congress. Main features of 20 years road development plans in India, PMGSY

Sources of power, estimation of water power, water budget equation, necessity and importance of harnessing small hydro power plants, Dams, Types of Dams, Location and Impact assessment of a Dam project.

UNIT - IV

GEOTECHNICAL ENGINEERING: History and its applications, Soil Properties, Classification of Soil, Geotechnical and Geophysical investigation of Soil.

IRRIGATION ENGINEERING: Necessity, advantages, disadvantages, impact of irrigation on human environment, need and development of irrigation in India.

Text Books:

1. Basic Civil Engineering, Satheesh Gopi, Pearson.
2. Basic Civil Engineering, Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kr. Jain, Firewall Medi

Reference Books:

1. Surveying by Prof. N. Singh, Tata McGraw Hill, New Delhi
2. Basic Civil Engineering, Rakesh Beohar, Firewall Media
3. Highway Engg. by S. K. Khanna & C.e.G.Justo, Nem Chand & Bros,Roorkee
4. Water Resources Engineering by Linseley and Franzini
5. Basic Civil Engineering, L.G. Kulkarni A. D. Pawar S. P. Nitsure, Technical Publications.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

PHY 104B PHYSICS LAB. - II							
B. Tech. Semester - II (Common for all Branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

Note: Students will be required to perform 10 experiments in a semester.

LIST OF EXPERIMENTS

1. To find the low resistance by Carey - Foster's bridge.

2. To find the resistance of a galvanometer by Thomson's constant deflection method using a post office box.
3. To find the value of high resistances by Substitution method.
4. To find the value of high resistances by Leakage method.
5. To study the characteristics of a solar cell and to find the fill factor.
6. To find the value of e/m for electrons by Helical method.
7. To find the ionisation potential of Argon/Mercury using a thyratron tube.
8. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
9. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10. To find the value of Planck's constant by using a photoelectric cell.
11. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
12. To find the value of Hall Co-efficient of semi-conductor.
13. To study the V-I characteristics of a p-n diode.
14. To find the band gap of intrinsic semi-conductor using four probe method.
15. To calculate the hysteresis loss by tracing a B-H curve.
16. To verify the Truth Table of various Logic Gates.

RECOMMENDED BOOKS :

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)
2. Practical Physics – S.L.Gupta & V.Kumar (Pragati Prakashan).
3. Advanced Practical Physics Vol.I & II – Chauhan & Singh (Pragati Prakashan).

GP 102B GENERAL PROFICIENCY & ETHICS

B. Tech. Semester – II (Common for all Branches)							
L	**T**	**P**	**Credits**		**Examination**	**:**	**50Marks**
1	**--**	**--**	**2**		**Total**	**:**	**50 Marks**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him / her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/ her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	--------
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(8 Marks)**
III	Technical Activities / Industrial, Educational tour	**(8 Marks)**
IV	Sports/games	**(4 Marks)**
V	Moral values & Ethics	**(10 Marks)**

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/ her achievement and verbal & communicative skill through presentation before the committee. **(20 Marks)**

C. Moral values & Ethics

Syllabus - Introduction to Value Education. Understanding ethics, value system, happiness, prosperity

A minor test / Quiz will be conducted and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal. The evaluation of this course will be made by the following Committee.

University Departments:

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

Affiliated Colleges:

1	Director/Principal	Chairman
2	Head of the Department/Sr. Faculty	Member
3	External Examiner to be appointed by the University	Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

MGT 201B ENGINEERING ECONOMICS							
B. Tech. Semester – III (Common for all Branches Except BT& BME)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

____COURSE OBJECTIVE: The aims of this course are to:

1. Acquaint the student with the basic economic concepts and their operational significance
2. Stimulate him to think systematically and objectively about cotemporary economic problems.

UNIT-I

Definition of economics- various definitions, nature of Economic problem, Micro and macro economics- their feature and scope, production possibility curve, Economic laws and their nature. Relation between Science, Engineering Technology and Economics. Concept and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its practical application and importance**.**

UNIT-II

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve. Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & application of the concept of elasticity of demand. Various concepts of cost-Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT III

Meaning of production and factors of production; Law of variable proportions, Law of Return to Scale, Internet and External economics and diseconomies of scale. Meaning of Market, Type of Marker– perfect Competition, Monopoly, Oligopoly, Monopolistic competition (Main features of these markers).

UNIT-IV

Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices . Nature and characteristics of Indian economy, privatization – meaning, merits and demerits. Globalisation of India economy – merits and demerits. Elementary Concept of WTO & TRIPS agreement, Monitory Policy & Fiscal Policy

TEXT BOOKS:

1. Ahuja H.L"Micro Ecomomic Theory" S. Chand Publication, New Delhi
2. Dewett K.K "Modern Ecomomic Theory" S. Chand Publication, New Delhi
3. Jain T.R, Grover M.L, Ohri V.K Khanna O.P,"Economics for engineers" V.K .Publication ,New Delhi

SUGGESTED BOOKS:

1. Jhingan M.L"Micro Ecomomic Theory" S.Chand Publication ,New Delhi
2. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
3. Mishra S.K "Modern Micro Economics" Pragati Publication Mumbai.

4. Dwivedi D.N "Micro Economics " Pearson Education, New Delhi.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

GES 201B ENVIRONMENTAL STUDIES							
B. Tech. Semester – III/IV (Common for all Branches)							
L	**T**	**P**	**Credit**		**Examination**	**:**	**75Marks**
3	**--**	**--**	**0**		**Total**	**:**	**75 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT – I The Multidisciplinary nature of environmental studies, Definition, scope and importance.

Need for Public awareness

UNIT – II **NATURAL RESOURCES:**

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation: deforestation, case studies, Timber exploitation, mining, dams and their effects and forests tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources; case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
   - Role of an individual in conservation of natural resources.
   - Equitable use of resources for sustainable lifestyles.

UNIT- III **ECOSYSTEMS:**

- Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco-system:
  a) Forest ecosystem, Grassland ecosystem, Desert ecosystem.
  b) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT- IV **BIODIVERSITY AND ITS CONSERVATIONS**:

- Introduction – Definition: Genetic, species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.

UNIT – V ENVIRONMENTAL POLLUTION:

Definition, causes, effects and control, measures of:

Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal Pollution, Nuclear hazards

- Solid waste management: Causes effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: Floods, earthquake, cyclone and landslides.

UNIT – VI SOCIAL ISSUES AND THE ENVIRONMENT:

a) From unsustainable to sustainable development
b) Urban problems related to energy
c) Water conservation, rain water harvesting, watershed management
d) Resettlement and rehabilitation of people; its problems and concerns, case studies
e) Environmental ethics: Issues and possible solutions
f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies
g) Wasteland reclamation, Consumerism and waste products
h) Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act
i) Issues involved in enforcement of environmental legislation, Public awareness

UNIT – VII Human population and the Environment., Population growth, variation among nations.
Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/ AIDS, Woman and Child Welfare.
Role of Information Technology in Environment and human health.
Case Studies.

REFERENCES:

1. Agarwal, K.C. 2001, Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Franch, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India .
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5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai. 1195p.
6. De A.K., Environmenal Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment ®.
8. Gleick, H.P., 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford Univ., Press 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bomaby Natural History Scociety, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Helhi 284p.
12. Mckinney, M.L. & Schoch, RM 1996, Environmental Sciences Systems & Solutions, Web enhanced Edition 639p.
13. Mhaskar A.K., Mater Hazardous, Tekchno-Sciences Publications (TB).

14. Miller T.G. Jr. Environmental Science, Wadsoworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Dutta, A.K. 1987, Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p
17. Sharma, B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Sciences (TB).
20. Trivedi, R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II Enviro Mdiea (R).
21. Trividi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II Enviro Media (R).
22. Trividi R.K. and P.K. Goel, Introduction to air pollution, Techno Sciences Pub. (TB).
23. Wagner K.D., 1998, Environmental Management, W.B. Saunders Co. Philadelophia, USA 499p.
24. A text bok environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

Note: 1. Examiner will set eight questions. Students will be required to attempt five Questions.
2. The awards of this paper shall not be counted in the award of the Degree/DMC.

ME 201B THERMODYNAMICS							
B. Tech. Semester – III (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

BASIC CONCEPTS: Macroscopic and microscopic approaches, definition of system and surrounding, concept of control volume, thermodynamic state, concepts of simple compressible substances, process and cycle, thermodynamic processes and thermodynamic equilibrium; Zeroth law; thermodynamic properties and use of tables of thermodynamic properties; Thermodynamic concept of energy; Modes of work and heat transfer.

FIRST LAW OF THERMODYNAMICS: The first law referred to cyclic and non-cyclic processes, Concept of internal energy of a system, Conservation of energy for simple compressible closed systems; Definitions of enthalpy and specific heats; free expansion process, Conservation of energy for an open system, Steady and transient processes. Problems

UNIT II

SECOND LAW OF THERMODYNAMICS: The directional constraints on natural processes; Kelvin- Planck and Clausius Statements and their Equivalence; Concept of reversibility; Carnot principle; Absolute thermodynamic temperature scale; Clausius Inequality, entropy, change in entropy in various thermodynamic processes, T-dS relations, entropy balance for closed and open systems, Principle of increase-in-Entropy, entropy generation, Third Law of Thermodynamics. Problems

Exergy: Concept of reversible work and irreversibility; Second law efficiency; Exergy change of a system: closed and open systems, exergy transfer by heat, work and mass, exergy destruction, exergy balance in closed and open systems. Problems

UNIT III

PURE SUBSTANCE AND PHASE: Phase Transformation, Solid-Liquid-Vapour Equilibrium, Throttling and Measurement of Dryness Fraction of Steam, , Idea of a generalized chart and the law of corresponding states; Concept of ideal gases and their equations of state. Problems

INTRODUCTION TO PROPERTIES OF MIXTURES AND PHASES: Dalton's model, Equation of state, properties of ideal gas mixtures, Change in entropy on mixing; Law of corresponding states and introduction to real-gas mixtures; Gibbs phase rule; Air/Water Mixtures, Psychrometrics. Problems

UNIT IV

THERMODYNAMIC PROPERTY RELATIONS: Maxwell relations; Clausius-Clapeyron equation; Difference in heat capacities; Ratio of heat capacities; Joule-Thompson coefficient and inversion curve.

THERMODYNAMICS OF REACTIVE SYSTEMS: First law analysis; Internal energy and enthalpy of reaction; Enthalpy of formation; Second law analysis; chemical equilibrium; equilibrium constant for ideal-gas mixtures and its variation with temperature. Problems

Text Books:

1. Engineering Thermodynamics – P K Nag, Tata McGraw Hill
2. Engineering Thermodynamics – Jones and Dugan, PHI, New Delhi.
3. Sonntag, Borgnakke and Van Wylen, Fundamentals of Thermodynamics, 5th Ed., JW Sons, Singapore.

Reference Books :

1. Dhar, P.L., Engineering Thermodynamics - a generalized approach Elsevier, New Delhi.
2. Moran M.J. and Shapiro H.N., Engineering Thermodynamics, IV Edition, John Wiley & Sons, Singapore.
3. Çengel Y.A. and Boles, M.A., Thermodynamics: An Engineering Approach, 4th Ed., TMG Hill, New Delhi

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ME 203B STRENGTH OF MATERIALS –I							
B. Tech. Semester – III (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

SIMPLE STRESSES & STRAINS: Concept & types of Stresses and strains, Poison's ratio, stresses and strain in simple and compound bars under axial loading, stress strain diagrams, Hooks law, elastic constants & their relationships, temperature stress & strain in simple & compound bars under axial loading, Numerical.

COMPOUND STRESSES & STRAINS: Concept of surface and volumetric strains, two dimensional stress system, conjugate shear stress at a point on a plane, principal stresses & strains and principal- planes, Mohr's circle of stresses, Numerical.

UNIT II

SHEAR FORCE & BENDING MOMENTS: Definitions, SF & BM diagrams for cantilevers, simply supported beams with or without over-hang and calculation of maximum BM & SF and the point of contra-flexure under (i) concentrated loads, (ii) uniformly distributed loads over whole span or a part of it, (iii) combination of concentrated loads and uniformly distributed loads, (iv) uniformly varying loads and (v) application of moments, relation between the rate of loading, the shear force and the bending moments, Problems.

FIXED BEAMS: Deflections, reactions and fixing moments with SF & BM calculations & diagrams for fixed beams under (i) concentrated loads, (ii) uniformly distributed load and (iii) a combination of concentrated loads & uniformly distributed load.

UNIT III

TORSION OF CIRCULAR MEMBERS: Torsion of thin circular tube, Solid and hollow circular shafts, tapered shaft, stepped shaft & composite circular shafts, combined bending and torsion, equivalent torque, effect of end thrust. Numericals.

COLUMNS & STRUTS: Column under axial load, concept of instability and buckling, slenderness ratio, derivation of Euler's formulae for the elastic buckling load, Eulers, Rankine, Gordon's formulae Johnson's empirical formula for axial loading columns and their applications, eccentric compression of a short strut of rectangular & circular sections, Numericals.

UNIT IV

BENDING & SHEAR STRESSES IN BEAMS: Bending stresses in beams with derivation & application to beams of circular, rectangular, I,T and channel sections, composite beams, shear stresses in beams with combined bending, torsion & axial loading of beams. Numericals.

SLOPE & DEFLECTION: Relationship between bending moment, slope & deflection, Mohr's theorem, moment area method, method of integration, Macaulay's method, calculations for slope and deflection of (i) cantilevers and (ii) simply supported beams with or without overhang under concentrated load, Uniformly distributed loads or combination of concentrated and uniformly distributed loads, Numericals.

TEXT BOOKS:

1. Strength of Materials – G. H. Ryder - Macmillan, India
2. Strength of Materials– Andrew Pytel and Fredinand L. Singer, Addison – Wesley

REFERENCE BOOKS:

1. Strength of Materials – Popov, PHI, New Delhi.
2. Strength of Materials - A Rudimentary Approach – M.A. Jayaram, Sapna Book House, Bangalore

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 205B ENGINEERING MECHANICS							
B. Tech. Semester – III (Mechanical, Automobile & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**

					Duration of Examination	**:**	**3 Hours**

UNIT- I

REVIEW OF BASIC FORCE SYSTEMS: Dimensions and units of mechanics, idealization of mechanics, laws of mechanics, vector algebra review, moment of a force about a point and axis, the couple and couple moment, addition and subtraction of couples, moment of a couple about a line, translation of a force to a parallel position, resultant of a force system, Problems.

EQUILIBRIUM: Introduction, free body diagram, control volumes, general equations of equilibrium, two point equivalent loading, static in-determinancy, simple truss, method of joints, method of sections, Problems.

UNIT-II

PROPERTIES OF SURFACES, MOMENTS AND PRODUCTS OF INERTIA : First moment of an area and the centroid, principal axes, formal definition of inertia quantities, relation between mass-inertia terms and area-inertia terms, translation of coordinate axes, transportation properties of the inertia terms, a brief introduction to tensors, the inertia of ellipsoid and principal moments of inertia, Problems.

UNIT-III

KINEMATICS OF PARTICLES AND RIGID BODIES: Velocity and acceleration in path and cylindrical coordinates, motion of a particle relative to a pair of translating axes, translation and rotation of rigid bodies, Chasles theorem, moving references, velocity and acceleration for different references, inertia and coriolis forces. Problems.

UNIT-IV

PARTICLE DYNAMICS, ENERGY & MOMENTUM METHODS: Newton's law for rectangular coordinates & cylindrical coordinates, rectifier translation, central force motion, Newton's law for path variables, work energy equations, work energy equations for a systems of particles, linear and angular momentum equations for a systems of particles. Problems

TEXT BOOK:

1. Engineering Mechanics - Statics & Dynamics by I.H. Shames, PHI, New Delhi.
2. Engineering Mechanics – Timoschenko.

REFERENCE BOOKS:

1. Statics & Dynamics by J.L. Meriam, JohnWiley & Sons (P) Ltd. New York.
2. Statics & Dynamics by Beer & Johnson, MGH, New Delhi.

Note:

1. In the semester examination, the examiner will set two questions from each part (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each part.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME – 207B FLUID MECHANICS

B. Tech. Semester – III (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT- I

FLUID PROPERTIES AND FLUID STATICS: Concept of fluid and flow, ideal and real fluids, properties of fluids, Newtonian and non-Newtonian fluids. Pascal's law, hydrostatic equation, hydrostatic forces on submerged plane and curved surfaces, stability of floating and submerged bodies, metacentric height, relative equilibrium.

MANOMETERS: Simple & differential manometers;

VORTEX MOTION: Free vortex flow, Forced vortex flow

UNIT II

FLUID KINEMATICS: Eulerian and Lagrangian description of fluid flow; stream, streak and path lines; types of flows, flow rate and continuity equation, differential equation of continuity in cylindrical and polar coordinates, rotation, vorticity and circulation, stream and potential functions, flow net.

FLUID DYNAMICS: Concept of system and control volume, Euler's equation, Bernoulli's equation, venturimeter, orifices, orificemeter, mouthpieces, Notches and weirs, kinetic and momentum correction factors, Impulse momentum relationship and its applications.

UNIT III

VISCOUS FLOW: Flow regimes and Reynold's number, Navier-Stokes equation of motion, Relationship between shear stress and pressure gradient, uni-directional flow between stationary parallel plates, parallel plates having relative motion, movement of piston in a dashpot, power absorbed in bearings.

FLOW THROUGH PIPES: Major and minor losses in pipes, Hagen-Poiseuille law, hydraulic gradient and total energy lines, series and parallel connection of pipes, branched pipes; equivalent pipe, power transmission through pipes.

UNIT IV

BOUNDARY LAYER FLOW: Boundary layer concept, displacement, momentum and energy thickness, von-Karman momentum integral equation, laminar and turbulent boundary layer flows: Boundary layer thickness, skin friction coefficient, drag on a flat plate, boundary layer separation

FLOW AROUND IMMERSED BODIES: Drag force, Lift & drag coefficient, streamlined and bluff bodies, lift and drag on a cylinder and an airfoil.

TEXT BOOKS:

1. Fluid Mechanics and Machinery– CSP Ojha, R Berndthsson and P N Chandramouli, Oxford University Press
2. Mechanics of Fluids – I H Shames, Mc Graw Hill

REFERENCES BOOKS:

1. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas, TMH

2. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar, S.K. Kataria and Sons
3. Fluid Mechanics– John F Douglas, Janusz M. Gasiorek, John A, Swaffield, Peason Education

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 209B MACHINE DRAWING							
B. Tech. Semester – III (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**40 Marks**
1	**-**	**4**	**3**		**Examination**	**:**	**60Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

Introduction to BIS Specification SP : 46 – 1988 Code of Engineering drawing – Machining symbols and surface Texture, Theory of conventional Tolerancing, Geometric Dimensioning and Tolerancing.

Toothed Gear: Gear terminology, I.S. convention representation of assembly of spur gears, helical gears, bevel gears, worm and worm wheel.

Orthographic views from isometric views of machine parts / components. Dimensioning, Sectioning. Exercises on Keys, Cotter and Joints; Shaft Couplings; Pipe Joint and Fittings; Pulleys; Bearings, Hangers and Brackets; Valve and Cocks; Automotive Parts.

UNIT II

Assembly drawing with sectioning and bill of materials from given detailed drawings of assemblies of miscellaneous Machine Parts; Lathe Tail Stock; Four Jaw Chuck; Tool Post; Tool Holder; Screw Jack; Machine Vice; Pipe Vice; Pedestal Bearing , Steam Stop Valve , Drilling Jigs; Milling Fixture and Hand Drill.

NOTE: For class work, the students shall be assigned to prepare at least ten drawing sheets covering all units and each topic of the syllabus.

For theory examination, the examiner will set a question paper containing total four questions, two questions from each unit covering each topic of the syllabus; students are required to attempt two questions at least one from each unit. The question from unit I will carry 20 marks each. Question from unit II will carry 40 marks.

Text Books:

1. A Text Book of Machine Drawing : P S Gill , S K Kataria & Sons
2. Machine Drawing - N D Bhatt , Charotar Publishing House.

Reference Books:

1. Machine drawing : N Sidheshwar, Kannaieh, V S Sastry, TMH., New Delhi.
2. Machine drawing : R K Dhawan, S Chand.

ME 211B STRENGTH OF MATERIALS –I LAB							
B. Tech. Semester – III (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credit**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To study the Brinell hardness testing machine & perform the Brinell hardness test.
2. To study the Rockwell hardness testing machine & perform the Rockwell hardness test.
3. To study the Vickers hardness testing machine & perform the Vickers hardness test.
4. To study the Erichsen sheet metal testing machine & perform the Erichsen sheet metal test.
5. To study the Impact testing machine and perform the Impact tests (Izod & Charpy).
6. To study the Universal testing machine and perform the tensile test.
7. To perform compression & bending tests on UTM.
8. To perform the shear test on UTM.
9. To study the torsion testing machine and perform the torsion test.
10. To draw shear Force, Bending Moment Diagrams for a simply Supported Beam under Point and Distributed Loads.

Note:

1. **At least ten experiments are to be performed in the semester.**
2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus.**

ME 213B COMPUTER AIDED DRAFTING LAB							
B. Tech. Semester – III (Mechanical Engineering)							
L	**T**	**P**	**Credit**		**Class Work**	**:**	**40 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**60 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

The students will be required to carry out the following exercises using any one of the educational CAD softwares like Latest version of AutoCAD, I-DEAS, CATIA, SOLID EDGE, Pro-Engineer etc).

List of Experiments/Exercises

UNIT I

1. Start a New Drawing, Name the Drawing Sheet, Set the Drawing Units, Drawing Precision, Drawing Limits, Grid, Snap and Draw the Margin and Title Block as given in Exercise Problems Sheet.
2. Redraw the 2D Figures including dimensions as given in Exercise Problems Sheet using various Fundamental of 2D commands in Draw and Modify Toolbars
3. Redraw the 2D Figures including dimensions as given in Exercise Problems Sheet using various Advance commands in Osnap, Grip, Block, Layers, Attributes, Edit Toolbars

UNIT II

4. Draw Front, Top, and Right Side Orthogonal view of each of the objects in given Exercise Problems Sheet using View Port commands
5. Draw 3D Surface Models of the Objects as given in Exercise Problems Sheet, using fundamental of 3D Drawing and Surface commands
6. Draw 3D Solid Models of the Objects as given in Exercise Problems Sheet, using fundamental of 3D Drawing and Solid commands

UNIT III

7. Draw 3D Models of different types of Bolts and Nuts with Washers as given in Exercise Problems Sheet.
8. Draw 3D Models of different types of Keys, Cotters and Joints as given in Exercise Problems Sheet.
9. Draw 3D Models of Simple Machine and Automobile Components as given in Exercise Problems Sheet.

Books:

1. Engineering Graphics with auto CAD, Latest edition, James D Bethune PHI
2. Machine Drawing- P S Gill, Katson
3. Machine Drawing includes Auto CAD –Ajeet Singh, Tata Mc Graw Hill

Note: For class work, the students should be assigned to prepare at least ten drawing sheets covering all units and each topic/ experiment/exercise of the syllabus.

For practical examination, the examiner should set a question paper containing total three questions, one questions from each unit covering all units and each topic/ experiment/ exercise of the syllabus; students are required to attempt all the three questions.

ME 215B FLUID MECHANICS LAB							
B. Tech. Semester – III (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credit**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To determine coefficient of discharge of an orifice meter.

2. To determine the coefficient of discharge of Notch (V / Rectangular types).
3. To determine the friction factor for the pipes.
4. To determine the coefficient of discharge of venturimeter.
5. To determine the coefficient of discharge, contraction & velocity of an orifice.
6. To verify the Bernoullis Theorem.
7. To find critical Reynolds number for a pipe flow.
8. To determine the meta-centric height of a floating body.
9. To determine the minor losses due to sudden enlargement, sudden contraction.
10. To determine loss coefficient for valves and bends.
11. To show the velocity and pressure variation with radius in a forced vertex flow.
12. To determine the coefficient of discharge of mouthpiece.
13. Flow visualization demonstration.

Note:

1. **At least ten experiments are to be performed in the semester.**
2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus (ME207B).**

GES 203B ENVIRONMENTAL STUDIES FIELD WORK
B. Tech. Semester –III/IV (Common for all Branches)

L	T	P	Credit		Field Work	:	25Marks
--	--	--	0		Total	:	25 Marks

FIELD WORK:

- Visit to a local area to document environmental assets – river/ forest/ grassland/ hill/ mountain.
- Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc. (Field work equal to 5 lectures hours).

Note: The awards of this paper shall not be counted in the award of the Degree/DMC.

ME 217 B WORKSHOP

B. Tech. Semester – III (Common for all branches Except Automobile & Bio Technology Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**50 Marks**
-	**-**	**2**	**2**		**Total**	**:**	**50 Marks**

Each student has to undergo a workshop atleast 4 weeks (80-100 hours) at the end of II semester during summer vacations. Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline/ department. **The evaluation of this training shall be carried out in the III semester**

LIST OF JOBS TO BE CARRIED OUT DURING THIS PERIOD

1. To study and prepare different types of jobs on machine tools (lathe, shaper, planer, slotter, milling, drilling machines).
2. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
3. To prepare joints for welding suitable for butt welding and lap welding.
4. To study various types of carpentry tools and prepare simple types of wooden joints.
5. To prepare simple engineering components/ shapes by forging.
6. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
7. To study of CNC lathe, CNC Milling and EDM Machines.
8. Any work assigned in electrical workshop, computer hardware/ language lab, electronics workshop, biomedical hardware, automobile workshop etc.

This student will prepare job(s)/project as an individual or in a group using workshop in house infrastructure.

The student shall submit a typed report.

Training will be evaluated on the spot out of 20 marks.

The report will be evaluated in the III Semester by a Committee consisting of two teachers.

The student will interact with the committee through presentation to demonstrate his/ her learning. The basis of evaluation will primarily be the knowledge and exposure of students on different kinds of Machines/instruments/tools/ skills etc. The committee will evaluate out of 30 marks.

The committee shall submit the awards out of 50 marks.

ME202B MANUFACTURING TECHNOLOGY							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION TO FOUNDRY - Steps involved in casting, advantages, limitations and applications of casting process, molding methods, molding materials and properties, Design considerations in casting, gating system design and Riser design, directional solidification in castings, problems.

MELTING, CLEANING AND TESTING OF CASTING PROCESS- Melting practice: Cupola, charge calculations, cleaning of casting, Fettling, defects in castings and their remedies, methods of testing of castings for their soundness, problems.

SPECIAL CASTING PROCESSES: Shell molding, precision investment casting, permanent mold casting, die casting, centrifugal casting, and continuous casting.

UNIT II

THEORY OF METAL FORMING -Classification of metal forming processes, Nature of plastic deformation, hot working and cold working, yield criteria and their significance, Principles of rolling roll passes roll pass sequences. Forging: process and defects, Extrusion and other processes: Extrusion principle, wire drawing, swaging, tube making.

POWDER METALLURGY- Introduction ,Production of Metallic Powder, Processing methods, Design consideration for powder metallurgy.

UNIT III

INTRODUCTION TO WELDING-Classification of welding process, Selection of a welding process, Effect of welding parameters, Selection of electrodes and fluxes, Metal transfer & its importance in arc welding, Power sources for arc welding, Inspections and defects of weldments, Gas welding, Arc welding, Resistance welding

OTHER WELDING PROCESSES: Introduction of thermit welding, electro slag welding, electron beam welding, forge welding, friction welding, diffusion welding, brazing and soldering.

UNIT IV

SHEET METAL FORMING PROCESSES- Classification of sheet metal processes, press tool operations, shearing action, Principle, process parameters, equipment and application of the following processes, piercing, blanking, deep drawing, spinning, stretch forming, embossing and coining, sheet metal die design, problems.

PLASTIC PROCESSING- Introduction, plastic materials, extrusion of plastic, injection moulding, blow moulding**.**

Text Books:

1. Principles of Manufacturing Materials & Processes – Campbell J. S., Publisher – Mc Graw Hill.

2. . Manufacturing Technology-Foundry, Forming and Welding - P.N. Rao, Tata McGraw Hill

Reference Books:

1. Foundry Technology - K.P. Sinha, D.B. Goel, Roorkee Publishing House.

2. Welding and Welding Technology, Richard L. Little Tata McGraw Hill Ltd.

3. Principle of Metal casting - Rosenthal, Tata McGraw Hill, New Delhi

4. Manufacturing Processes and Systems: Ostwald Phillip F., Munoz Jairo, John Wiley & Sons

5. Elements of Manufacturing Processes – B.S. Nagendra Parasher, RK Mittal, PHI N. Delhi

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 204 MATERIAL SCIENCE							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

ENGINEERING MATERIAL AND CRYSTALLOGRAPHY

Engineering Materials: Classification of engineering materials, Property spectrum of engineering materials

Crystal Geometry:space lattice,unit cell, Bravais crystal system, atomic packing fraction, Miller indices, interplaner spacing, linear density, planer density, Numerical problems

Crystal Imperfcections: Classification of Imperfections, line imperfection ,Mixed dislocations, Characteristics of dislocation ,sources of dislocation, their effects and remedies, phenomenon related to behaviour of dislocations, surface imperfection, volume imperfection, whiskers.

UNIT II

PHASES DIAGRAMS AND HEAT TREATMENT

Solid solution, types of solid solution, phases, Gibb's Phase rule, Phase diagrams, unary and binary phase diagrams, eutectic and eutectoid phase diagrams, peritectic and peritectoid phase diagrams, microstructural changes, lever rule, Iron carbon system

PHASE TRANSFORMATIONS: terminology, Strengthening mechanism, cold and hot working, precipitation hardening, dispersion hardening, solid solution hardening, Recovery, re-crystallization and grain growth.

Diffusion process, types of diffusion, laws of diffusion- Fick's first law and Fick's second law of diffusion.

HEAT TREATMENT: purpose of heat treatment, microstructure of steel and iron, Transformation in Steel and Critical cooling curve, Hardening, annealing, normalizing, stress relieving, tempering, carburizing, nitriding, cyaniding, flame and induction hardening.

UNIT III

MATERIAL DEFORMATION AND FAILURE

Inelastic deformation, slip systems, critical resolved shear stress (crss) yielding, strain hardening, bauschinger effect, frank read source, Anelastic behaviour, Viscoelastic behaviour

FRACTURE: Ductile fracture, brittle fracture, Griffith theory of crack propagation, cleavage fracture, method of protection against fracture ,Ductile to brittle transition

CORROSION AND OXIDATION: Corrosion, types of corrosion, laws of corrosion ,oxidation and its mechanism, passivity, special type of corrosion, protection against corrosion and oxidation.

Fatigue, mechanism of fatigue, improving fatigue life, Creep, factor affecting creep, mechanism of creep, creep resistant materials

UNIT IV

STEEL ALLOYS AND COMPOSITES

Plain carbon steel, cast iron, effects of alloying elements on steel, effects on alloying elements on non-ferrous metals, ferrous alloys, non ferrous alloys, alloys in different applications, materials for special cases.

Composite materials: introduction, laminates, reinforced composite materials and their classification ,particulate composites, flake composites, whisker reinforced composites, hybrid composites, sandwitch composites, fibre-reinforced glass and glass ceramic composites, MMC and wood composite, advantages and limitatation of composites, Application of composites materials

Text Books:

1 Material Science, Metallurgy & Engineering materials-K.M.GUPTA, Umesh Publications

2 Material Science and Engineering-An Introduction - Callister; W.D., John Wiley & Sons., Delhi

REFERENCE BOOKS:

1. Material Science & Engineering –V. Raghvan, Prentice Hall of India Pvt. Ltd, New Delhi

2 Elements of Material Science and Engineering: VanVlack, Wesley Pub. Comp

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 206B STRENGTH OF MATERIALS- II							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

THIN WALLED VESSELS: Hoop & Longitudinal stresses & strains in cylindrical & spherical vessels & their derivations under internal pressure, volumetric strain, Numericals.

THICK CYLINDERS & SPHERES: Derivation of Lame's equations, radial & hoop stresses and strains in thick and compound cylinders and spherical shells subjected to internal fluid pressure only, Numericals.

UNIT II

STRAIN ENERGY : Definitions, expressions for strain energy stored in a body when load is gradually, suddenly and with impact, strain energy of beams due to: bending, pure shear, Horizontal shear and torsion, beam deflections, Castigliano's theorems, Numericals.

THEORIES OF ELASTIC FAILURE: Various theories of elastic failures with derivations and graphical representations, applications to problems of 2-dimensional stress system with combined direct loading and bending, and combined torsional and direct loading, Numericals.

UNIT III

STRESSES DUE TO ROTATION: Stresses in Rotating Ring, and Disc, hollow disc and solids disc, Stresses in rotating cylinders, hollow cylinders & solids cylinder, rotating discs of uniform strength, Numericals.

UNSYMMETRICAL BENDING: Properties of beam cross section, product of inertia, ellipse of inertia, slope of the neutral axis, stresses & deflections, shear center and the flexural axis for I-section and channel section, Numericals

UNIT IV

CURVED BEAMS: Stresses in beam of initial large radius of curvature, position of neutral axis for rectangular, circular and trapezoidal sections, stresses in crane hooks, stresses in circular rings subjected to tension or compression, Numericals.

SPRINGS: Stresses in open coiled helical spring subjected to axial loads, axial couples and combined action of axial loads and axial couples, leaf springs, and flat spiral springs, energy methods in determining spring deflection Numericals

Text Books:

1. Strength of Materials – G.H.Ryder, Macmillan, India.
2. Mechanics of Materials – (Metric Edition): Ferdinand P. Beer and E. Russel Johnston, Jr. Second Edition, McGraw Hill.

Reference Books :

1. Book of Solid Mechanics – Kazmi, Tata Mc Graw Hill
2. Strength of Materials – Sadhu Singh - Khanna Publication

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ME 208B FLUID MACHINES							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

IMPACT OF FREE JETS: Impulse – momentum principle, jet impingement - on a stationary flat plate, inclined plate and a hinged plate, at the center of a stationary vane, on a moving flat plate, inclined plate, a moving vane and a series of vanes, Jet striking tangentially at the tip of a stationary vane and moving vane(s), jet propulsion of ships. Problems

IMPULSE TURBINES: Classification – impulse and reaction turbines, water wheels, component parts, construction, operation and governing mechanism of a Pelton wheel, work done, effective head, available head and efficiency of a Pelton wheel, design aspects, speed ratio, flow ratio, jet ratio, number of jets, number of buckets and working proportions, Performance Characteristics, governing of impulse turbines. Problems

UNIT II

FRANCIS TURBINES: Component parts, construction and operation of a Francis turbine, governing mechanism, work done by the turbine runner, working proportions and design parameters, slow, medium and fast runners, degree of reaction, inward/outward flow reaction turbines, Performance Characteristics, Problems.

PROPELLER AND KAPLAN TURBINES: Component parts, construction and operation of a Propeller, Kaplan turbine, differences between the Francis and Kaplan turbines, draft tube - its function and different forms, Performance Characteristics, Governing of reaction turbine, Introduction to new types of turbine, Deriaz (Diagonal), Bulb, Tubular turbines, Problems.

UNIT III

DIMENSIONAL ANALYSIS AND MODEL SIMILITUDE: Dimensional homogeneity, Rayleigh's method and Buckingham's p-theorem, model studies and similitude, dimensionless numbers and their significance. Unit quantities, specific speed and model relationships for turbines, scale effect, cavitations – its causes, harmful effects and prevention, Thomas cavitation factor, permissible installation height, Problems.

HYDRAULIC SYSTEMS: Function, construction and operation of Hydraulic accumulator, hydraulic intensifier, hydraulic crane, hydraulic lift and hydraulic press, Fluid coupling and torque converter, Hydraulic ram, Problems

UNIT IV

CENTRIFUGAL PUMPS: Classification, velocity vector diagrams and work done, manometric efficiency, vane shape, head capacity relationship and pump losses, pressure rise in impeller, minimum starting speed, design considerations, multi-stage pumps. Similarity relations and specific speed, net positive suction head, cavitation and maximum suction lift, performance characteristics. Brief introduction to axial flow, mixed flow and submersible pumps, Problems.

RECIPROCATING PUMPS: Construction and operational details, discharge coefficient, volumetric efficiency and slip, work and power input, effect of acceleration and friction on indicator diagram (pressure – stroke length plot),

separation, air vessels and their utility, rate of flow into or from the air vessel, maximum speed of the rotating crank, characteristic curves, centrifugal vs reciprocating pumps, brief introduction to screw, gear, vane and radial piston pumps, Problems.

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TEXT BOOKS:

1. Hydraulics & Fluid Mechanics – Modi & Seth, Pub. - Standard Book House, N.Delhi
2. Hydraulic Machines – Jagdish Lal, Metropolitan

REFERENCE BOOKS:

1. Fluid Mechanics and Hydraulic Machines – S S Rattan, Khanna Publishers
2. Introduction to Fluid Mechanics and Fluid Machines – S K Som and G Biswas, Tata McGraw Hill
3. Fluid Mechanics and Fluid Power Engineering – D S Kumar, S K Kataria and Sons

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME – 210B ENERGY CONVERSION							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

FUELS AND COMBUSTION: Classification of fuels- solid, liquid & gaseous fuels, Combustion equations, Stochiometric air-fuel ratio, Excess air, Orsat apparatus for exhaust & flue gas. Enthalpy and internal energy of combustion, Enthalpy of formation, Adiabatic flame temperature, Calorific values of fuel, Problems.

STEAM BOILERS AND DRAFT: Classification, comparison between fire and water tube boilers, Essentials of a good boiler, Constructional and operational details of Locomotive & Lancashire Boilers, High pressure boilers- Benson, Lamont, Loeffler and Velox boilers, Boiler mountings and accessories, Boiler performance, Natural& Artificial drafts, Chimney height, Maximum draft and chimney efficiency, Boiler heat balance sheet, Problems.

UNIT II

VAPOUR POWER CYCLES: Carnot and Rankine vapour cycles, effect of operating conditions on efficiency of Rankine cycle, Rankine cycle with superheat, reheat and regeneration, Binary vapour cycle, Problems.

FLOW THROUGH NOZZLES: Velocity and heat drop, mass discharge through a nozzle, critical pressure ratio and its significance, effect of friction and nozzle efficiency, supersaturated flow, relationship between area, velocity & pressure in nozzle flow, Problems.

UNIT III

STEAM TURBINES: Classification, Impulse Turbine- Flow through blades, velocity diagram, power output and efficiency, maximum blade efficiency of single stage impulse turbine, blade friction, compounding of impulse turbine. Reaction Turbine-Flow through blades, degree of reaction, velocity diagram, power output, blade efficiency and blade height, comparison of impulse and impulse reaction turbines. Energy losses in steam turbines, stage efficiency, overall efficiency and reheat factor, condition for maximum blade efficiency for impulse and reaction turbine, governing of steam turbines, Problems.

UNIT IV

STEAM CONDENSERS: Elements of a condensing plant, types of condensers, comparison of jet and surface condensers. Condenser vacuum, sources of air leakage & its disadvantages, vacuum efficiency and condenser efficiency, determination of mass of cooling water for jet and surface condensers, cooling ponds and cooling towers, Problems.

AIR COMPRESSORS: Working of a single stage reciprocating air compressor; calculation of work input with and without clearance; Volumetric efficiency; Isothermal efficiency; Advantages of multi stage compression; Multi - stage compressor with Inter-cooling; Perfect Inter cooling; Optimum intercooler pressure, Problems.

TEXT BOOKS:

1. Engineering Thermodynamics – P K Nag Tata Mc Graw Hill

2.Thermal Science & Engineering – D S Kumar, S K Kataria & Sons

REFERENCE BOOKS:

1. Applied Thermodynamics for Engineering Technologists – T D Eastop and A McConkey, Pearson Education
2. Thermal Engineering – A S Sarao, Satya Prakashan
3. Thermodynamics and Heat Engines vol. II – R Yadav, Central Publishing House

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 212B MATERIAL SCIENCE LAB							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credit**		**Class Work**	**:**	**20Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To study crystal structures with the help of ball model.
2. To study crystal structures and crystals imperfections using ball models.
3. To study microstructures of metals/ alloys through microscopic observation.
4. To study hardening (by quenching) of steel specimen by Jominy Test.
5. To observe effect of tempering temperature on the property of given steel specimen.
6. To study microstructure of heat-treated steel through microscopic observation.
7. To study thermo-setting of plastics.
8. To study the creep behavior of a given specimen.
9. To study the mechanism of chemical corrosion and its protection.
10. To study the properties of various types of plastics.
11. To study Bravais lattices with the help of models.

Note:

1. At least ten experiments are to be performed in the semester.

2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus.**

ME 214B FLUID MACHINES LAB							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credit**		**Class Work**	**:**	**20 Marks**
--	--	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To study the constructional details of a Pelton turbine and draw its fluid flow circuit.
2. To draw the following performance characteristics of Pelton turbine-constant head, constant-speed and constant efficiency curves.
3. To study the constructional details of a Francis turbine and draw its fluid flow circuit.
4. To draw the constant head, constant speed and constant efficiency performance characteristics of Francis turbine.
5. To study the construction details of a Kaplan turbine and draw its fluid flow circuit.
6. To draw the constant head, speed and efficiency curves for a Kaplan turbine.
7. To study the constructional details of a Centrifugal Pump and draw its characteristic curves.
8. To study the constructional details of a Reciprocating Pump and draw its characteristics curves.
9. To study the construction details of a Gear oil pump and its performance curves.
10. To study the constructional details of a Hydraulic Ram and determine its various efficiencies..
11. To study the model of Hydro power plant and draw its layout.

Note:

1. **At least ten experiments are to be performed in the semester.**
2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus (ME208B).**

ME 216B ENERGY CONVERSION LAB							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credit**		**Class Work**	**:**	**20 Marks**
--	--	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To study low pressure boilers and their accessories and mountings.
2. To study high pressure boilers and their accessories and mountings.
3. To prepare heat balance sheet for given boiler.
4. To study the working of impulse and reaction steam turbines..
5. To find dryness fraction of steam by separating and throttling calorimeter.
6. To find power out put & efficiency of a steam turbine.
7. To find the condenser efficiencies.
8. To study and find volumetric efficiency of a reciprocating air compressor.
9. To study cooling tower and find its efficiency.
10. To find calorific value of a sample of fuel using Bomb calorimeter.
11. Calibration of Thermometers and pressure gauges.

Note:

1. **At least ten experiments are to be performed in the semester.**
2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus.**

ME 218B MANUFACTURING PRACTICE							
B. Tech. Semester – IV (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**3**	**1.5**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To make a pattern for a given casting with all the necessary allowances, parting line, running system details. Prepare the mold and make the casting. Investigate the casting defects and suggest the remedial measures.
2. To make a component involving horizontal and vertical position welding and study the welding defects and suggests their remedies.
3. To prepare a job on surface grinder/ cylindrical grinder and measure the various parameters of the finished piece.
4. To cut external threads on a lathe.

5. Manufacture and assembly of a unit consisting of 2 to 3 components to have the concept of tolerances and fits (shaft and bush assembly or shaft, key and bush assembly or any suitable assembly).
6. Leveling of machine tools and testing their accuracy.
7. Disassembly and assembly of small assemblies such as tail stock, bench vice, screw jack etc.
8. Development and manufacture of complex sheet-metal components such as funnel etc.
9. Multi slot cutting on milling machine by indexing.
10. Drilling and boring of a bush.
11. Modeling of 3D runner system and creation of drawing for manufacturing of the casting patterns.
12. Development of blank size for complex sheet metal components using drawing software and compare results with manual calculation method.

Note:

1. **At least ten experiments are to be performed in the semester.**
2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus (ME 202B).**

GPME 202B GENERAL PROFICIENCY & ETHICS							
B. Tech. Semester – IV (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Examination**	**:**	**75Marks**

1	**--**	**--**	**2**		**Total**	**:**	**75 Marks**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him / her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/ her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	--------
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(8 Marks)**
III	Technical Activities / Industrial, Educational tour	**(8 Marks)**
IV	Sports/games	**(14 Marks)**
V	Moral values & Ethics	**(15 Marks)**

NOTE: Report submitted by the students should be typed on both sides of the paper.

C. A student will support his/ her achievement and verbal & communicative skill through presentation before the committee. **(30 Marks)**

C. Moral values & Ethics

Syllabus - Process for Value Education, self-evaluation concept and process.

A minor test will be conducted during the semester and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

University Departments:

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member
3	Vice- Chancellor's Nominee	Member

Affiliated Colleges:

4	Director/Principal	Chairman
5	Head of the Department/Sr. Faculty	Member
6	External Examiner to be appointed by the University	Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

ME 301B KINEMATICS OF MACHINES							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION: Links-types, Kinematics pairs-classification, Constraints-types, Kinematic chains, Mechanism and machines, Degrees of freedom of planar mechanism, Grubler's equation, Inversions of four bar chain, Slider crank chain and double slider crank chain

KINEMATIC SYNTHESIS OF MECHANISMS: Number synthesis, Freudenstein's equation, Stages of kinematic synthesis and errors, Chebychev spacing of precision points, Limit positions and dead centre of four-bar mechanism, Transmission angle in four bar mechanism and slider crank mechanism, Problems.

UNIT II

VELOCITY IN MECHANISMS: Velocity of point in mechanism, Relative velocity method, Velocities in four bar mechanism, Slider crank mechanism and quick return motion mechanism, Rubbing velocity at a pin joint, Instantaneous center method, Types & location of instantaneous centers, Kennedy's theorem, Problems.

ACCELERATION IN MECHANISMS: Acceleration of a point on a link, four Bar mechanism and slider Crank mechanism, Coriolis component of acceleration, Analytical method for determining the velocity and acceleration of slider crank mechanism, Problems.

UNIT III

GEARS: Classification & terminology, Law of gearing, Tooth forms & comparisons, Length of path of contact, Contact ratio, Interference & under cutting in involute gear teeth, Minimum number of teeth on gear and pinion to avoid interference

GEAR TRAINS: Synthesis of simple, compound, epicyclic and planetary gear trains, Sun and planet gear, Torque in epicyclic gear trains, Problems.

UNIT IV

CAMS AND FOLLOWERS - Classification & terminology, Cam profile by graphical methods with knife edge and radial roller follower for uniform velocity, simple harmonic and parabolic motion of followers, Analytical methods of cam design–tangent cam with roller follower and circular cams with flat faced follower, Problems.

FRICTION DEVICES: Type of friction, Laws of friction, Flat pivots and flat collar bearing-uniform pressure and uniform wear, Belt and pulley drive, Length of open and cross belt drive, Ratio of driving tensions for flat belt drive, Centrifugal tension, V-belt drive, Problems.

TEXT BOOKS:

1. Theory of Mechanisms and Machines: Amitabha Ghosh and Ashok Kumar Mallik, Third Edition Affiliated East-West Press.
2. Theory of Machines and Mechanisms: Joseph Edward Shigley and John Joseph Uicker, Jr. Second Edition, MGH, New York.

REFERENCE BOOKS:

1. Mechanism and Machine Theory: J.S. Rao and R.V. Dukkipati Second Edition New age International.
2. Theory of Machines: Thomas Beven.
3. Theory and Machines: S.S. Rattan, Tata McGraw Hill.
4. Kinematics of Machines-Dr. Sadhu singh, Pearson Education

Note:

3. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

4. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 303B MACHINE DESIGN - I							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**2**	**--**	**5**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

DESIGN CONCEPTS: Design cycle, Phases of design, Brain storming, reverse engineering and redesign, Role of designer, Feasibility study-technical feasibility, economic & financial feasibility, societal & environmental feasibility, Selection of Fits and tolerances.

SELECTION OF MATERIALS: Classification of Engg. Materials, Mechanical properties of the commonly used engineering Materials, hardness, strength parameters with reference to stress-strain diagram, Factor of safety.

UNIT II

MECHANICAL JOINTS: ISO Metric Screw Threads, Bolted joints in tension, Eccentrically loaded bolted joints in shear and under combined stresses, Design of power screws, Design of various types of welding joints under different static load conditions.

RIVETED JOINTS, COTTER & KNUCKLE JOINTS: Design of various types of riveted joints under different static loading conditions, eccentrically loaded riveted joints, design of cotter and knuckle joints.

UNIT III

BELT, ROPE AND CHAIN DRIVES: Design of belt drives, Flat & V-belt drives, Condition for Transmission of max. Power, Selection of belt, design of rope drives, design of chain drives with sprockets.

KEYS, COUPLINGS & FLYWHEEL: Design of Keys – Flat, Kennedy Keys, Splines, Couplings design – Rigid & Flexible coupling, turning Moment diagram, coefficient of fluctuation of energy and speed, design of flywheel – solid disk & rimmed flywheels.

UNIT IV

CLUTCHES: Various types of clutches in use, Design of friction clutches – single disc, Multidisc, Cone & Centrifugal, Torque transmitting capacity.

BRAKES: Various types of Brakes, Self energizing condition of brakes, Design of shoe brakes – Internal & external expanding, band brakes, Thermal Considerations in brake designing.

Text Books :

1. Mechanical Engg. Design, Joseph Edward Shigley, McGraw Hill Book Co.
2. Design of Machine Elements, V.B. Bhandari ,Tata McGraw Hill, New Delhi.
3. Engineering design – George Dieter, McGraw Hill, New York.
4. Product Design and Manufacturing , A.K.Chitale and R.C.Gupta, PHI, New Delhi.
5. Machine Design An Integrated Approach: Robert L.Norton, Addison Wisley Longman
6. Analysis and Design of Machine Elements, V K Jadon, S Verma, I K International
7. Machine Design, S.G. Kulkarni, TMH , New Delhi.
8. Design of machine elements-C S Sharma, Kamlesh Purohit, PHI.
9. PSG design data book
10. Machine Design Data book by I K International Publication

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

3. The paper setter will be required to mention in the note in the question paper that the use of only *PSG Design Data book / Machine Design Data book* by I K International Publication, New Delhi is permitted.

ME 305B QUALITY ENGINEERING							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

PHILOSOPHIES AND FUNDAMENTALS

Introduction to Quality Control and Total Quality System-Evolution of Quality Management Philosophy, Quality, Quality control, Quality Assurance, Quality circles and quality improvement, TQM, Cost of quality.

SOME PHILOSOPHIES AND THEIR IMPACT ON QUALITY- Deming, Juran, Crossby, Ishikawa

QUALITY MANAGEMENT: Practices, Tools, and standards- Tools for quality improvement- Check sheets, Pareto diagrams, Flow charts, Cause and effect diagrams, Histograms, Scatter plots etc. ISO 9000

UNIT II

STATISTICAL FOUNDATIONS AND METHODS OF QUALITY IMPROVEMENT

DESCIPTIVE STATISTICS-Data collection and presentation, measures of central tendency, measures variation and skewness, measures of association, probability distribution- discrete probability distribution, and continuous probability distribution.

INFERENTIAL STATISTICS- Drawing conclusions on Product and Process Quality-Sampling distribution, Estimation of product and process parameters-Point estimation, Interval Estimation, **HYPOTHESIS TESTING**-concepts, errors, steps, testing of mean, difference between two means, proportion, difference between two proportions, difference between two bionomial proportions, variance, ratio of two variances, Concepts of sampling-introduction, sampling design and schemes, Sample size determination. -Numerical Problems

UNIT III

STATISTICAL PROCESS CONTROL

Introduction, causes of variation, Control charts for variables and attributes- X, R, P, and C charts, **ACCEPTANCE SAMPLING**- advantages and disadvantages of sampling, producer's risk and Consumer's risk, OC curve, types of sampling plans.

PROCESS CAPABILITY- Introduction, Specification limits and control limits, Process Capability Indices, Taguchi Method, brief of six sigma approach.Numerical Problems

UNIT IV

ADVANCEMENTS IN QUALITY MANAGEMENT

TOTAL QUALITY MANAGEMENT- A Management Philosophy, Employee involvement, Continuous Improvement, The costs of Poor Quality.

QUALITY IN SERVICE SECTOR- Introduction, Service Industries and their characterstics, a model for service quality, applications.

Text Book:

1. Fundamentals of Quality Control and Improvement by Amitava Mitra- PHI, New Delhi
2. Managing for Total Quality-N. Logothetis- PHI

Reference Books:

1. Research Methodolgy: Methods and Techniques by C.R. Kothari – New age International
2. Quality Planning and Analysis- by J M Juran & Frank M. Gryna -TMH

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 307B INTERNAL COMBUSTION ENGINES AND GAS TURBINES							
B. Tech. Semester – V (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**

					Duration of Examination	**:**	**3 Hours**

UNIT I

AIR STANDARD CYCLES: Internal and external combustion engines; classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines, Wankel Engines, Assumptions made in air standard cycle; Otto cycle; diesel cycle, dual combustion cycle, comparison of Otto, diesel and dual combustion cycles; sterling and Ericsson cycles; air standard efficiency, specific work output, specific weight; work ratio; mean effective pressure; deviation of actual engine cycle from ideal cycle. Problems.

CARBURETION, FUEL INJECTION AND IGNITION SYSTEMS: Mixture requirements for various operating conditions in S.I. Engines; elementary carburetor, Requirements of a diesel injection system; types of injection systems; petrol injection, Requirements of ignition system; types of ignition systems ignition timing; spark plugs. Problems.

UNIT II

COMBUSTION IN I.C. ENGINES : S.I. engines; Ignition limits; stages of combustion in S.I. Engines; Ignition lag; velocity of flame propagation; detonation; effects of engine variables on detonation; theories of detonation; octane rating of fuels; pre-ignition; S.I. engine combustion chambers, Stages of combustion in C.I. Engines; delay period; variables affecting delay period; knock in C.I. engines, Cetane rating; C.I. engine combustion chambers.

LUBRICATION AND COOLING SYSTEMS: Functions of a lubricating system, Types of lubrication system; mist, wet sump and dry sump systems; properties of lubricating oil; SAE rating of lubricants, engine performance and lubrication, Necessity of engine cooling; disadvantages of overcooling; cooling systems; air-cooling, water cooling; radiators.

UNIT–III

ENGINE TESTING AND PERFORMANCE: Performance parameters: BHP, IHP, mechanical efficiency, brake mean effective pressure and indicative mean effective pressure, torque, volumetric efficiency; specific fuel consumption (BSFC, ISFC), thermal efficiency; heat balance; Basic engine measurements; fuel and air consumption, brake power, indicated power and friction power, heat lost to coolant and exhaust gases; performance curves. Problems.

AIR POLLUTION FROM I.C. ENGINES AND ITS REMEDIES: Pollutants from S.I. and C.I. Engines, Methods of emission control; alternative fuels for I.C. Engines; the current scenario on the pollution front.

UNIT–IV

ROTARY COMPRESSORS: Root and vane blowers; Static and total head values; Centrifugal compressors- Velocity diagrams, slip factor, ratio of compression, pressure coefficient, pre-whirl; Axial flow compressor- Degree of reaction, polytropic efficiency, surging, choking and stalling, performance characteristics, Problems.

GAS TURBINES: Brayton cycle; Components of a gas turbine plant; open and closed types of gas turbine plants; Optimum pressure ratio; Improvements of the basic gas turbine cycle; multi stage compression with inter-cooling; multi stage expansion with reheating between stages; exhaust gas heat exchanger, Applications of gas turbines. Problems.

TEXT BOOKS:

1. Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
2. Gas Turbines - V. Ganesan, Pub.- Tata McGraw Hill.

3. Engineering fundamental of the I. C. Engines – Willard W. Pulkrabek Pub.-PHI,India

REFERENCE BOOKS:

1. Internal Combustion Engines & Air pollution- Obert E.F, Pub.-Hopper & Row Pub., New York
2. Internal Combustion Engines Fundamentals- John B. Heywood, Pub.-McGraw Hill, New York

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 309B MANUFACTURING SCIENCE							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

MECHANISM OF METAL CUTTING: Deformation of metal during machining, nomenclature of lathe, milling tools, mechanics of chip formation, built-up edges, mechanics of orthogonal cutting, Merchant cutting force circle

and shear angle relationship in orthogonal cutting, factors affecting tool forces: Cutting speed, feed and depth of cut, surface finish. Temperature distribution at tool chip interface. Numericals.

UNIT II

CUTTING TOOL MATERIALS & CUTTING FLUIDS: Characteristics of tool materials, various types of cutting tool materials, coated tools, cutting tool selection, Purpose and types of cutting fluids, basic actions of cutting fluids, effect of cutting fluid on tool life, selections of cutting fluid.

TOOL WEAR AND MACHINABILITY: Types of tool wear, tool life, factors governing tool life, Machinability: Definition and evaluation. Economics of machining. Numericals on tool life.

GEAR MANUFACTURING: Introduction, methods of manufacture. Gear generation and forming: Gear cutting by milling, single point form tool, gear hobbing and shaping. Gear finishing operations: Gear shaving, gear burnishing, gear grinding, lapping.

UNIT III

UNCONVENTIONAL MACHINING PROCESSES: Abrasive jet machining: Principles, applications, process parameters. Ultrasonic machining: Principles, applications, analysis of process parameters. Electro-chemical machining and grinding: Principles, classifications, choice of electrolytes, applications. Electric discharge machining: Principles, selection of tool materials and dielectric fluid. Electron beam machining: Generation of electron beam, relative merits and demerits. Laser beam machining: Principles and applications.

UNIT IV

JIGS & FIXTURES: Introduction, location and location devices, clamping and clamping devises, Drill Jigs, Milling Fixtures.

MANUFACTURING ACCURACY: Product cycle in manufacturing, part print analysis, location, principles, tolerance stacking, accuracy of machining, operation selection, tolerance analysis.

METROLOGY & MACHINE TOOLS TESTING: Tolerances, limits and fits, methods of linear measurement and angular measurement, Go and No Go gauges. Introduction to Machine tools testing**,** measuring instruments used for testing, test procedures, acceptance tests of machine tools.

TEXT BOOKS

1. Manufacturing Technology – Metal cutting and machine Tools: P.N. Rao, T.M.H, New Delhi
2. Manufacturing Science - A. Ghosh & Mallik A.K., Affliated East West Press, N. Delhi

REFERENCE BOOKS

1. Principles of Machine Tools – G.C. Sen & A. Bhattacharya, Tata McGraw Hill, New Delhi
2. Manufacturing Engg.& Tech, Kalpakian, Serope Addison -Wisly Publishing Co. New York.
3. Modern Machining Processes: P.C. Pandey & H.S. Shan, T.M.H. Company, New Delhi
4. Text Book of Production Engineering: P.C. Sharma, S.Chand & Sons.
5. Introduction to Jig and Tool Design: Kempster M.H.A, Hodder & Stoughton, England

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 311B APPLIED NUMERICAL TECHNIQUES AND COMPUTING							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

INTRODUCTION TO NUMERICAL COMPUTING: Need of computing, numeric data, analog computing, digital computing, process of numerical computing, characteristic of numerical computing, computational environment.

APPROXIMATE AND ERROR IN COMPUTATION: Accuracy of numbers, Precision, absolute errors, Relative errors, percentage error, error in the approximate of a function,

SOLUTION OF ALGEBRAIC & TRANSCENDENTAL EQUATION: Bisection Method, Regula Falsi Method, Secant method, Iteration method, Aitkin Δ^2 method, Newton Raphson method, Mullar's method

UNIT-II

SOLUTION OF SIMULTANEOUS ALGEBRAIC EQUATION BY DIRECT METHODS: Matrix Inversion Method, Cramer's rule, Guass elimination method, Guass Jordon method, factorization method, Iteration Methods **:** Jacobi method, **:**Guass Siedal method, Relaxation method

EMPIRICAL LAWS & CURVE FITTING: Principle of Least square method, Method of group averages and method of moments.

UNIT-III

EIGEN VALUE & EIGEN VECTORS PROBLEMS: Eigen value & Eigen vectors by Cayley Hamiltion method, properties of Eigen value, power method, Jacobi Method, Given Method, House holder method.

INTERPOLATION METHODS: Newton Forward and Newton Backward interpolation method, Newton divided difference formula, Spline interpolation, Lagrange interpolation, Lagrange inverse interpolation, Iterative Method

UNIT-IV

NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION: Newton Forward difference Formula and backward difference Formula, Newton central difference Formula, Integration by Trapezoidal rule, Simpson One third rule, Simpson three eight rule, Boole's rule, Weddle's Rule

NUMERICAL SOLUTION OF FIRST ORDER DIFFERENTIAL EQUATION: Picard method, Tayler's Series method, Euler's methods, Modified Euler's methods, Runge Kutta Method of forth order, Predicator-Corrector method namely Milne's method and Adams- Bashforth method and solution of problems through a structural programming in C language

TEXT BOOKS:

1. Numerical Methods for Mathematics, Science and Engineering by John H.Mathews, PHI New Delhi.
2. Applied Numerical Methods – Carnahan, B.H., Luthar, H.A. and Wilkes, J.O., Pub.- J. Wiley, New York

REFERENCE BOOKS:

1. Numerical method in Engg. & science with programs in C & C++ by Khanna pulishers, Dr. B.S Grewal
2. Numerical methods by Balagurusamy Tata Mc Graw Hill Publishing company Ltd., New Delhi
3. Numerical method for Engineers stevan c.chapra & Raymond P. Canale Tata Mc Graw Hill Publishing company Ltd.
4. Numerical Solution of Differential Equations, by M.K. Jain, Published by Wiley Eastern, New York.
5. Introductory Methods of Numerical Analysis by S.D. Sastry, Published by Prentice Hall of India.
6. Numerical Methods – Hornbeck, R.W., Pub.- Prentice Hall, Englewood Cliffs, N.J.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 313B KINEMATICS OF MACHINES LAB							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. **To study various types of Kinematic links, pairs, chains and Mechanisms.**
2. **To study inversions of 4 Bar Mechanisms, Single and Double slider crank mechanisms.**
3. **To plot slider displacement, velocity and acceleration against crank rotation for Single slider crank mechanism.**
4. To study the different type of the belt drives.
5. **To study various type of cam and follower arrangements.**
6. To plot follower displacement v/s cam rotation for various Cam Follower systems.
7. To study various types of gears-Spur, Helical, Double helical, Spiral, Bevel gear, Hypoid
8. To study various types of gear trains – Simple, Compound and Epicyclic
9. To find co-efficient of friction between belt and pulley.
10. Draw the involute and cycloidal teeth profile.

Note:

1. **Ten experiments are to be performed in the Semester.**

2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

ME 315B I. C. ENGINES LAB							
B. Tech. Semester – V (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To study the constructional details & working principles of two-stroke/ four stroke petrol engine.
2. To study the constructional detail & working of two-stroke/ four stroke diesel engine.
3. Analysis of exhaust gases from single cylinder/ multi cylinder diesel/ petrol engine by Orsat Apparatus.
4. To prepare heat balance sheet on multi-cylinder diesel engine/petrol engine.

5. To find the indicated horse power (IHP) on multi-cylinder petrol engine/diesel engine by Morse Test.

6. To prepare variable speed performance test of a multi-cylinder/ single cylinder petrol engine/ diesel engine and prepare the curves (i) bhp, ihp,fhp, vs speed (ii) volumetric efficiency & indicated specific fuel consumption vs speed.

7. To find fhp of a multi-cylinder diesel engine/ petrol engine by Willian's line method & by motoring method.

8. To perform constant speed performance test on a single cylinder/ multi-cylinder diesel engine & draw curves of (i) bhp vs fuel rate, air rate and A/ F and (ii) bhp vs mep, mech efficiency & sfc.

9. To measure CO & Hydrocarbons in the exhaust of 2- stroke / 4-stroke petrol engine.

10. To find intensity of smoke from a single cylinder / multi-cylinder diesel engine.

11. To draw the scavenging characteristic curves of single cylinder petrol engine.

12. To study the effects of secondary air flow on bhp, sfc, Mech. Efficiency & emission of a two-stroke petrol engine.

Note:

1. **At least Ten experiments are to be performed in the Semester.**
2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or as designed & set by the department as per the scope of the syllabus (ME307B)**

ME 317B COMPUTER AIDED MANUFACTURING PRACTICES							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**40 Marks**
1	**--**	**2**	**2**		**Examination**	**:**	**60 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

THEORY

INTRODUCTION TO CAM: Introduction to Computer aided Manufacturing, Numerical Control, Computer Numerical Control, Direct Numerical Control, Adaptive Control, G-code and M- codes, Design of Pre & Post Processors.

NON – TRADITION MACHINING: introduction to Non –Tradition Machining, EDM & Wire EDM

PART PROGRAMMING: NC Programming: APT Programming, Manual Part Programming, Computer Aided Part Programming, Programming on CNC -Turning & Machining Centre; Interfacing of tools and machines with Computers,

ROBOTICS AND AUTOMATION: Introduction to Robotics, Automation and Its Application In Manufacturing

PRACTICES

1. To make a spur gear of given part drawing involving operations namely drilling, boring, reaming, honing, key slotting, gear teeth machining, lapping and gear teeth finishing.
2. To study EDM machining set up and make a job on it involving operations namely machining, engraving, groove cutting and slot cutting on die steel material.
3. To study CNC lathe trainer and its components (hardware and software) especially controllers (Fanuc and Siemens) and make a CNC programme using APT language of given part drawing for machining cylindrical job involving operations namely turning, step turning, taper turning, threading, radius contour cutting, chamfering and run the programme in simulation and actual mode in Cut Viewer or other software and run the program in actual mode using CNC controllers.
4. To study CNC milling trainer and its components (hardware and software) especially controllers (Fanuc and Siemens) and make a CNC programme using APT language of given drawing for milling job operations namely end cutting, side cutting, contour cutting, face cutting, etc and run the programme in simulation and actual mode in Cut Viewer or other software and run the program in actual mode using CNC controllers.
5. To study the Score-Base- Robots & its components (hardware and software) and make a programme for loading and unloading a job on CNC machine.
6. To make programme of a given part drawing for operations namely welding and spray painting using Score-Base - Robotic Arm and run the programme in simulation mode only..

Books

1. **Computer Aided Manufacturing by P.N RAO, NK Tewari and T.K Kundra, Tata McGraw Hill Education Private Limited New Delhi**
2. **CAD/CAM Theory and Practices by Ibrahim Zeid and R Sivasubramanian Tata McGaw Hill Education Private Limited New Delhi**
3. **CAD/CAM Applications by P.N. Rao, Tata McGraw Hill Education Private Limited New Delhi**
4. **Manuals of CNC Machines and CNC Softwares**

Note:

3. **At least FIVE experiments are to be performed in the semester.**
4. **At least four experiments should be performed from the above list. Remaining one experiment may either be performed from the above list or designed & set by the department as per the scope of the theory part.**

ME 319B APPLIED NUMERICAL TECHNIQUES AND COMPUTING LAB							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**

					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

The students will be required to carry out the following exercises, that are based on the theory course ME311B: APPLIED NUMERICAL TECHNIQUES AND COMPUTING, with the help of MATLAB software / Sci lab/ C / C++ on personal computer.

1. Solution of Non-linear equation in single variable using the method of successive bisection.
2. Solution of Non-Linear equation in single variable using the Newton Raphson, Secant, Bi – Section and Modified Euler's, method.
3. Solution of a system of simultaneous algebraic equations using the Gaussian elimination procedure.
4. Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method.
5. Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method employing the technique of successive relaxation.
6. Numerical solution of an ordinary differential equation using the Euler's method.
7. Numerical solution of an ordinary differential equation using the Runge - Kutta 4^{th} order method.
8. Numerical solution of an ordinary differential equation using the Predictor – corrector method.
9. Numerical solution of a system of two ordinary differential equation using Numerical intergration.
10. Numerical solution of an elliptic boundary value problem using the method of Finite Differences.

Note:

1. **At least ten experiments are to be performed in the semester.**
2. **At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the department as per the scope of the syllabus (ME311B)**

ME 321B PROFESSIONAL TRAINING I							
B. Tech. Semester – V (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**50 Marks**

--	--	**2**	**2**		**Total**	**:**	**50 Marks**

At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the V Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.

ME 302B DYNAMICS OF MACHINES							
B. Tech. Semester – VI (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

STATIC AND DYNAMIC FORCE ANALYSIS: Static force analysis in four-bar mechanism and slider crank mechanism, Internal force analysis, Inertia force in four-bar mechanism, Combined static and dynamics force analysis in slider-crank mechanism, Problem

TURNING MOMENT AND FLYWHEEL: Turning moment on crankshaft, Turning moment diagrams-single cylinder double acting steam engine, four stroke IC engine and multi-cylinder steam engine, Fluctuation of energy, Flywheel, Problems.

UNIT II

BALANCING OF ROTATING COMPONENTS: Static balance, Dynamic balance, Balancing of rotating masses, Two plane balancing, Graphical and analytical methods, Balancing machines-static balancing and dynamic balancing machines, Field balancing, Problems.

BALANCING OF RECIPROCATING PARTS: Primary and secondary forces and couples, Partial balancing, Effects of partial balancing, Balancing of single cylinder engine, balancing of multi cylinder; inline; radial engines, firing order.

UNIT III

GOVERNORS: Terminology, Centrifugal governors-Watt governor, Dead weight governors-Porter & Proell governor, Spring controlled governor-Hartnell governor, Sensitivity, Stability, Hunting, Isochronism, Effort and Power of governor, Controlling force diagrams for Porter governor and Spring controlled governors

GYROSCOPE: Precession angular motion and gyroscopic couple and their effects on aeroplane, ship during steering, rolling and pitching, Stability of two wheel and four wheel vehicles moving on curved paths, Problems.

UNIT IV

BRAKE AND DYNAMOMETERS: Types of brakes- external shoe brakes, band brakes, band and block brakes, Braking of vehicle, Types of dynamometers-Prony brake, rope brake dynamometers, Belt transmission dynamometer, torsion dynamometer, Problems.

INERTIA FORCES IN RECIPROCATING PARTS: Forces on reciprocating parts of an engine neglecting the weight of connecting rod, Crankshaft torque, Dynamically equivalent system-analytical and graphical method, Correction couple, Problems.

Text Books:

1. Theory of Mechanisms and Machines: Amitabha Ghosh and Ashok kumar Mallik, Third Edition Affiliated East-West Press.
2. Theory of Machines and Mechanisms: Joseph Edward Shigley and John Joseph Uicker, Jr. Second Edition, MGH, New York.

Reference Books:

1. Mechanism and Machine Theory: J.S. Rao and R.V. Dukkipati Second Edition New age International
2. Theory of Machines: Thomas Beven.
3. Theory and Machines: S.S. Rattan, Tata McGraw Hill.
4. Kinematics of Machines-Dr. Sadhu singh, Pearson Education

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 304B MACHINE DESIGN –II

B. Tech. Semester – VI (Mechanical Engineering)

L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**2**	**--**	**5**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

DESIGN ASPECTS: Ergonomic and value engineering considerations in design, design for manufacturability, assembly, interchangeability, Statistical consideration in design, considerations for casting, forging and machining

VARIABLE LOADING: Different types of fluctuating/ variable stresses, Fatigue strength considering stress concentration factor, surface factor, size factor, reliability factor etc., Fatigue design for finite and infinite life Goodman and Soderberg's Criterion, Fatigue design using Miner's equation, Problems.

UNIT II

SHAFTS: Detailed design of shafts for static and dynamic loading, Rigidity and deflection consideration.

SPRINGS : Types of Springs, Design for helical springs against tension and their uses, compression and fluctuating loads, Design of leaf springs, Surging in springs, Design Problem.

UNIT III

BEARINGS: Classification, Design of pivot and collar bearing, Selection of ball and roller bearing based on static and dynamic load carrying capacity, load-life relationship, Selection of Bearings from manufacturer's catalogue, Lubricants and their properties, Selection of lubricants, Types of lubrication – Boundary, mixed and hydrodynamic lubrication, Design of journal bearings using Raimondi and Boyd's Charts, , Design Problems.

UNIT IV

GEARS: Classification, Selection of gears, Terminology of gears, Force analysis, Selection of material for gears, Beam & wear strength of gear tooth, Form or Lewis factor for gear tooth, Dynamic load on gear teeth -Barth equation and Buckingham equation and their comparison, Design of spur, helical, bevel & worm gear including the Consideration for maximum power transmitting capacity, Gear Lubrication, Design Problems.

Text Books :

1. Mechanical Engg. Design, Joseph Edward Shigley, McGraw Hill Book Co.
2. Design of Machine Elements, V.B. Bhandari ,Tata McGraw Hill, New Delhi.
3. Engineering design – George Dieter, McGraw Hill, New York.
4. Product Design and Manufacturing , A.K.Chitale and R.C.Gupta, PHI, New Delhi.
5. Machine Design An Integrated Approach: Robert L.Norton, Addison Wisley Longman
6. Analysis and Design of Machine Elements, V K Jadon, S Verma, I K International
7. Machine Design, S.G. Kulkarni, TMH , New Delhi.
8. Design of machine elements-C S Sharma, Kamlesh Purohit, PHI.
9. PSG design data book
10. Machine Design Data book by I K International Publication

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
3. The Paper **setter will be required to mention in the note in the question paper that the use of only *PSG Design Data book* / *Machine Design Data book* by I. K. International Publication, New Delhi is permitted.**

ME306B HEAT TRANSFER							
B. Tech. Semester – VI (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**1**	**--**	**5**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

BASICS CONCEPTS: Thermodynamics Vs Heat transfer, Define Heat Transfer, thermal conductivity Vs diffusivity, basic modes of heat transfer, Combined heat transfer.

STEADY STATE HEAT CONDUCTION: Introduction, I-D heat conduction through a plane wall, long hollow cylinder, hollow sphere, Conduction equation in Cartesian, polar and spherical co-ordinate systems, Numericals.

UNIT II

STEADY STATE CONDUCTION WITH HEAT GENERATION: Introduction, 1-D heat conduction with heat sources, Extended surfaces (fins)- Fins with uniform cross-sectional area, Fin effectiveness, Brief introduction of 2-D heat conduction, Numericals.

TRANSIENT HEAT CONDUCTION (1-D): Lumped capacitance, semi-infinite and infinite solid conduction modes for walls, cylinders, spheres; Chart solution, Relaxation Method, Numericals.

UNIT III

CONVECTION: Forced convection-Thermal and hydro-dynamic boundary layers, Equation of continuity, Momentum and Energy equations, Internal flow through circular tube and external flow over a flat plate, Fluid friction and heat transfer (Colburn analogy), Free convection from a vertical flat plate, Empirical relations for free convection from vertical and horizontal planes & cylinders, Numericals.

THERMAL RADIATION: Basic laws, Black body radiation, intensity and emissive power, diffuse and gray surfaces, Shape factors and network analogy, Radiation shields, applications to two and three surface enclosures, introduction to participating media, Numericals.

UNIT IV

HEAT EXCHANGERS: Classification, Performance variables, Analysis of a parallel/ counter flow heat exchanger, Heat exchanger effectiveness, pressure drop, Numericals.

HEAT TRANSFER WITH CHANGE OF PHASE: Laminar film condensation on a vertical plate, Drop-wise condensation, Pool boiling regimes, Nucleate boiling and critical heat flux, film boiling and minimum heat flux, Flow boiling.

Text Books :

1. Heat Transfer – J.P. Holman, John Wiley & Sons, New York.
2. Fundamentals of Heat & Mass Transfer–Incropera, F.P. & Dewill, D.P –John Willey New York.
3. Heat transfer –P.K. Nag, McGraw Hill

Reference Books :

1. Heat Transfer – A. Bejan, John Wiley & Sons, Inc.
2. Conduction of Heat in Solids – Carslow, H.S. and J.C. Jaeger – Oxford Univ. Press.
3. Conduction Heat Transfer – Arpasi, V.S. – Addison – Wesley.
4. Compact Heat Exchangers – W.M. Keys & A.L. Landon, Mc. Graw Hill.
5. Thermal Radiation Heat Transfer – Siegel, R. and J.R. Howell, Mc. Graw Hill.
6. Heat Transmission – W.M., Mc.Adams , Mc Graw Hill.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

The paper setter will be required to mention in the note of question paper that the use of Steam tables, Charts, Graphical plots is permitted.

ME 308B AUTOMATIC CONTROLS							
B. Tech. Semester – VI (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**

3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-1

INTRODUCTION: Types of control systems ; Typical Block Diagram : Performance Analysis; Representation of Processes & Control Elements – Mathematical Modeling. Block Diagram Representation, Representation of Systems or Processes, Comparison Elements; Representation of Feedback Control systems – Block Diagram & Transfer Function Representation, Representation of a Temperature, Control System, Signal Flow Graphs, Mason's Formula, Problems.

TYPES OF CONTROLLERS: Types of Control Action; Proportional Controller, Integral Controller, Derivative Controller, On-off controller, PD, PID Controller, Hydraulic Controllers; Electronic Controllers; Pneumatic Controllers; Problems

UNIT-II

TRANSIENT AND STEADY STATE RESPONSE: First order system; Unit Step, Unit Ramp and Unit Impulse Response of First Order system, Second Order System; Step Response of Second Order System, Delay Time, Rise Time, Peak Time, Settling Time.

FREQUENCY RESPONSE ANALYSIS: Introduction; Closed and Open Loop Transfer Function; Bode Diagram; Polar Plots; Rectangular Plots; Nichols Plots

UNIT-III

STABILITY OF CONTROL SYSTEMS: Characteristic Equation; Routh's Criterion; Nyquists Criterion, Problems.
ROOT LOCUS METHOD : Introduction; Root Loci of a Second Order System; General Case; Rules for Drawing Forms of Root Loci; Relation between Root Locus Locations and Transient Response; Parametric Variation; Problems.

UNIT-IV

STATE SPACE ANALYSIS OF CONTROL SYSTEMS: Introduction; Generalized State Equation; Techniques for Deriving System State – Space Equations; Transfer Function from State Equations; Solution of State Vector Differential Equations; Discrete Systems; Problems.

CONTROL APPLICATION: Machine Tool Control; Hydraulic Control, NC/ DNC/ CNC Control system, Engine Governing; Mechanical Governors, Hydraulic Governors, Pneumatic Governors, Electronic Governors, Diesel Fuel Ignition Control.

TEXT BOOKS:

1. Theory & Applications of Automatic Controls by B.C. Nakra, Published by New Age International Pvt. Ltd. Publishers, New Delhi.
2. Modern Control Engg. by Ugata, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Automatic Control Systems by Kuo' Published by Prentice Hall of India, New Delhi.
2. Control System Engineering, I. J. Nagrath and M. Gopal, New Age , New Delhi.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 310B MEASUREMENTS AND INSTRUMENTATION							
B. Tech. Semester – VI (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INSTRUMENTS AND THEIR REPRESENTATION: Introduction, Typical Applications of Instrument Systems, Functional Elements of a Measurement System, Classification of Instruments, Standards and Calibration.

BASIC STATISTICAL CONCEPTS : Types of Measured Quantities (Discrete and Continuous), Central Tendency of Data, Mode, Median, Arithmetic Mean, Best Estimate of true Value of Data, Measures of Dispersion, Range, Mean Deviation, Variance, Standard Deviation, Normal Distribution, Central Limit Theorem, Significance Test, Method of Least Squares, Graphical Representation and Curve Fitting of Data.

UNIT II

STATIC AND DYNAMIC CHARACTERISTICS OF INSTRUMENTS: Introduction, Accuracy, Precision, Resolution, Threshold, Sensitivity, Linearity, Hysteresis, Dead Band, Backlash, Drift, Formulation of Differential Equations for Dynamic Performance- Zero Order, First Order and Second order systems, Response of First and Second Order Systems to Step, Ramp, Impulse and Harmonic Functions.

UNIT III

TRANSDUCER, INTERMEDIATE AND RECORDING ELEMENTS: Introduction, Types and Classification of Transducers, Selection of Transducers, Strain Gauges and Rosettes, Linear Variable Differential Transformer, Rotary Variable Differential Transformer; Peizo-electric Transducers, Optical Transducers and Opto-electric Transducers, Mechanical, Hydraulic and Pneumatic Amplifying elements, Compensators, Data Transmission Elements, Data Acquisition Systems, Data Display and Storage.

UNIT IV

MEASUREMENT OF MECHANICAL QUANTITIES: Force Measurement: Hydraulic Load Cell, Pneumatic Load Cell, Elastic Force Devices, Separation of Force Components. Torque Measurement: Torque Reaction Methods and Torque Measurement Methods using Sensors. Pressure Measurement: Introductory Review of Moderate Pressure Measurement using Manometers and Elastic Elements; Vacuum Measurement using Mcleod, Pirani, Ionisation and Knudsen Gauges, High Pressure Measurement, Pressure Calibration. Flow Measurement: Drag Force Flow Meter, Turbine Flow Meter, Electronic Flow Meter, Electro Magnetic Flow meter. Hot-Wire Anemometer. Temperature Measurement: Electrical, Non-electrical and Radiation Methods.

TEXT BOOKS:

1. Measurement systems Application and Design. Ernest O. Doebelin, Tata McGraw Hill Edition (Fourth Edition) 2002.

2. Measurement and Instrumentation in Engineering, Francis S. Tse and Ivan E. Morse, Marcel Dekker.

REFERENCE BOOKS:

1. Principles of Measurement and Instrumentation – Alan S. Morris Prentice Hall of India.
2. Mechanical Measurements : T.G. Beckwith, W.L. Buck and R.D. Marangoni Addison Wesley.
3. Instrumentation, Measurement and Analysis – B.C. Nakra and K.K. Chaudhary, TMH.
4. Mechanical Measurements by D. S. Kumar, Kataria & Sons.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 312B INDUSTRIAL ENGINEERING							
B. Tech. Semester – VI (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT – I

INTRODUCTION: Definition and brief history of industrial engineering, objectives and relevance of industrial engineering for achieving excellence in industry, decisions in industrial engineering.

PRODUCTION SYSTEM AND PRODUCTIVITY: Value addition, products and services, **conversion** process, production system, types of production system, productivity and its measurement, factors effecting productivity and strategies for improving productivity.

WORKFORCE MANAGEMENT: Teams, employee empowerment, quality circles, incentive plans, job design, job specialization, job enlargement, job rotation, job enrichment.

WORK STUDY: Method study, Principles of motion economy, Techniques of method study- various charts, therbligs, Work measurement- various methods, time study, PMTS, determining time, work sampling, numericals.

UNIT II

MANUFACTURING COST ANALYSIS: Elements of cost, overheads estimation, types of cost, cost variance analysis, fixed & variable costs, break even analysis, numericals.

MATERIALS MANAGEMENT: Strategic importance of materials in industries, pressure for high and low inventory, relevant costs, basic inventory control models-EOQ, EBQ with and without shortage, purchase discounts, sensitivity analysis, inventory control systems- P, Q, Ss systems, service level, stockout risk, determination of order point and safety stock, selective inventory control-ABC, FSN, SDE, VED., numericals.

UNIT III

PRODUCTION PLANNING AND CONTROL(PPC): Introduction to forecasting- Simple and weighted moving average methods, objectives and variables of PPC, Aggregate planning- basic concept and its relation with other decision areas, Master Production Schedule, Scheduling operations, various methods for line and intermittent production systems, Gantt chart, Sequencing- Johnson algorithm for n jobs and 2 machines, n jobs & 3 machines, 2 jobs & n machines, n jobs & m machines, Various means of measuring effectiveness of PPC, numericals.

UNIT IV

PRODUCT DESIGN AND DEVELOPMENT: Various approaches, Product life cycle, Role of 3S's –Standardization, Simplification, Specialization, Introduction to value engineering, role of ergonomics in product design.

MANUFACTURING STRATEGIES

Intoduction to JIT, TPM, fundamentals of quality & TQM, Kaizan- elements, benefits and implementation aspects. Overview of Supply Chain Management, Management Information system (MIS) and its role in decision making.

Text Books

1. Production and Operations Management by S. N. Chary- TMH

2. Industrial Engineering and Management by O.P. Khanna- Dhanpat Rai Publications

Reference Books:

1. Modern Production Management- S.S. Buffa- John Wiley

2. Operations Management for comeptitive advantage by Chase-Jacob-Aquilino- TMH

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

HUM- 302 B REPORT WRITING SKILLS							
B. Tech. Semester – VI (Common for all branches)							
L	**T**	**P**	**Credit**		**Class Work**	**:**	**25 Marks**
1	**-**	**--**	**1**		**Examination**	**:**	**50 Marks**
					Total	**:**	**75 Marks**
					Duration of Examination	**:**	**2 Hours**

OBJECTIVE

The course aims at developing competence for report writing with a focus on its complex writing techniques and procedures.

COURSE CONTENT

UNIT I

Report Writing

Reports: meaning, their importance and types, Structure of reports, Formats of reports, Use of illustrations

UNIT II

Writing of Business and Technical Reports:

Preliminary steps and procedure of writing report, writing various types of reports on technical, business related topics

RECOMMENDED READING

1. Borowick, Jerome. N. *Technical Communication and its Applications*. New Delhi: PHI, 2000
2. Guffey, Mary Ellen. *Business Communication: Process & Product*. USA: South western College Publishing, 2000.
3. Kumar, Sanjay and Pushp Lata. *Communication Skills*. Delhi: OUP, 2011

SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST) AND INSTRUCTIONS FOR THE EXAMINER

1. The duration of the exam will be 2 hours.
2. The Question Paper for this theory course shall have three questions in all covering both the units. All will be compulsory with internal choice.
3. Question no. 1 will be of 10 marks. The question may have two/ three parts with enough internal choice, covering various components of both the Units.
4. Question no 2 with internal choice will be of 10 marks covering contents of the Unit I. It will be theoretical in nature.
5. Question no 3 will have two parts of 15 marks each. The student will be asked to write reports on business and technical subject/ issue covering contents of Unit II. The emphasis would be on testing the actual report writing on a given business and technical situation/ subject in letter format.

HUM- 304 B ORAL PRESENTATION SKILLS							
B. Tech. Semester – VI (Common for all branches)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**2 Hours**

OBJECTIVE

To enable students to develop their speaking skills with professional proficiency

COURSE CONTENT

Oral Presentations:

Group Discussion; Mock interviews

Note for the Teacher:

The teacher concerned, by devising her/ his method, must preview and review the student's spoken proficiency at the beginning and end of the semester respectively to find the efficacy of the course and degree of improvement in the student.

RECOMMENDED READING

1. Konar, Nira. *English Language Laboratories: A Comprehensive Manual*. Delhi: PHI, 2011
2. Kumar, Sanjay and Pushp Lata. *Communication Skills*. Delhi: OUP, 2011

SCHEME OF END SEMESTER EXAMINATION (Practical)

An external Practical exam of 30 marks of 2 hour duration for the course will be conducted by an external examiner appointed by the competent authority of the University's.

NOTE: Students will be tested for their oral communication competence making them participate in Group discussion, mock situations for interview. Students may also be evaluated through a viva conducted by an external examiner.

ME 314B DYNAMICS OF MACHINES LAB							
B. Tech. Semester – VI (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. **To perform experiment on Watt Governors to prepare performance characteristic curves.**
2. **To perform experiment on Porter Governors to prepare performance characteristic curves.**
3. **To perform experiment on Proell Governor to prepare performance characteristic curves.**
4. **To perform experiment on Hartnell Governor to prepare performance characteristic curves.**
5. To study the different types of Brakes and Dynamometers.

6. **To study gyroscopic effects on Aeroplane and Naval ship**
7. To find experimentally the Gyroscopic couple on motorized gyroscope and compare with applied couple.
8. To perform the experiment for static balancing on Static Balancing Machine.
9. To perform the experiment for dynamic balancing on Dynamic Balancing machine.
10. Determine the turning moment on crank shaft neglecting weight of the connecting rod in the reciprocating parts of an engine.
11. To perform the experiment of balancing of rotating parts and finds the unbalanced couple and forces
12. To determine experimentally the unbalance forces and couples of reciprocating parts.

Note: 1. **Ten experiments are to be performed in the Semester.**

2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus (ME302B).

ME316B HEAT TRANSFER LAB							
B. Tech. Semester – VI (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To determine the thermal conductivity of a metallic rod.
2. To determine the thermal conductivity of an insulating power.

3. To determine the thermal conductivity of a solid by the guarded hot plate method.

4. To find the effectiveness of a pin fin in a rectangular duct natural convective condition and plot temperature distribution along its length.

5. To find the effectiveness of a pin fin in a rectangular duct under forced convective and plot temperature distribution along its length.

6. To determine the surface heat transfer coefficient for a heated vertical tube under natural convection and plot the variation of local heat transfer coefficient along the length of the tube. Also compare the results with those of the correlation.

7. To determine average heat transfer coefficient for a externally heated horizontal pipe under forced convection & plot Reynolds and Nusselt numbers along the length of pipe. Also compare the results with those of the correlations.

8. To measure the emissivity of the gray body (plate) at different temperature and plot the variation of emissivity with surface temperature.

9. To find overall heat transfer coefficient and effectiveness of a heat exchange under parallel and counter flow conditions. Also plot the temperature distribution in both the cases along the length of heat of heat exchanger.

10. To verify the Stefan-Boltzmann constant for thermal radiation.

11. To demonstrate the super thermal conducting heat pipe and compare its working with that of the best conductor i.e. copper pipe. Also plot temperature variation along the length with time or three pipes.

12. To determine the critical heat flux using two phase heat transfer apparatus.

13. To determine the water side overall heat transfer coefficient on a U-tube heat exchanger.

14. Design of Heat exchanger using CAD and verification using thermal analysis package eg. ANSYS software etc.

Note: 1. Ten experiments are to be performed in the Semester.

2. At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed & set by the department as per the scope of the syllabus (ME306B).

ME 318B MEASUREMENT AND INSTRUMENTATION LAB							
B. Tech. Semester – VI (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To Study various Temperature Measuring Instruments and to Estimate their Response times.
   (a) Mercury – in glass thermometer
   (b) Thermocouple
   (c) Electrical resistance thermometer
   (d) Bio-metallic strip
2. To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a dead-weight pressure gauge calibration set up.
3. To study a Linear Variable Differential Transformer (LVDT) and use it in a simple experimental set up to measure a small displacement.
4. To study the characteristics of a pneumatic displacement gauge.
5. To measure load (tensile/compressive) using load cell on a tutor.
6. To measure torque of a rotating shaft using torsion meter/strain gauge torque transducer.
7. To measure the speed of a motor shaft with the help of non-contact type pick-ups (magnetic or photoelectric).
8. To measure the stress & strain using strain gauges mounted on simply supported beam/cantilever beam.
9. To measure static/dynamic pressure of fluid in pipe/tube using pressure transducer/pressure cell.
10. To test experimental data for Normal Distribution using Chi Square test.
11. To learn the methodology of pictorial representation of experimental data and subsequent calculations for obtaining various measures of true value and the precision of measurement using Data acquisition system/ calculator.
12. Vibration measurement by Dual Trace Digital storage Oscilloscope.
13. To find out transmission losses by a given transmission line by applying capacitive /inductive load.

Note:

1. **At least ten experiments are to be performed in the Semester.**

2. At least seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the department as per the scope of the Syllabus (ME310B).

GPME 302B GENERAL PROFICIENCY & ETHICS							
B. Tech. Semester – VI (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Examination**	**:**	**75Marks**
1	**--**	**--**	**2**		**Total**	**:**	**75 Marks**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him / her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

B. The student will present a written report before the committee with following in view:

The student will present before the committee his/ her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	--------
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(8 Marks)**
III	Technical Activities / Industrial, Educational tour	**(8 Marks)**
IV	Sports/games	**(14 Marks)**
V	Moral values & Ethics	**(15 Marks)**

NOTE: Report submitted by the students should be typed on both sides of the paper.

D. A student will support his/ her achievement and verbal & communicative skill through presentation before the committee. **(30 Marks)**

C. Moral values & Ethics

Syllabus - A few topics from the below mentioned books

1. R.R.Gaur, R. Sangal and G.P. Bagaria, " Bagaria, " A foundation course in Human Values and Professional Ethics", Pub: Excel Books, New Delhi-110028.
2. M. Govindrajan, S Natrajan & V.S. Senthil Kumar, " Engineering Ethics (including Human Values)" Eastern Economy Edition, Prentics Hall of India Ltd.

A minor test/ Quiz will be conducted during the semester and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

University Departments:

1	Chairperson of the Department	Chairman
2	Senior Most Faculty Counselor	Member

3	Vice- Chancellor's Nominee	Member
Affiliated Colleges:		
7	Director/Principal	Chairman
8	Head of the Department/Sr. Faculty	Member
9	External Examiner to be appointed by the University	Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).

ME 401B AUTOMOBILE ENGG.							
B. Tech. Semester – VII (Mechanical Engineering)							
L	T	P	Credits		Class Work	:	25 Marks
3	1	--	4		Examination	:	75 Marks
					Total	:	100 Marks
					Duration of Examination	:	3 Hours

UNIT I

INTRODUCTION TO AUTOMOBILES : Classification, Components, Requirements of Automobile Body; Vehicle Frame, Separate Body & Frame, Unitised Body, Car Body Styles, Bus Body & Commercial Vehicle Body Types; Front Engine Rear Drive & Front Engine Front Drive Vehicles, Four Wheel Drive Vehicles, Safety considerations; Safety features of latest vehicle; Future trends in automobiles.

CLUTCHES : Requirement of Clutches – Principle of Friction Clutch – Wet Type & Dry Types; Single Plate Clutch, Diaphragm Spring Clutch, Multi plate Clutch, Centrifugal Clutches, Electromagnetic Clutch, Over Running Clutch; Clutch Linkages.

UNIT II

POWER TRANSMISSION : Requirements of transmission system; General Arrangement of Power Transmission system; Object of the Gear Box; Different types of Gear Boxes; Sliding Mesh, Constant Mesh, Synchro- mesh Gear Boxes; Epi-cyclic Gear Box, Freewheel Unit. Overdrive unit-Principle of Overdrive, Advantage of overdrive, Transaxle, Transfer cases.

DRIVE LINES, UNIVERSAL JOINT, DIFFERENTIAL AND DRIVE AXLES: Effect of driving thrust and torque reactions; Hotchkiss Drive, Torque Tube Drive and radius Rods; Propeller Shaft, Universal Joints, Slip Joint; Constant Velocity Universal Joints; Front Wheel Drive; Principle, Function, Construction & Operation of Differential; Rear Axles, Types of load on Rear Axles, Full Floating, three quarter Floating and Semi Floating Rear Axles.

UNIT III

SUSPENSION SYSTEMS : Need of Suspension System, Types of Suspension; factors influencing ride comfort, Suspension Spring; Constructional details and characteristics of leaf springs.

STEERING SYSTEM : Front Wheel geometry & Wheel alignment viz. Caster, Camber, King pin Inclination, Toe-in/Toe-out; Conditions for true rolling motions of Wheels during steering; Different types of Steering Gear Boxes; Steering linkages and layout; Power steering – Rack & Pinion Power Steering Gear, Electronics steering.

UNIT IV

AUTOMOTIVE BRAKES, TYRES & WHEELS : Classification of Brakes; Principle and constructional details of Drum Brakes, Disc Brakes; Brake actuating systems; Mechanical, Hydraulic, Pneumatic Brakes; Factors affecting Brake performance, Power & Power Assisted Brakes; Tyres of Wheels; Types of Tyre & their constructional details, Wheel Balancing, Tyre Rotation; Types of Tyre wear & their causes.

EMISSION CONTROL SYSTEM & AUTOMOTIVE ELECTRICAL : Sources of Atmospheric Pollution from the automobile, Emission Control Systems – Construction and Operation of Positive Crank Case Ventilation (PVC) Systems, Evaporative Emission Control, Heated Air Intake System, Exhaust Gas Recirculation (ECR) Systems, Air Injection System and Catalytic Converters; Purpose construction &

operation of lead acid Battery, Capacity Rating & Maintenance of Batteries; Purpose and Operation of Charging Systems, Purpose and Operations of the Starting System; Vehicle Lighting System.

TEXT BOOKS:

1. Automobile Engineering by Anil Chhikara, Satya Prakashan, New Delhi.
2. Automobile Engineering by Dr. Kirpal Singh, Standard Publishers Distributors.

REFERENCE BOOKS:

1. Automotive Mechanics – Crouse / Anglin, TMH.
2. Automotive Technology – H.M. Sethi, TMH, New Delhi.
3. Automotive Mechanics – S.Srinivasan, TMH, New Delhi.
4. Automotive Mechanics – Joseph Heitner, EWP.
5. Motor Automotive Technology by Anthony E. Schwaller – Delmer Publishers, Inc.
6. The Motor Vehicle – Newton steeds Garrett, Butter Worths.

Note:

3. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
4. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 403B REFERIGERATION & AIR CONDITIONING							
B. Tech. Semester – VII (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

INTRODUCTION: Definition of refrigeration & air conditioning; Necessity; Methods of refrigeration; Unit of refrigeration; Coefficient of performance (COP), Fundamentals of air-conditioning system; Refrigerants- Definition, Classification, Nomenclature, Desirable properties; Secondary refrigerants; Eco-friendly refrigerants and environmental issues of refrigeration & air conditioning industry.

AIR REFRIGERATION SYSTEM: Carnot refrigeration cycle, temperature limitations; Brayton refrigeration or the Bell Coleman air refrigeration cycle; Necessity of cooling the aero plane; Air craft refrigeration systems, Simple cooling and Simple evaporative types, Boot strap and Boot strap evaporative types, Regenerative type and Reduced Ambient type system; problems.

UNIT II

VAPOR COMPRESSION REFRIGERATION (VCR) Systems: Simple Vapor Compression (VC) Refrigeration systems, Limitations of Reversed Carnot cycle with vapor as the refrigerant; analysis of VCR cycle considering degrees of sub cooling and superheating; VCR cycle on p-v, t-s and p-h diagrams; Effects of operating conditions on COP; Liquid suction heat exchanger; actual VCR cycle; comparison of VC cycle with Air Refrigeration cycle, Problems.

MULTISTAGE REF. SYSTEMS- Necessity of compound compression, Compound VC cycle , Inter-cooling with liquid sub –cooling and / or water inter cooler: Multistage compression with flash inter-cooling and / or water inter-cooling; systems with individual or multiple expansion valves; Individual compression system with individual or multiple expansion valves; Individual compression systems with individual or multiple expansion valves but with and without intercoolers. Cascade refrigerating systems and its necessity; selection of pairs of refrigerants for the system; concept of cascade temperature, analysis, multistaging, applications, problems.

UNIT III

PSYCHROMETRY of Air & Air Conditioning Processes: properties of moist Air, Gibbs Dalton law, Sp. humidity, Dew point temperature, Degree of saturation, Relative humidity, Enthalpy, Humid specific heat, Wet bulb temperature. Psychrometric chart; Psychrometry of air-conditioning

processes- Mixing Process and other basic processes in conditioning of air; Psychrometric processes in air-conditioning equipment like in air washer etc, Problems.

AIR- CONDITIONING LOAD CALCULATIONS: Outside and inside design conditions; Sources of heating load; Sources of cooling load; Heat transfer through structure, Solar radiation, Electrical applications, Infiltration and ventilation, Heat generation inside conditioned space; Comfort chart, Design of summer air-conditioning and Winter air conditioning systems, Problems. Air Conditioning Systems with Controls & Accessories: Classifications, Layout of plants; Equipment selection; Air distribution system; Duct systems Design; Filters; Refrigerant piping. Temperature, Pressure, Humidity sensors; Actuators and Safety controls, Accessories.

UNIT IV

OTHER REFRIGERATION SYSTEMS: Vapor Absorption Refrigeration Systems – Basic Systems; COP of the System, Performance, Relative merits and demerits; Properties of aqua ammonia; Electrolux Refrigeration; Study of Lithium bromide water system. Steam Jet Refrigerating System- Introduction, Analysis, Relative merits and demerits, Performance Applications; problems

REFRIGERATION AND AIR CONDITIONING EQUIPMENTS: Type of compressors and their performance curves; types of Condensers; types of expansion devices; types of evaporators. Cooling and dehumidifying coils and cooling towers.

TEXT BOOKS:

1. Refrigeration & Air conditioning –R.C. Jordan and G.B. Priester, Prentice Hall of India.
2. Refrigeration & Air conditioning –C.P. Arora, TMH, New Delhi.

REFERENCE BOOKS:

1. A course in Refrigeration & Air Conditioning – Arora & Domkundwar, Dhanpat Rai & Sons.

2. Refrigeration & Air conditioning –W.F. Stocker and J.W. Jones, TMH, New Delhi.

3. Refrigeration & Air conditioning- Manohar Prasad, Wiley Eastern limited, New Delhi.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 405B OPERATIONS RESEARCH							
B. Tech. Semester – VII (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

OPERATIONS RESEARCH –AN OVERVIEW- Introduction, history, approach, techniques and tools, applications of OR, phases and processes of OR study, limitations of OR.

LINEAR PROGRAMMING- Introduction, Formulation, redundant constraints, Solution-Graphical and Simplex, Gauss-Jordan reduction process in simplex methods, BIG M methods computational problems.

UNIT II

TRANSPORTATION PROBLEM- Introduction, , Basic feasible solution of a transportation problem- North-West corner, matrix minimum and Vogel's Approximation method, Methods for checking optimality of the solution- Stepping stone and MODI method, Unbalanced Transportation problem Degenerate transportation problem. Maximisation in Transportation Problem, computational problems.

ASSIGNMENT PROBLEM- Introduction, solution of an assignment problem- Hungarian Method, Unbalanced Assignment problem, computational problems

ADVANCED TOPICS IN OR- Duality, Primal- Dual relationship, Economic interpretation, Shadow price, Post optimality and sensitivity analysis, problems

UNIT III

WAITING LINE MODELS- Introduction, Elements of a queuing system, operating characteristics of a queuing system, queue parameters, M/M/1 queue, problems

NETWORK ANALYSIS IN PROJECT PLANNING (PERT AND CPM)- Introduction, network diagram, event activity, critical path method, PERT, Cost analysis and Crashing the Network, Problems.

UNIT IV

SIMULATION- Introduction, advantages of simulation, limitations of simulation, Monte Carlo Simulation and its application in industries, Problems.

DECISION THEORY- Decision Process, SIMON model, types of decision making environment-certainity, risk, uncertainity, decision making with utilities, problems.

Text Books:

1. Quantitative Techniques by N D Vohra, TMH New Delhi
2. Operations Research Theory and applications by J.K.sharma, Macmillan

Reference Books:

1. Operations Research by Hamdy A. Taha- PHI New Delhi

Note:

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2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 407B POWER PLANTS ENGINEERING							
B. Tech. Semester – VII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

INTRODUCTION: Energy resources and their availability, types of power plants, selection of the plants, review of basic thermodynamic cycles like Rankine, Brayton, Binary vapor power cycle, Combined cycle etc used in power plants. Environmental aspect's of power generation.

POWER PLANT ECONOMICS: Load curve, different terms and definitions, cost of electrical energy, tariffs methods of electrical energy, performance & operating characteristics of power plants- incremental rate theory, input-out put curves, efficiency, heat rate, economic load sharing, Problems.

UNIT II

STEAM POWER PLANTS: Flow sheet and working of modern-thermal power plants, super critical pressure steam stations, site selection; Coal storage, Preparation, Coal handling systems, Feeding and burning of pulverized fuel, Ash handling systems, Dust collection system; electrostatic precipitator.

COMBINED STEAM AND GAS CYCLES: Constant pressure gas turbine power plants, Arrangements of combined plants, re-powering systems with gas production from coal, using PFBC systems, with organic fluids, parameters affecting thermodynamic efficiency of combined cycles; IGCC. Problems.

UNIT III

HYDRO ELECTRIC POWER PLANTS : Rainfall and run-off measurements and plotting of various curves for estimating stream flow and size of reservoir, power plants design, construction and operation of different components of hydro-electric power plants, site selection, comparison with other types of power plants.

NUCLEAR POWER PLANTS: Principles of nuclear energy, basic nuclear reactions, nuclear reactors-PWR, BWR, CANDU, Sodium graphite, Fast breeder, Homogeneous; Gas cooled. Advantages and limitations, Nuclear power station, waste disposal.

UNIT IV

NON-CONVENTIONAL POWER GENERATION: Solar energy -Solar radiation estimation, solar energy collectors, low, medium & high temperature power plants; OTEC; Wind power plants; Tidal power plants and Geothermal power plants.

DIRECT ENERGY CONVERSION SYSTEMS: Fuel cell, MHD power generation-principle, open & closed cycle's systems; thermoelectric power generation; thermionic power generation.

TEXT BOOKS:

1. Power station Engineering and Economy by Bernhardt G.A. Skrotzki and William A. Vopat – Tata Mc Graw Hill Publishing Campany Ltd., New Delhi .

2. Power Plant Engineering : Manoj kumar Gupta, PHI learning ,First Edition 2012

REFERENCE BOOKS:

1. Power Plant Engg. : M.M. El-Wakil, McGraw Hill 1985.

2. Power Plant Engineering : P.K. Nag Tata McGraw Hill second Edition 2001

Note:

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MEI 623B ENTREPRENEURSHIP							
B. Tech. Semester – VII - Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

ENTREPRENEURIAL DEVELOPMENT PERSPECTIVE: Concepts of Entrepreneurship Development, Evolution of the concept of Entrepreneur, Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Attributes and Characteristics of a successful Entrepreneur, Role of Entrepreneur in Indian economy and developing economies with reference to Self-Employment Development, Entrepreneurial Culture

UNIT II

CREATING ENTREPRENEURIAL VENTURE: Business Planning Process, Environmental Analysis - Search and Scanning, Identifying problems and opportunities, Defining Business Idea, Basic Government Procedures to be complied with.

UNIT III

ENTREPRENEURSHIP DEVELOPMENT AND GOVERNMENT: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available; Role of Central/State agencies in the Entrepreneurship Development - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

UNIT IV

PROJECT MANAGEMENT AND CASE STUDIES

Technical, Financial, Marketing, Personnel and Management Feasibility, Estimating and Financing funds requirement - Schemes offered by various commercial banks and financial institutions like IDBI, ICICI, SIDBI, SFCs, Venture Capital Funding, Why do Entrepreneurs fail - The Four Entrepreneurial Pitfalls (Peter Drucker), Case studies of Successful Entrepreneurial Ventures, Failed Entrepreneurial Ventures and Turnaround Ventures.

Texts and References:

1. Entrepreneurship: New Venture Creation - David H. Holt.
2. Entrepreneurship - Hisrich Peters.
3. The Culture of Entrepreneurship - Brigitte Berger.
4. Project Management - K. Nagarajan.
5. Dynamics of Entrepreneurship Development - Vasant Desai.
6. Entrepreneurship Development - Dr. P.C.Shejwalkar.
7. Thought Leaders - Shrinivas Pandit.
8. Entrepreneurship, 3rd Ed. - Steven Brandt.
9. Business Gurus Speak - S.N.Char.
10. The Entrepreneurial Connection - Gurmit Narula.

Note:

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BME 451B MEDICAL INSTRUMENTATION							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**

					Duration of Examination	:	3 Hours

UNIT-I

PHYSIOLOGY AND TRANSDUCERS: Cell and its structure – Action and resting – Potential propagation of action potential – Sodium pump – Nervous system – CNS – PNS – Nerve cell – Synapse – Cardio pulmonary system – Physiology of heart and lungs – Circulation and respiration – Transducers – Different types – Piezo-electric, ultrasonic, resistive, capacitive, inductive transducers – Selection criteria.

UNIT-II

ELECTRO – PHYSIOLOGICAL AND NON-ELECTRICAL PARAMETER MEASUREMENTS: Basic components of a biomedical system – Electrodes – Micro, needle and surface electrodes – Amplifiers – Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier. ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms. Measurement of blood pressure – Cardiac output – Cardiac rate – Heart sound – Respiratory rate – Gas volume – Flow rate of CO_2, O_2 in exhaust air - PH of blood, ESR, GSR measurements – Plethysmography.

UNIT-III

MEDICAL IMAGING AND PATIENT MONITORING SYSTEMS: X-ray machine - Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography – Different types of biotelemetry systems and patient monitoring – Electrical safety. Biological effects of X-rays and precautions.

UNIT-IV

ASSISTING AND THERAPEUTIC EQUIPMENTS: Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialyzers. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

TEXT BOOKS

1. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980.
2. Medical Instrumentation, Application and Design – John G. Webster, John Wiley, 3rd Ed., 1998.

REFERENCE BOOKS

1. Principles of Applied Biomedical Instrumentation – L.A.Geoddes and L.E. Baker, John Wiley, 1975.
2. Hand-book of Biomedical Instrumentation – R.S. Khandpur, TMH, 2nd Ed., 2003.
3. Biomedical Telemetry – Mackay, Stuart R., John Wiley, 1

Note:

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ECE 305B CONSUMER ELECTRONICS							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

MONOCHROME TV (INTRODUCTION): Elements of a TV System,Picture transmission,Sound transmission,Picture reception,Sound reception,Synchronization,Receiver control,Image continuity, Scanning Process, Aspect Ratio, Flicker, Composite Video Signal, Picture Elements,Kell factor, Vertical Resolution,Horizontal Resolution,Video bandwidth,Interlacing, 625 Line System,Bandwidths for TV Transmission,Vertical and horizontal synch detail,Vestigial Side Band transmission(Advantages and Disadvantages)

MONOCHROME TV (PICTURE AND CAMERA TUBES): Monochrome picture tube,beam reflection,Beam focussing,Screen Phosphor,Face plate,Picture tube characteristics,picture tube circuit controls,Monochrome Camera Tubes:Basic principle,Image Orthicon, Vidicon,Plumbicon

UNIT II

COLOUR TV ESSENTIALS: Compatibility , Colour perception,Three Colour theory,Luminance,Hue and Saturation, Dispersion and Recombination of light,Primary and secondary colours,luminance signal,Chrominance Signal, Colour picture tube,colour TV Camera,Colout TV display Tubes,colour Signal Transmission,Bandwidth for colour signal transmission,Colour TV controls. Cable TV,Block Diagram and principle of working of cable TV.

PLASMA AND LCD: Introduction,liquid crystals,types of LCD's,TN,STN,TFT,Power requirements,LCD working,Principle of operation of TN display,Construction of TN display,Behaviour of TN liquid crystals,Viewing angle,colour balance, colour TN display, limitatons, advantages, disadvantages, applications.

UNIT III

LED AND DMD : Introduction to LED Television , comparison with LCD and Plasma TV's, schematic of DMD, introduction to Digital MicroMirror device, Diagram of DMD, principle of working, emerging applications of DMD.

MICROWAVE OVENS AND AIR CONDITIONERS: Microwaves, Transit Time, Magnetron, Waveguides, Microwave Oven, Microwave Cooking. Air conditioning,Components of air conditioning systems,all water Air conditioning systems,all air air conditioning Systems,Split air conditioner.

UNIT IV

MICROPHONES: Introduction, characteristics of microphones,types of microphone:carbon,moving coil,wireless,crystal,introduction to tape recorder.

LOUDSPEAKER: Introduction to ideal and basic loudspeaker,loudspeaker construction types of loudspeaker: Dynamic and permanent magnet,woofers,tweeters,brief introduction to baffles,equalisers.

TEXT BOOKS :

1.Consumer Electronics by S. P. Bali(Pearson Education)

2.Complete Satellite and Cable T.V by R.R Gulati(New Age International Publishers)

REFERENCE BOOKS:

1. Monochrome and Colour Television by R. R. Gulati

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EE 451B ENERGY AUDIT							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION TO THE POWER DISTRIBUTION SYSTEM: Description of the power distribution system- voltage levels, Components of the distribution system- Substation, Transformer, feeders, distribution system planning, operation & maintenance objectives, activities involved in O&M, grid management, load

scheduling & dispatch, load balancing, 66-33/ 11 KV substation equipment, 11/ 0.4 KV substation equipment, Distribution transformers- reasons for DT failures.

UNIT II

ENERGY ACCOUNTING & ENERGY AUDIT: Need for energy accounting, objectives & functions of energy accounting, Energy flow diagram in power distribution system, energy accounting procedure- Energy measurement, and problemsin energy accounting & overcoming these problems in energy accounting, Definition, need and types of energy audit, energy audit instruments,procedure for conducting an energy audit.

UNIT III

AT&C LOSS REDUCTION & EFFICIENCY IMPROVEMENT: Concepts and principles of distribution losses- transmission & distribution losses, AT&C losses in power distribution network, factors contributing to high technical & commercial losses. Technical loss reduction- Short term measures for technical loss reduction, long term plans for technical loss reduction, Commercial loss reduction- reasons for commercial losses, measures for commercial loss reduction.

UNIT IV

DEMAND SIDE MANAGEMENT: An introduction, Why DSM?, Benefits of DSM, DSM in power systems: load management, DSM techniques and emerging trends, EC Act 2001, DSM on consumer side – the industrial sector, the agricultural sector, the domestic & commercial sectors, ESCO-a route for DSM.

TEXT BOOKS:

1. Handbook of Energy Engineering, The Fairmont Press, INC.-Albert Thumann& Paul Mehta.
2. Energy Management Supply & Conservation, Butterworth Heinemann, 2002-dr. Clive Beggs.

REFERENCE BOOKS:

1. Hand book on energy audit & environment management by ISBN 81-1993.0920 TERI

Note:

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EEE457B ENERGY RESOURCES & TECHNOLOGY							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

ENERGY SOURCES & AVAILABILITY: World energy situation. Indian energy scenario. Comparative study of thermal, hydro, nuclear and gas power plants. Impact of thermal, gas, hydro and nuclear power stations on environment, air and water pollution, green house effect (global warning), Plasma confinement - magnetic confinement and inertial confinement, geothermal, hydrogen energy, fuel cells, Alkaline fuel cells (AFC), Solid oxide fuel cell (SOFC), Molten carbonate fuel cells (MCFC), thermo-electric power, MHD power generation OTEC & tidal waves.

UNIT-II

SOLAR ENERGY: Solar constant, solar radiation geometry, local solar time, day length, solar radiation measurement, radiation on inclined surface, solar radiation data & solar charts. Flat plate collectors , liquid and air type. Theory of flat plate collectors, advanced collectors, optical design of concentrators, selective coatings, solar water heating, solar dryers, solar stills, solar cooling and refrigeration. Thermal storage. Conversion of heat into mechanical energy. Active and passive heating of buildings. Solar cells.

UNIT-III

WIND ENERGY: Wind as a Source of Energy, Characteristics of wind, wind data. Horizontal & Vertical axis wind Mills, Wind Energy: Wind energy potential measurement, general theories of wind machines, basic laws and concepts of aerodynamics, wind mill and wind electric generator. Basic electric generation schemes- constant speed constant frequency, variable speed constant frequency and variable speed variable frequency schemes. Applications of wind energy.

UNIT-IV

BIOMASS ENERGY: Introduction to biomass, biofuels & their heat content, biomass conversion technologies. Aerobic & anaerobic digester, Factors affection biogestion, biogas plants - types & description. Utilisation of biogas - Gasifiers, direct thermal application of Gasifiers. Advantages & problems in development of Gasifiers, use in I.C. engines , Energy plantation. Pyrolysis scheme. Alternative liquid fuels –ethanol and methanol. Ethanol

production.

TEXT BOOKS:

1. Electric Power Generation, B.R.Gupta
2. Power Generation, Operation and Control, Wood and Wollenberg, John Wiley & Sons,1984.
3. Power Plant Engg: G.D. Rai

REFERENCE BOOKS:

1. Renewable Energy Resources: John Twidell and Tony Weir
2. Renewable Energy Resources Conventional & Non- Conventional: M.V.R Koteswara Rao
3. Science & Technology of Photovoltaics: Jayarama Reddy P.

Note:

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BT401B BIOINFORMATICS							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

INTRODUCTION: Internet, intranet and extranet, networking, protocols, genomic data, organization, representation, data base management systems.

SEQUENCING DATA BANK: Introduction, collecting and storing sequence in laboratory, nucleic acid data bank – Gen Bank, EMBL, AIDS and RNA, protein data bank (PDB), cambridge structural database CSD, genome data bank, hybridoma data bank structure and others.

UNIT-II

SEQUENCE ANALYSIS: Analysis tools for sequence data banks, pair wise alignment: NEEDLEMAN and WUNSCH algorithms, Smith Waterman, multiple alignment – CLUSTAL-W, BLAST, FASTA, sequence patterns and motifs and profiles.

PREDICTIONS: Secondary and tertiary structure: algorithms Chao-Fasman algorithm, hidden Markov model, neural networking, protein classification, fold libraries, fold recognition (threading), homology detection, SRS-access to biological data banks.

UNIT-III

PHYLOGENETIC ANALYSIS– Basic concepts in systematics, taxonomy and phylogeny, phylogenetic trees-various types and their construction, tree building methods, distance methods, multiple alignment character based method, phylogenetic software.

MANAGING SCIENTIFIC DATA: Introduction, challenges faced in integration of biological information, SRS, Kleisli Query System TAMBIS, P/ FDM mediator for a bioinformatics database, federation, discovery link and data management.

UNIT-IV

GENOMICS & PROTEOMICS: Genome mapping, assembly and comparison, functional genomics: sequence based approaches & microarray based approaches, proteomics: technology of protein expression analylsis & posttranslational modifications, protein sorting, protein-protein interaction.

TEXT / REFERENCE BOOKS:

- Developing Bioinformatics Computer Skill, ed. Gibes & Jombeck, Shroff Publication
- Bioinformatics, ed. David W. Mount

TEXT / REFERENCE BOOKS

- Developing Bioinformatics Computer Skill, ed. Gibes & Jombeck, Shroff Publication
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AE 417B MODERN VEHICLE TECHNOLOGY							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

TRENDS IN POWER PLANTS: Hybrid vehicles – stratified charged / lean burn engines – Hydrogen engines – battery vehicles – Electric propulsion with cables – magnetic track vehicles.

UNIT II

SUSPENSION BRAKES AND SAFETY: Air suspension – Closed loop suspension – antiskid braking system, Retarders, Regenerative braking safety cage – air bags – crash resistance – passenger comfort

UNIT III

NOISE & POLLUTION: Reduction of noise – Internal & external pollution control through alternate fuels / power plants – Catalytic converters and filters for particulate emission.

UNIT IV

VEHICLE OPERATION AND CONTROL: Computer control for pollution and noise control and for fuel economy – Transducers and actuators – Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

VEHICLE AUTOMATED TRACKS: Preparation and maintenance of proper road network – National highway network with automated roads and vehicles – Satellite control of vehicle operation for safe and fast travel.

TEXT BOOKS

1. Heinz Heisler, "Advanced Vehicle Technology" - Arnold Publication.

REFERENCES

1. Beranek.L.L., Noise reduction, McGraw Hill Book Co., Inc., Newyork, 1993.

2. Bosch Hand Book, 3rd Edition, SAE, 1993.

Note:

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CE 451B POLLUTION & CONTROL							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT – I

WATER POLLUTION – Classification of water pollutants, water characteristics, effluent standards, primary treatment, secondary treatment – aerobic (activated sludge, aerated lagoons, trickling filter, roughing filter, rotating biological contactor) anaerobic (contact process, UASB).

UNIT – II

AIR POLLUTION: Classification of air pollutants, Particulates: Physical characteristics, mode of formation, setting properties, Control measures.

HYDROCARBONS: Nature; sources, control, Carbon Monoxide: Source, harmful effects on human health, control measures. Oxides of Sulphur and Nitrogen Sources, effects on human health and plants. Control measure.

UNIT – III

SOLID WASTE: Types, sources and properties of solid waste, methods of solid waste treatment and disposal

SOLID WASTE MANAGEMENT – Generation, Collection and techniques for ultimate disposal, Elementary discussion on resource and energy recovery.

UNIT – IV

Elementary treatment of nuclear pollution, metal pollution, noise pollution their effects & control.

Trace element: Mechanism of distribution, essential and non essential elements, trace of element in marin environment, its ecological effects and biological effects.

Suggested Books:

1. Environmental Engg.: by Howard s. Peavy & Others, MGH International.
2. Metacaf – EDDY – Waste-water engineering revised by George Teholonobus (TMH)
3. Environmental Chemistry by B.K. Sharma, Goel Publishing, Meerut.
4. Environmental Chemistry, A.K.DE, Wiley Eastern.
5. Air Pollution: H.C. Perking – Mc Graw Hill.

Note:

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CSE 411B MANAGEMENT INFORMATION SYSTEM							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

FOUNDATIONS:-

INFORMATION SYSTEM: Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, Managing the digital firm, Electronic Commerce and Electronic business, DBMS, RDBMS , introduction to Telecommunication and Networks

I.T.INFRASTRUCTURE:- Managing Hardware Assets, Managing Software Assets, Managing Data Resources. Internet And New It Infrastructure .

UNIT II

CONCEPTUAL SYSTEM DESIGN: Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, and prepare the conceptual design report. Information Systems Security and Control, Ethical and Social Impact of Information Systems.

UNIT III

DETAILED SYSTEM DESIGN: Inform and involve the organization, aim of detailed design, project management of MIS detailed design , identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, documentation of detailed design

UNIT IV

IMPLEMENTATION, EVALUATION AND MAINTENANCE OF THE MIS: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development, Redesigning the organization with Information systems, Managing Knowledge Work.

TEXT BOOKS:

1.Management Information System by W. S. Jawadekar, 2002, Tata McGraw Hill.
2.Management Information System by K.C. Laudon & J.P. Laudon 7th Edition 2003 Pearson Education Publishers Indian Reprint.
3.Information System for Modern Management (3rd edition)- Robert G. Murdick, Loel E. Ross & James R. Claggett. PHI

REFERENCE BOOKS:

1.Management Information System; O Brian; TMH

2.Management Information System by Davis Olson Mac Graw Hill
3.Management Information System by Stallings,(Maxwell Mc Millman Publishers)

Note:

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IT413**B** **CYBER SECURITY**							
B. Tech. Semester – VII – Open Elective							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION TO CYBERCRIME: Cybercrime and Information Security, Classifications of Cybercrimes, The need for Cyberlaws, The Indian IT Act Challenges to Indian Law and Cybercrime Scenario in India, Weakness in Information Technology Act and it consequences, Digital Signatures and the Indian IT Act, Cybercrime and Punishment; Technology, Students and Cyberlaw; Survival tactics for the Netizens, Cyber-offenses: Cyberstalking, Cybercafe and Cybercrimes, Botnets, Attack Vector, Cloud Computing;

UNIT II

TOOLS AND METHODS USED IN CYBERCRIME: Proxy Servers and Anonymizers, Phishing and identity theft, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow; Cybercrime: Mobile and Wireless Devices: Trends in Mobility, Attacks on Wireless Networks, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones.

UNIT III

UNDERSTANDING COMPUTER FORENSICS: The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to

Computer Forensics, Forensics and Social Networking Sites: The Security/ Privacy Threats, Challenges in Computer Forensics, Forensics Auditing, Antiforensics.

UNIT IV

CYBERSECURITY: ORGANIZATIONAL IMPLICATIONS: Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Forensics Best Practices, Media and Asset Protection, Importance of Endpoint Security in Organizations.

TEXT BOOKS:

- "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Nina Godbole, Sunit Belapur, Wiley India Publications, April, 2011

Note:

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2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 409B AUTOMOBILE ENGG. LAB							
B. Tech. Semester – VII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	**--**	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To study and prepare report on the constructional details, working principles and operation of the following Automotive Engine Systems & Sub Systems.

(a) Multi-cylinder: Diesel and Petrol Engines. (b) Engine cooling & lubricating Systems.

© Engine starting Systems. (d) Contact Point & Electronic Ignition Systems.

2. To study and prepare report on the constructional details, working principles and operation of the following Fuel supply systems:

(a) Carburetors (b) Diesel Fuel Injection Systems (c) Gasoline Fuel Injection Systems.

3. To study and prepare report on the constructional details, working principles and operation of the following Automotive Clutches.

(a) Coil-Spring Clutch (b) Diaphragm – Spring Clutch. (c) Double Disk Clutch.

4. To study and prepare report on the constructional details, working principles and operation of the following Automotive Transmission systems.

(a) Synchromesh – Four speed Range. (b) Transaxle with Dual Speed Range.

© Four Wheel Drive and Transfer Case. (d) Steering Column and Floor – Shift levers.

5. To study and prepare report on the constructional details, working principles and operation of the following Automotive Drive Lines & Differentials.

(a) Rear Wheel Drive Line. (b) Front Wheel Drive Line. (c) Differentials, Drive Axles and 4 Wheel Drive Line.

6. To study and prepare report on the constructional details, working principles and operation of the following Automotive Suspension Systems.

(a) Front Suspension System. (b) Rear Suspension System.

7. To study and prepare report on the constructional details, working principles and operation of the following Automotive Steering Systems.

(a) Manual Steering Systems, e.g. Pitman –arm steering, Rack & Pinion steering. (b) Power steering Systems, e.g. Rack and Pinion Power Steering System. (c) Steering Wheels and Columns e.g. Tilt & Telescopic steering Wheels, Collapsible Steering Columns.

8. To study and prepare report on the constructional details, working principles and operation of the following Automotive Tyres & wheels.

(a) Various Types of Bias & Radial Tyres (b) Various Types of wheels.

9. To study & prepare report on constructional details, working principles and operation of Automotive Brake systems.

(a) Hydraulic & Pneumatic Brake systems. (c) Drum Brake System. (e) Disk Brake System.

(b) Antilock Brake System. (d) System Packing & Other Brakes.

10. To study and prepare report on the constructional details, working principles and operation of Automotive Emission / Pollution control systems.

11. Modeling of any two automotive systems on 3D CAD using educational softwares (eg. 3D modeling package/Pro Engineer/I-Deas/ Solid Edge etc.)

12. Crash worthiness of the designed frame using Hypermesh and LS-Dyna solver or other software.

Note: 1. Ten experiments are to be performed in the Semester.

2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

ME 411B REFERIGERATION & AIR CONDITIONING.LAB							
B. Tech. Semester – VII (Mechanical & Aeronautical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	--	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

LIST OF EXPERIMENTS:

1. To study the Vapor Compression Refrigeration (VCR) System and determine its C.O.P. Draw the cycle on P-H and T-S diagrams.
2. To Study the Mechanical heat pump and find its C.O.P.
3. To study the cut- sectional models of Reciprocating, Rotary and Screw type refrigerant compressors.
4. To study the various controls used in Refrigerating & Air Conditioning systems.
5. To study the Ice- plant, its working cycle and determine its C.O.P and capacity.
6. To study the mixing process for different inlet conditions and plot them on Psychrometric charts and understand the concept of recirculation of air on re-circulated air-conditioning set up.
7. To study the basic air conditioning processes like heating, cooling, humidification, cooling and dehumidification and plot them on Psychrometric chart.
8. To determine the By-pass factor of cooling coil and plot them on Psychrometric charts for different inlet conditions.
9. To study the chilling plant and its working cycle.
10. To study the aqua- ammonia absorption system and find its COP.

Note: 1. Ten experiments are to be performed in the Semester.

2. At least eight experiments should be performed from the above list. Remaining two experiments may either be performed from the above list or designed & set by the concerned institute as per the scope of the syllabus.

ME 413B PROJECT							
B. Tech. Semester – VII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**100 Marks**
--	--	**4**	**4**				

The primary objective of this course is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design, analysis augmented with creativity, innovation and ingenuity.

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. which commences in the VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairman of Department	: Chairperson
Project coordinator	: Member Secretary
Respective project supervisor	: Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

ME 415B PROFESSIONAL TRAINING II							
B. Tech. Semester – VII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**50 Marks**
--	--	**2**	**2**		**Total**	**:**	**50 Marks**

- At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional / Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.
- The typed report should be in a prescribed format.
- The report will be evaluated in the VII Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis

of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

- The student will interact with the committee through presentation to demonstrate his/ her learning.
- Teachers associated with evaluation work will be assigned 2 periods per week load.

ME 402B COMPUTER AIDED DESIGN							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION: Introduction to CAD/ CAM, Historical developments, Industrial look at CAD/ CAM, Introduction to CIM; Basics of geometric and solid modelling, explicit, Implicit, intrinsic and parametric equations coordinate systems.

TRANSFORMATIONS: Introduction, transformation of points and line, 2-D rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic and perspective projections, reconstruction of 3-D objects.

UNIT II

CURVES: Algebraic and geometric forms, tangents and normal, blending functions re-parametrization, straight lines, conics, cubic splines, Bezier curves and B-spline curves.

SURFACES: Algebraic and geometric forms, tangents and normal, blending functions, reparametrization, sixteen point form, four curve form, plane surface, ruled surface Surface of revolution, tabulated cylinder, bi-cubic surface, bezier surface, B-spline Surface.

UNIT III

SOLIDS: Solid models and representation scheme, boundary representation, constructive Solid geometry, sweep representation, cell decomposition, spatial occupancy Enumeration

UNIT IV

FINITE ELEMENT MODELLING: Type of FE analysis; Degree of freedom; Influence coefficient; Element and stiffness equations; Application of FE analysis to 1-D problem; Assembly procedure; General structure of FE analysis procedure.

TEXT BOOKS:

1. CAD/ CAM by Groover and Zimmer, Prantice Hall.
2. CAD/ CAM Theory and Practice by Zeid, McGraw Hill

3. Mathematical Elements for computer Graphics by David F. Rogers and J. Alan Adams, Published by Mc Graw Hill, New York

REFERENCE BOOKS:

1. CAD/CAM (Principles, Practice & Manufacturing Management) by Chirs Mc Mohan & Jimmie Browne, Published by Addison- Wesley.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 404B MECHANICAL VIBRATION							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
3	**1**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT-I

BASIC CONCEPT & SINGLE DEGREE OF FREEDOM SYSTEM-UNDAMPED AND DAMPED

Classifications of Vibrations: Free and Forced, Undamped and Damped, Linear and Non-linear, Deterministic and Random, Harmonic Motion, Vector and Complex Number Representations

Single Degree of Freedom system, Governing equations using D'Alemberts Principal, concept of viscous damping, response of Free Damped Vibrations (Under Damping, Critical and Over Damping), Logarithmic Decrement, determination of Structural damping, determination of natural frequency of vibratory systems using Energy Method, Equivalent systems

UNIT –II

FORCED VIBRATIONS

Governing equation under harmonic excitation and response using techniques of calculus and phasor diagram, Magnification factor, Active and passive vibration isolation, Forced and Motion Transmissibility, Rotating and Reciprocating unbalance, Critical Speeds and Whirling of Rotating Shafts Vibration isolation materials

Transient Response, Impulse Excitation, Response to Step Excitations

UNIT-III

MULTI DEGREE FREEDOM SYSTEM AND NUMERICAL TECHNIQUES

Two Degrees of Freedom Systems, Normal Mode Vibrations, Coordinate Coupling, Principal Coordinates, Free Vibrations in Terms of Initial Conditions, Forced Harmonic Vibrations, Simple Vibration Absorber

Multi degrees of Freedom Systems , Eigen value problems-close coupled system and far coupled systems using influence coefficient, Natural Frequencies and Normal Modes, Orthogonality of Normal Modes, Method of Matrix Iteration, Introduction to vibration of continuous system with the help of lateral vibration of Beam , Dunkerley's method and Rayleigh's method

UNIT-IV

VIBERATION MEASEUREMENT AND CONDITION MONITERING

Principle of seismometer and accelerometer ,Basic Vibration measuring set ups- amplitude and phase measurement ;vibration pick-ups, working principle of piezoelectric accelerometer and eddy current based displacement probe, bending critical speed of simple shaft

Fourier series and Fourier transform, Condition monitoring- its need and types; concept of 1X, 2X,3X,- vibration signals in a rotating machines.

Reference Books:

1. Theory of Vibrations with Applications W.T. Thomson, Prentice Hall of India.
2. Mechanical Vibration : G.K. Grover and S.P. Nigam, Nem Chand and Sons
3. Mechanical Vibrations: Thammaiah Gowda, Mc-Graw Hill
4. Theory and Practice of Mechanical Vibrations J.S. Rao and K. Gupta, Wiley Eastern Ltd.
5. Mechanical Vibrations S.S. Rao, Addison – Wesely Publishing Company

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 406B COMPUTER AIDED DESIGN LAB							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**20 Marks**
--	--	**2**	**1**		**Examination**	**:**	**30 Marks**
					Total	**:**	**50 Marks**
					Duration of Examination	**:**	**3 Hours**

The students will be required to carry out the following exercises using any one of the educational CAD softwares like Latest version of AutoCAD, I-DEAS, CATIA, SOLID EDGE, PRO-ENGINEER etc

LIST OF EXPERIMENTS/ EXERCISES

UNIT I

1. Start a New Drawing, Name the Drawing Sheet, Set the Drawing Units, Drawing Precision, Drawing Limits, Grid, Snap and Draw the Margin and Title Block as given in Exercise Problems Sheet.
2. Draw Front, Top, Right Side and Orthogonal view of each of the objects in given Exercise Problems Sheet using View Port commands.

UNIT II

3. Draw 3D Surface Models of the Objects as given in Exercise Problems Sheet, using fundamental of 3D Drawing and Surface commands
4. Draw 3D Solid Models of the Objects as given in Exercise Problems Sheet, using fundamental of 3D Drawing and Solid commands

UNIT III

5. Draw 3D Surface Models of Mechanical and Automobile Sheet metal components as given in Exercise Problems Sheet.
6. Draw 3D Solid Models of Mechanical and Automobile Solid Metal components as given in Exercise Problems Sheet.
7. Draw 3D Models of Simple Mechanical and Automobile Assemblies as given in Exercise Problems Sheet.

Note: **For class work, the students should be assigned to prepare at least ten drawing sheets covering all units and each topic/ experiment/exercise of the syllabus.**

For practical examination, the examiner should set a question paper containing total three questions, one questions from each unit covering all units and each topic/experiment/exercise of the syllabus; students are required to attempt all the three questions.

ME 408B SEMINAR							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**50 Marks**
--	--	**2**	**2**				

The objectives of the course remains

- To learn how to carry out literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/ She will give a seminar talk on the same before a committee constituted by the chairperson of the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students' seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

ME 413B PROJECT							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**75 Marks**
--	--	**8**	**8**		**Examination**	**:**	**125Marks**
					Total	**:**	**200 Marks**
					Duration of Examination	**:**	**3 Hours**

The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department	: Chairperson
Project coordinator	: Member
External expert	: To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

ME 432B OPTIMIZATION METHODS FOR ENGINEERING SYSTEMS							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION: Unimodel objective Function, Classification; Optimization Techniques, Levels of optimization, Mathematically representation of optimization problem.

Single Variable and Multivariable Optimization methods with and without constraints (equality), Calculus methods of optimization.

UNIT II

SEARCH METHODS: Elimination Methods – Dichotomous Search, Fibonacce and Golden Section Methods; Unconstrained Minimization Methods: Univariate, Conjugate Directions, Gradient and Variable Metric Methods.

INTERPOLATION METHODS – Quadratic and Cubic Interpolation Methods.

UNIT III

CONSTRAINED MINIMIZATION METHODS: Characteristics of a constrained problem; conversion of constrained to unconstrained problem, Direct Methods of feasible directions; Indirect Methods of interior and exterior penalty functions.

GEOMETRIC PROGRAMMING: applicability, degree of difficulty, problem formulation and Solutions of Unconstrained and Constrained problems.

UNIT VI

DYNAMIC PROGRAMMING: Concept of Sub-optimization and the principle of optimality; Calculus, Tabular and Computational Methods in Dynamic Programming; An Introduction to Continuous Dynamic Programming.

INTEGER PROGRAMMING : Gomory's Cutting Plane Method for Integer Linear Programming; Formulation & Solution of Integer Polynomial and Non-linear problems.

Text Books :

1. Optimization (Theory & Applications) – S.S. Rao, Wiley Eastern Ltd., New Delhi.
2. Optimization Concepts and Applications in Engineering - Ashok D. Belegundu and Tirupathi R Chandrupatla - Pearson Education.

Reference Books :

1. Optimization: Theory and Practice, C.S.G. Beveridge and R.S. Schechter, MGH, New York.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 434B AUTOMOBILE DESIGN							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

FRAME: Study of Loads, Moments and Stresses on Automobile Frame Members. Design of Frame for Passenger and Commercial Vehicles.

SUSPENSION SPRINGS: Design of Leaf Springs, Coil Springs and Torsion Bar Springs for automobile.

UNIT II

FRONT AXLE: Analysis of Loads, Moments and Stresses at different sections of Front Axle.

BEARINGS: Determination of Bearing Loads at Kingpin Bearings. Wheel Spindle Bearings, Choice and selection of Bearings

UNIT III

STEERING SYSTEMS: Determination of Optimum Dimension and Proportions for Steering Linkages ensuring minimum error in Steering.

DRIVE LINE AND READ AXLE: Design of Propeller Shaft, Design of Final Drive Gearing, Design details of Full-floating, Semi-floating and Three Quarter Floating, Rear Axle Shafts and Rear Axle Housings.

UNIT IV

CLUTCH: Type of Clutches, Torque capacity of Clutch. Design of Clutch Components

GEAR BOX: Design of Three Speed and Four Speed Gear Boxes.

TEXT BOOKS:

1. Dean Averns,Automobile Chassis Design, llliffe Books
2. Heldt, P.M., Automotive Chassis, Chilton Co., New York
3. Automobile Design Problems, K M Aggarwal, Satya Prakashan, New Delhi
4. Auto Design, R B Gupta, Satya Prakashan, New Delhi
5. Automobile Engineering, R B Gupta, Satya Prakashan, New Delhi

REFERENCE BOOKS:

1. Steeds.W., Mechanics of Road Vehicles, llliffee Books Ltd., London
2. Giles, J.G. Steering, Suspension and Tyres, llliffee Books Ltd., London,.
3. Newton, Steeds & Garret, Motor Vehicle, llliffee Books Ltd., London,.
4. Heldt, P.M. Torque Converter, Chilton Book Co., New York,

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 436B MECHATRONICS

B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION AND BASICS: What is Mechatronics?; A Measurement System with its constituent elements; Open and Closed Loop Systems; Sequential Controllers; Micro-processor Based Controllers; Mechatronic Approach.

HARDWARE OF MEASUREMENT SYSTEMS: A review of Displacement, Position Velocity, Motion, Force, Fluid Pressure, Liquid Flow, Liquid Level, Temperature, Light Sensors / alongwith Performance Terminology; Selection of Sensors; Input Data by Switches; Signal Conditioning; Brief Review of Operational Amplifier; Protection; Fitering; Wheat Stone Bridge; Digital Signals; Multiplexers; Data Acqusition; Digital Signal Processing; Pulse Modulation; Data Presentation Systems – Displays; Data Presentation Elements; Magnetic Recording; Data Acquisition Systems; Testing & Calibration; Problems.

UNIT II

PNEUMATIC, HYDRAULIC, MECHANICAL AND ELECTRICAL ACTUATION SYSTEMS: Pneumatic and Hydraulic Systems; Directional Control Valves; Valve Symbols; Pressure Control Valves; Cylinder Sequencing; Process Control Valves; Rotary Actuators; Mechanical Systems – Types of Motion, Kinematic Chains, Cams, Gear Trains, Ratchet & Pawl, Belt & Chain Drives, Bearings, Mechanical Aspect of Motor Selection; Electrical Systems; Mechanical & Solid State Switches; Solenoids; D.C. & A.C. Motors; Stepper Motors; Problems.

SYSTEM MODELING AND PERFORMANCE: Engineering, Systems; Rotational – Translational Systems; Electro-mechanical Systems; Hydraulic – Mechanical Systems; A review of modeling of First and Second Order Systems and Performance Measures; Transfer Functions for first order System, Second Order System, Systems in series & Systems with Feedback Loops; Frequency Response of First Order and Second Order Systems; Bode Plots: Performance Specifications: Stability; Problems.

UNIT III

CLOSED LOOP CONTROLLERS: Continuous and Discrete Processes – Lag, Steady State Error; Control Modes; Two- step Mode; Proportional Mode – Electronic Proportional Controllers; Derivative Control – Proportional plus Derivative Control; Integral Control - Proportional plus Integral Control; PID Controller – Operational Amplifier PID Circuits; Digital Controllers – Implementing Control Modes; Control System Performance; Controller Tuning – Process Reaction Method & Ultimate Cycle Method; Velocity Control; Adaptative Control; Problems.

DIGITAL LOGIC AND PROGRAMMABLE LOGIC CONTROLLERS : A Review of Number Systems & Logic Gates; Boolean Algebra; Kanaugh Maps; Sequential Logic; Basic Structure of Programmable Logic Controllers; Input/ Output Processing; Programming; Timers, Internal Relays and Counters; Master & Jump Controls; Data Handling; Analogue Input/ Output; Selection of a PLC; Problems.

UNIT IV

MICROPROCESSORS AND INPUT/OUTPUT SYSTEMS: Control; Microcomputer Structure; Micro- controllers; Applications; Programming Languages; Instruction Sets; Assembly Language Programs; Subroutines; Why C Language ? A review of Program Structure, Branches, Loops, Arrays, Pointer; Examples of Programs; Interfacing; Input/ Output; Interface Requirements; Peripheral Interface Adaptors; Serial Communication Interface; Examples of Interfacing; Problems.

DESIGN AND MECHATRONICS: Design Process; Traditional and Mechantronics Design; Possible Mechatronics design solutions for Timed Switch, Wind Screen Wiper Motion, Bath Room Scale, A Pick & Place Robot, Automatic Camera, Engine Management System & Bar Code Recorder.

TEXT BOOKS:

1. Mechatronics by W. Bolton, Published by Addition Wesley.

2. Mechatronics System Design – Devdas Shetty and Richard A. Kolx Brooks/ Cole 1997.

REFERENCE BOOKS:

1. Introduction to Mechatronics and Measuring System : david G. Alciation and Michael B. Hist and Tata McGraw Hill

2. Mechtronics – Sensing to Implementation - C.R.Venkataraman, Sapna

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 438B FLEXIBLE MANUFACTURING SYSTEM							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

AUTOMATION AND MANUFACTURING FLEXIBILITY: Automation and types, reasons for automation, Basic elements of an Automated System: Sensors, Actuators, Analog-to-Digital and Digital-to-Analog Converters, Input/ Output Devices for Discrete Data, Definition of Manufacturing Flexibility, Need of Manufacturing flexibility, Types of Manufacturing Flexibilities, Classification of Manufacturing systems on Flexibility types, Resources and Processes to increase flexibility of manufacturing systems

GROUP TECHNOLOGY (GT): GT and its benefits, Parts classification and coding systems, the composite part concept, GT based Machine cell design through Cluster Analysis and Hollier's Algorithm; Numerical problems

UNIT II

NUMERICAL CONTROL (NC): Fundamentals of NC Technology and advantages in Manufacturing, NC Machines and types, Computer Numerical Control, Distributed Numerical Control, brief introduction of NC Part Programming.

FLEXIBLE MANUFACTURING SYSTEMS (FMS): Components of an FMS, FMS work stations. Material handling and storage system: Functions of material handling system, FMS layout configurations, Computer control system: Computer function, FMS data file, system reports. Planning the FMS, FMS applications and benefits

UNIT III

ROBOTIC TECHNOLOGY: Common robot configurations, Joints and links, work volume, types of robot control, accuracy and repeatability, interlocks, advantages and disadvantages. Brief review of Robot programming and languages: Motion programming, simulation and offline programming, work cell control. Applications of Robot: Material handling, processing operations, assembly and inspection

MATERIALS HANDLING SYSTEMS: Automated flow lines, methods of work part transport, Transfer Mechanisms, buffer storage, automation for machining operations, part feeding devices, Brief review of Automated assembly systems and types,

UNIT IV

COMPUTER INTEGRATED MANUFACTURING SYSTEMS (CIMS): Elements of CIM, Brief Review of Computer aided process Planning, Computer Integrated Production Management Systems, MRP, Capacity Planning, MRPII, Shop floor Control systems, Computer Process Monitoring, Computer aided quality control, Adaptive Control of Manufacturing

TEXT BOOKS:

1. Automation, Production Systems and Computer Integrated Manufacturing: Groover M.P, Prentice Hall of India.

2. CAD/CAM: Groover M.P, Zimmers E.W, Prentice Hall of India.

REFERENCE BOOKS:

1. Approach to Computer Integrated Design and Manufacturing: Nanua Singh, John Wiley and Sons, 1998.

2. Production Management Systems: A CIM Perspective: Browne J, Harhen J, Shivnan J, Addison Wesley, 2nd Ed. 1996.

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 440B MANUFACTURING MANAGEMENT							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

MANUFACTURING SYSTEMS DESIGN: Definition, Systems, Subsystems, Systems Approach Fundamentals, Systems Approach for designing of Manufacturing Systems, Brief reviews of Systematic Layout Planning (SLP), Computerized Layout Planning, Assembly Line balancing, Group Technology & Cellular Systems, Classification & Grouping, overview of FMS. Strategic consideration for comparison of various systems

UNIT II

NEW PRODUCT DEVELOPMENT (NPD): Product Development, Customer Need, Strategies for New Product development, Product life cycle, Product status. Corporate Design Strategies, Modular Design, Standardization, Value Engineering & Analysis

MANUFACTURING PLANNING & CONTROL SYSTEMS: Overview of Aggregate Planning Models, Master Production Schedule, Capacity planning, Just-in-Time (JIT) Manufacturing Philosophy, KANBAN, JIT requirements, Optimized Production Technology (OPT).

UNIT III

FORECASTING METHODS: Need of Forecasting in Industries, Different Methods and Models of Forecasting, Forecasting Errors – MAD, Regression Methods, Linear Model for single & multiple variables, Brief idea of computerized forecasting systems, Numerical Problems

MATERIAL REQUIREMENTS PLANNING (MRP): Definition of MRP systems. Elements of MRP systems, MRP I & II. Structured Bill of Materials, Regenerative & Net change MRP, Operating an MRP, Integration of Production & Inventory Control

UNIT IV

MAINTENANCE & RELIABILITY: Concept of preventive & breakdown maintenance, maintenance cost, optimal preventive maintenance, reliability definitions, failure analysis and curve, systems reliability- series parallel, redundancy, methods of improving reliability, MTBF, MTTR, Maintainability, availability, brief concept of tero-technology

MANUFACTURING SYSTEMS ECONOMICS: Concept of time value of money, Single payment, Equal Series payment, various machine and project selection & evaluation techniques: Payback period, Present worth, Equivalent annual cost, Cost- benefit ratio, Depreciation concept various methods-straight line, declining balance, Sum of the digits, Sinking fund

TEXT BOOKS:

1. Operations Management – SCHOROEDER, MGH, New York.

2. Production Operations Management – CHARY, TMH, New Delhi.

REFERENCE BOOKS:

1. Production Operations Management – ADAM & EBERT, PHI, New Delhi

2. Production & Operations Management – MARTINICH, John Wiely SE, New Delhi.

3. Production & Operation Management- Panneerselvam, PHI, New Delhi

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

ME 442B ROBOTICS ENGINEERING							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

ROBOTIC MANIPULATION: Automation and Robots; Robot Classification – Drive Technologies, Work-Envelope Geometries, Motion Control Methods, Applications; Robot Specifications – No. of Axes, Capacity and Speed, Reach and Stroke, Tool Orientation, Repeatability, Precision, Accuracy, Operating Environment, An Example, Rhino X-3.

UNIT II

DIRECT KINEMATICS: The Arm Equation Homogenous Co-ordinates – Frames, Translations and Rotations, Composite Homogenous Transformations; Screw Transformations; Link Co-ordinates; The Arm Equation; A Five-Axis Articulated Robot; A Four-Axis SCARA Robot; A Six-Axis Articulated Robot; Problems.

INVERSE KINEMATICS: Solving the Arm Equation: The Inverse Kinematics Problem; General Properties of Solutions; Tool Configuration; Inverse Kinematics of a Five-Axis Articulated Robot, Four-Axis Scara Robot, Six-Axis Articulated Robot and Three-Axis Planer Articulated Robot; A Robotic Work Cell; Problems.

UNIT III

WORK SPACE ANALYSIS AND TRAJECTORY PLANNING : Work Space Analysis; Work Envelope of a Five-Axis Articulated Robot; Work Envelope of a Four Axis Scrara Robot; Work Space Fixtures; The Pick and Place Operation; Continuous Path Motion; Interpolated Motion; Straight Line Motion; Problems.

DIFFERENTIAL MOTION AND STATICS : The Tool Configuration Jacobian Matrix; Joint – Space Singularities; Generalised Inverses; Resolved – Motion Rate Control; n > 6; Rate Control of Redundant Robots : n > 6; Rate Control using (1) – Inverses; The Manipulator Jacobian; Induced Joint Torques and Forces; Problems.

UNIT IV

MANIPULATOR DYNAMICS : Lagrange's Equation; Kinetic & Potential Energy; Generalised Force; Lagrange – Euler Dynamic Model; Dynamic Models of a Two-Axis Planer Articulated Robot and A Three-Axis SCARA Robot; Direct & Inverse Dynamics; Recursive Newton - Euler Formulation; Dynamic Model of a One-Axis Robot; Problems.

ROBOT CONTROL : The Control Problems; State Equations; Constant Solutions; Linear Feedback Systems; Single-Axis PID Control; PD-Gravity Control; Computed –Torque Control; Variable-structure Control; Impedance Control; Problems.

Text Books:

1. Fundamental of Robotics (Analysis & Control) by Robert J.Schilling, Published by PHI, Pvt. Ltd., New Delhi.
2. Introduction to Robotics (Mechanics & Control) by John J. Craig, Published by Addition Wesley (Intl. Student Edition).
3. Analytical Robotics & Mechatronics by Wolfram Stadler, Published by Mc-Graw Hill, Inc., New Delhi.
4. Industrial Robotics - Technology, Programming & Applications by Mikell P. Grover, Weiss, Nagel and Ordef , Published by Mc-Graw Hill International Edition.

5. A Robot Engg. Test Book - Mohsen Shahinpoor, Harper & Low, Publishing New York.

6. Robotic Engineering – An Integrated Approach : Richard D.Klafter, Thomas A. Chmielewski and Michael Negin PHI 1989.

7. Foundations of Robotics Analysis and Control - Tsuneo Yashikawa MIT Press 1990, Indian Reprint 1998.

8. Robots and Control - R.K.Mittal and I.J.Nagrath - Tata McGraw Hill 2003

Note:

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ME 444B ERGONOMICS AND WORK PLACE DESIGN							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

Basic Principles of Ergonomics, Anthropometry, Posture and Health; Anthropometry Practical; Displays, Controls and HMI; Tools and Equipment Design; Workplace Design and Assessment; Task Analysis; Questionnaire and Interview Design; Product Design and Evaluation; Designing for manufacture and maintenance; Health and Safety Legislation and Ergonomics.

UNIT II

Application of Ergonomics Principles, Cognitive Ergonomics, Human Information Processing; Memory; Reading; Perception; Navigation; Problem Solving; Decision Making, Human-Computer Interaction, Input/Output Technology, Usability; Evaluation; Health problems.

UNIT III

Future Systems, Job Design, Scientific Management, Enrichment, Enlargement, Rotation, Cells, Shift work, Management Style and Job Design, Change Management. New Technology, Unemployment, Deskilling, Introducing new technology. Questionaire design and assessment. Task analysis techniques. Measurement of human error and risk. Use of simulation and prototypes. Product Evaluation. Experimental Design.

UNIT IV

Case Studies: A set of case studies will be used to demonstrate how ergonomics has lead to changes in work activity, safety and product design. Case studies will include advanced computer applications, workplace assessment and re-design, accident analysis and industrial inspection, and in manufacturing. Students will be required to apply the principles to a real life ergonomic design as applied to a product, service or computer application.

TEXT BOOKS:

1. Work Design: Industrial Ergonomics – Knoz, Stephan A., Johnson, Steven, Holcomb Hathaway, Scottsdale, AZ.
2. Human factors in engineering and design – Sanders, M.S. & McCormick, E.J., 6th ed., McGraw-Hill, New York.

REFERENCE BOOKS:

1. Ergonomics: Man in his working environment- Murrell, K.F.H, Champan & Hall, London.
2. Man – Machine Engineering – Chapanis A: Wordsworth Publishing Co.
3. The Practice and Management of Industrial Ergonomics – Alexander, D.C., Prentice-Hall, Englewood Cliffs, NJ.
4. Textbook of Work Physiology – Astrand, P.O. & Rhodahl, K.– McGraw-Hill, New York.
5. Human Factors in Lighting – Boyce, P.R. Macmillan, New York.
6. The Ergonomics of Workspaces and Machines : A design manual – Clark, T.S. & Corlett, E.N. Taylor & Francis, London.
7. Ergonomics at work. Oborne, D Wiley, London.
8. Bodyspace–Anthropometry, Ergonomics and Design. – Pheasant, S. Taylor & Francis,.

Note:

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ME 446B MODERN MANUFACTURING PROCESSES							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

Limitations of conventional manufacturing processes, Need of unconventional manufacturing processes, Classification of Modern Manufacturing Processes and its future possibilities.

ULTRASONIC MACHINING- Introduction, Basic Principle of USM, Elements of Process, tool feed mechanism, cutting tool system design, effect of parameters on MRR, economic considerations, applications, limitations of the process, advantages and disadvantages.

ABRASIVE JET MACHINING- Process description, features of AJM, Parameters in AJM, metal removal rate (MRR) in AJM. Advantages, limitations and Practical applications of AJM. Water Jet Machining- Jet cutting equipments, process details,

UNIT II

CHEMICAL MACHINING, basic technique of chemical machining, Mechanism of metal removal, process variables, advantages and applications .Electrochemical machining, principle of ECM process, ECM process detail, chemical reactions in ECM, tool work gap, process variables and characteristics in ECM, advantages, disadvantages and application of ECM ,Electrochemical Grinding - Material removal, surface finish, accuracy, advantages, applications.

UNIT III

THERMAL SPARK EROSION PROCESSES: Electric Discharge Machining (EDM) or spark erosion machining processes, practical aspects of spark erosion machining, mechanism of metal removal, spark erosion generators, electrode feed control, dielectric fluids, flushing, electrodes for spark erosion, selection of electrode material, tool electrode design, surface finish, machining accuracy, machine tool selection, applications. Wire cut EDM. Advantages and disadvantages of spark erosion machining.

LASER BEAM MACHINING (LBM)- Introduction, lasing process, Laser machining system, Thermal effect on workpiece, calculation of MRR, description of laser drilling machine, cutting speed and accuracy of cut, advantages and limitations.

UNIT IV

PLASMA ARC MACHINING (PAM): introduction, non thermal generation of plasma types of plasma arc , the stabilized arc, mechanism of plasma torch, , mechanism of metal removal, PAM parameters, equipments for D.C. plasma torch unit, safety precautions, economics, other applications of plasma jets.

ELECTRON BEAM MACHINING (EBM) – Description of the process, need for high vacuum in EBM, process parameters in EBM. Advantages and disadvantages of EBM. Electron beam welding.

Text Books:

1. Advanced Machining Processes by V.K. Jain. Allied Publishers Pvt Ltd
2. Modern Machining Methods by M. Adithan, Khanna Publishers
3. Modern Machining Processes by P.C. Pandey and H.S. Shan. Tata McGraw- Hill
4. Advanced Methods of Machining by J. A. Mcgeough, Springer
5. Non-Traditional Manufacturing Process by Benedict, CRC pub.

6. Unconventional Manufacturing Process by M K Singh, New Age Publishers

7. Nonconventional manufacturing by P. K. Mishra, Narosa Publishers

Note:

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ME 448B EMERGING AUTOMOTIVE TECHNOLOGIES							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

The Future Of The Automotive Industry : Challenges and Concepts for the 21st century. Crucial issues facing the industry and approaches to meet these challenges.

Fuel Cell Technology For Vehicles : What is fuel cell, Type of fuel cell, Advantages of fuel cell. Current state of the technology. Potential and challenges. Advantages and disadvantages of hydrogen fuel.

UNIT II

Latest Engine Technology Features : Advances in diesel engine technology. Direct fuel injection Gasoline engine. Diesel particulate emission control. Throttling by wire. Variable Valve Timing, Method used to effect variable Valve Timing. Electromagnetic Valves, Camless engine actuation.

42 Volt System : Need, benefits, potentials and challenges. Technology Implications for the Automotive Industry. Technological evolution that will occur as a result of the adoption of 42 volt systems.

UNIT III

Electrical And Hybrid Vehicles : Types of hybrid systems, Objective and Advantages of hybrid systems. Current status, Future developments and Prospects of Hybrid Vehicles

Integrated Starter Alternator: Starts stop operation, Power Assist, Regenerative Braking. Advanced lead acid batteries, Alkaline batteries, Lithium batteries, Development of new energy storage systems, Deep discharge and rapid charging ultra capacitors.

UNIT IV

X-By Wire Technology : What is X-By Wire, Advantage over hydraulic systems. Use of Automotive micro controllers. Types of censors. Use of actuators in an automobile environment.

Vehicles Systems : Constantly Variable Transmission, Benefits, Brake by wire, Advantages over power Braking System. Electrical assist steering, Steering by wire, Advantages of Steering by wire. Semi-active and fully-active suspension system. Advantages of fully active suspension system.

TEXT & REFERENCE BOOKS:

1. Advanced Vehicle Technologies by Heinz Heisler-SAE International Publication.
2. Electric and Hybrid Electric vehicles by Ronald K. Jurgen.- SAE International Publication
3. Electronic Braking, Traction and Stability control-SAE Hardbound papers.
4. Electronics steering and suspension systems- SAE Hardbound papers.
5. 42 Volt system by Daniel J. Holt- SAE International Publication
6. Diesel Particulate Emission by J.H. Johnson- SAE Hardbound papers.
7. Fuel Cell Technologies for vehicles by Richard Stobart- SAE Hardbound papers.

Note:

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ME 450B RELIABILITY ENGINEERING							
B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Class Work**	**:**	**25 Marks**
4	**-**	**--**	**4**		**Examination**	**:**	**75 Marks**
					Total	**:**	**100 Marks**
					Duration of Examination	**:**	**3 Hours**

UNIT I

INTRODUCTION TO RELIABILITY: Reliability: Definition; Probability Concept; Addition of Probabilities; Complimentary Events; Kolmogorov Axioms. Failure Data Analysis: Introduction, Mean Failure Rate, Mean Time to Failure (MTTF), Mean Time between Failures (MTBF), MTTF in terms of Failure Density, MTTF in Integral Form.

UNIT-II

SYSTEM RELIABILITY: Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tieset methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

UNIT III

RELIABILITY MODELS: Hazard Models: Introduction, Constant Hazard; Linearly Increasing Hazard, the Weibull Model, Density Function and Distribution Function, Reliability Analysis, Important Distributions and their Choice, Standard Deviation and Variance.

Conditional Probability: Introduction, Multiplication Rule, Independent Events, Venn Diagram, Hazard Rate as conditional probability, Bayes Theorem..

UNIT IV

RELIABILITY IMPROVEMENT: Repairable Systems: Redundancy, Element, Unit and standby Redundancy, Optimization; Reliability cost trade- off, Introduction to Repairable Systems, Instantaneous Repair Rate, , Reliability and Availability Functions, Important Applications. Maintainability and Availability: Introduction, Maintenance Planning, Reliability and Maintainability trade off.

TEXT BOOKS:

1. Reliability Engineering, L.S. Srinath, Affiliated East-West Press, New Delhi.
2. Reliability Engineering, A.K.Govil, Tata Mc-Graw Hill, New Delhi.

REFERENCE BOOKS:

1. Reliability Engineering, L.Balagurusamy, Tata Mc-Graw Hill, New Delhi, 1984.
2. Reliability Based Design, S. Rao, Mc-Graw Hill, 1992.
3. Reliability in Engineering Design, K.C. Kapur and L.R. Lamberson, Wiley Publications.
4. Reliability Engineering, D.J. Smith, 1972, E.W. Publications.
5. *Reliability Evaluation of Engineering and Systems R.Billintan & R.N. Allan, Plenum Press.*
6. *Reliability in Engineering and Design, K.C. Kapoor & L.R. Lamberson, John Wiely and Sons.*
7. *Life Testing and Reliability Estimation, S.K. Sinha & B.K. Kale, Wiely Eastern Ltd.*
8. *Probabilistic Reliability, An Engineering Approach, M.L. Shooman, McGraw Hill.*
9. *System Reliability Engineering, G. H.Sandler, Prentice Hall.*

Note:

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GFME – 402	**GENERAL FITNESS FOR THE PROFESSION**

B. Tech. Semester – VIII (Mechanical Engineering)							
L	**T**	**P**	**Credits**		**Examination**	**:**	**100 Marks**
1	**--**	**--**	**4**		**Total**	**:**	**100 Marks**

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

1. Dean, Faculty of Engineering & Technology/ Director
   /Principal of affiliated college : Chairperson
2. Chairperson of the department : Member
3. External expert : Appointed by the university

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I. Academic Performance --------

II. Extra Curricular Activities / Community Service, Hostel Activities **(12 Marks)**

III Technical Activities / Industrial, Educational tour **(12 Marks)**

IV Sports/games **(16Marks)**

Note: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/ her achievement and verbal & communicative skill through presentation before the examiners. **(40 Marks)**

C. Faculty Counselor Assignment **(20 Marks)**

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/ her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
4. Moral values & Ethics- Syllabus (one lecture/ week on the topics of Human values/Ethics is to be delivered)