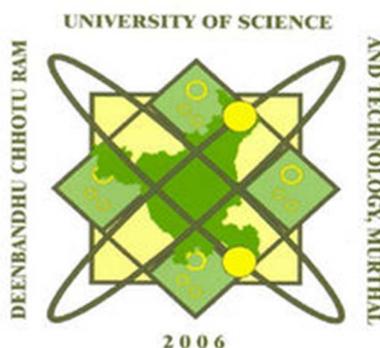


CURRICULUM
(Scheme & Syllabi for First and Second semesters)
for
**UNDERGRADUATE DEGREE
COURSE (B. Tech.)**
IN
ENGINEERING
(Common for All Branches)

[w.e.f. 2018-19]



DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE AND TECHNOLOGY
(Established Under Haryana Legislature Act NO. 29 of 2006)
Murthal-131039, Sonapat (Haryana)
www.dcrust.ac.in

Recommended by corresponding Board of Undergraduate studies and Faculty of Engineering and Technology
Approved in 13th meeting of The Academic Council held on 18th June 2018

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)
B.Tech. 1ST YEAR (SEMESTER – I) (Common for all branches)
Choice Based Credit System (Scheme Of Studies & Examinations w.e.f. 2018-19)

S. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total Marks	Credits	Duration of Exam (Hrs.)
			L	T	P		Theory	Practical			
1	HUM101C	ENGLISH LANGUAGE SKILLS (Gr.-A)	2	0	0	25	75	0	100	2	3
2		MATHEMATICS-I	3	1		25	75	0	100	4	3
3	CH101C	PHYSICS (Gr.-A) OR CHEMISTRY (Gr.-B)	3	1		25	75	0	100	4	3
4	EE101C	BASIC ELECTRICAL ENGINEERING (Gr.-A)(Except CHE)	3	1		25	75	0	100	4	3
	EE103C	ELECTRICAL AND ELECTRONICS ENGG (For CHE only)									
	CSE101C	OR PROGRAMMING FOR PROBLEM SOLVING (Gr.-B)	3	0		25	75	0	100	3	
5	ME101C	ENGINEERING GRAPHICS & DESIGN (Gr.-A)	1	0	4	25	0	75	100	3	3
	ME103C	OR WORKSHOP/ MANUFACTURING PRACTICES (Gr.-B)									
6	HUM103C	ENGLISH LANGUAGE LAB (Gr.-A)	0	0	2	25	0	75	100	1	3
7		PHYSICS LAB (Gr.-A)	0	0	2	25		75	100	1	3
	CH103C	OR CHEMISTRY LAB (Gr.-B)									
8	EE105C	BASIC ELECTRICAL ENGINEERING LAB(Gr.-A)	0	0	2	25		75	100	1	3
	EE107C	ELECTRICAL AND ELECTRONICS ENGG .LAB (For CHE only)									
	CSE103C	OR PROGRAMMING FOR PROBLEM SOLVING LAB (Gr.-B)	0	0	4	25		75	100	2	
Total			12	3	10	200	300	300	800	20	
			10	2	10	150	225	225	600	17	

MATHEMATICS AND PHYSICS COURSES FOR DIFFERENT BRANCHES

COURSE CODE	COURSE TITLE
MATH101C	MATHEMATICS –I (For computer Science & Engg)
MATH103C	MATHEMATICS –I (For Bio-technology)
MATH105C	MATHEMATICS –I (common for all branches except CSE & BT)
PHYSICS AND PHYSICS LAB. (ANY ONE COMBINATION)	
PHY101C	INTRODUCTION TO ELECTROMAGNETIC THEORY
PHY111C	IEMT LAB (For ME, AE, Aero & ECE)
PHY103C	MECHANICS
PHY113C	MECHANICS LAB (For CE)
PHY105C	OPTICS, FIBRE OPTICS, MAGNETISM AND QUANTUM MECHANICS
PHY115C	OFMQ LAB (For CHE, BT & BME)
PHY107C	WAVES, OPTICS AND QUANTUM MECHANICS
PHY117C	WAVES, OPTICS AND QUANTUM MECHANICS LAB (For EE and EEE)
PHY109C	SEMICONDUCTOR PHYSICS
PHY119C	SEMICONDUCTOR PHYSICS LAB (For CSE)

Note:

- Every student has to participate in the MANDATORY INDUCTION PROGRAM OF THREE WEEK DURATION at the start of regular teaching of first semester. It comprises physical activity, creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept/ Branch & Innovations.
- All the branches are to be divided into groups '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.

For DCRUST Murthal: GROUP A: BME, BT, CSE, ECE.

GROUP B: CE, CHE, EE, ME.

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B.Tech. Semester I/II (Common for All Branches)**HUM 101 C ENGLISH LANGUAGE SKILLS****CATEGORY : HUMANITIES**

L	T	P	Credits	Class Work	:	25 Marks
2	0	0	2	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course objectives:

1. To equip students with English Language skills needed in academic and professional world
2. To make students technically proficient in handling language skills required for competitive exams.
3. To inculcate human/ethical values in the students to ensure their holistic development
4. To develop ability to critically read the literary texts

Course outcomes:

The students will be able to

1. Acquire basic proficiency in English
2. Develop their verbal ability
3. Enhance their writing, reading and analytical skills
4. Develop proficiency in reading along with sensitivity to the impact literary texts can have on their minds/lives

Course Contents:**Unit I: Basic Writing skills**

- (a) Subject Verb Agreement
- (b) Noun Pronoun Agreement
- (c) Governance of Nouns Through Prepositions
- (d) Basic Verb Patterns (V, SV, SVO, SVOO,SVC,SVOC,SVOA)

Unit II: Vocabulary Building

- (a) One word substitution*(*List attached*)
- (b) Phrasal Verbs* (*List attached*)
- (b) Commonly used Idioms * (*List attached*)
- (d) Words/Phrases/Idioms from the texts prescribed in Unit IV-- their meaning and use in sentences

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Unit III: Creating Grammatical Cohesion

- (a) Referring Time in Language(Tenses)
- (b) Use of Conditional Sentences
- (c) Use of Active and Passive Voice
- (d) Synthesis of Sentences using Coordinating and Subordinating Conjunctions

Unit IV: Reading and Writing Practices

(a) Literary Texts:

- i. “The Secret of Work” by Swami Vivekananda**
- ii. “ Public Transport in London and Delhi” by Nirad C. Chaudhuri #
- iii. “An Outline of Intellectual Rubbish” by Bertrand Russell #
- iv. “Mother Teresa” by Khushwant Singh #

- (b) Writing official Letters- Issues Concerning Students’ academic and social life
- (c) Essay Writing
- (d) Paragraph Writing

Note: Eight hour time on an average to each unit is recommended for class room teaching purposes.

Scheme of End Semester Examination (Major Test):

1. The duration of examination will be three hours.
2. Nine questions of 15 marks each will be set, out of which the examinees will have to attempt five questions.
3. First question of 15 marks will be compulsory. It will cover all the four units of the syllabus. The question will have sub- parts with marks assigned against each.
4. Question No 02 to 09 will be set from the four units of the syllabus --- two from each unit of 15 marks each. The nature of the questions in each unit will depend upon the nature of content therein. Examinees will have to attempt four more questions, selecting one from each unit. The questions may have parts.

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Instruction for paper setter: Recommended pattern of questions in each unit will be as follows:

Unit I

Two questions of 15 marks each will be set from this unit. Examinees will attempt either of the two questions. Questions will be in the form of correcting the errors in the sentences, picking up the right alternative, filling in the blanks or completing the sentences. Examinees can also be asked to frame sentences on the patterns given or vice versa.

Unit II

Two questions of 15 marks each will be set from this unit out of which one is to be attempted. Questions will be in the form of giving the meaning of phrasal verbs, idioms and proverbs and using them in sentences/contexts of one's own or in the form of matching exercises, or choosing the correct alternative. The phrases/idioms/proverbs may be given from the texts prescribed in Unit IV. Examinees may also be asked to pick up the odd ones from the given series.

Unit III

Two questions of 15 marks each will be set from this unit also out of which one is to be attempted. Questions will be set on testing examinees' knowledge of the components prescribed preferably in the style deemed fit for the component by the examiner.

Unit IV

Two questions of 15 marks each will be set from this unit out of which one needs to be attempted. The questions may have parts if required. One question will be set on the literary texts prescribed. This question may be in the form of comprehension passage, long/short answer question, explanation of lines/passage from the text with reference to the context. The second Question will be in the form of writing formal letter / essay / paragraph.

Recommended Readings:

1. *Bhatnagar, Nitin and Mamta Bhatnagar. *Communicative English for Engineers and Professionals*. Pearson Education, 2013.(The soft copy of the book is available in the university library)
2. # Bhatnagar, k. Manmohan.Ed. *The Spectrum of Life: An Anthology of Modern Prose*. Delhi: Macmillan India Ltd., 2006.
3. Sinha, R.P.*Current English Grammar and Usage*. OUP, 2017.
4. Rizvi, M. Ashraf. *Effective Technical Communication*. McGraw Hill Education (India) Pvt. Ltd., 2014.
5. Eastwood, John. *Oxford Guide to English Grammar*. OUP, 2010.
6. Kumar, Sanjay and Pushp Lata. *Communication Skills*. OUP, 2011.
7. Raman, Meenakshi and Sangeeta Sharma.*Communication Skills*.New Delhi:OUP,2011.

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8. Hill, L. A. *A Guide to Correct English*. London:OUP,1965.
9. *Oxford Dictionary of English Idioms*. New Delhi: OUP, 2009
- 10.**Vivekananda, Swami. *Karma Yoga*. New Delhi: Sahityashila Prakashan, 2015.
- 11.**

<http://yousigma.com/religionandphilosophy/swamivivekananda/thesecretofwork.pdf>

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Study Material (List) for Unit-II

One Word Substitution

1. People who work together - Colleagues
2. A person belonging to one's own country - Compatriot
3. One who is completely self-satisfied - Complacent
4. One who sells sweets and pastries - Confectioner
5. Belonging to an individual from birth - Congenital
6. One who believes in keeping things and customs as they are - Conservative
7. A number of stars grouped together - Constellation
8. One who lives at the same time - Contemporary
9. A person who lives in a foreign country - Alien
10. One who takes part in sports and other activities for enjoyment only - Amateur
11. A statement that is open to more than one interpretation - Ambiguous
12. Which cannot be compared- Unique
13. A partner in crime - Accomplice
14. Written declaration made on an oath - Affidavit
15. A list of things to be discussed at a meeting - Agenda
16. One who doubts the existence of God - Agnostic/Atheist
17. One who is a habitual drunkard - Alcoholic
18. A medicine which produces insensitivity - Anaesthetic
19. A book written by an unknown author - Anonymous
20. The study of man - Anthropology
21. A medicine used to counteract poison - Antidote
22. One who studies things of the past - Antiquarian
23. A substance which kills germs - Antiseptic
24. An artificial pond or a tank used for keeping live fish, water plants, etc. - Aquarium
25. One who criticizes- Critic
26. One who knows history- Historian
27. One who is out to destroy the government - Anarchist
28. Absence of government - Anarchy
29. The science of the structure of human body - Anatomy
30. An instrument used for measuring force of the wind - Anemometer
31. A building that can touch sky- Skyscraper
32. Which is not been heard before- Unprecedented
33. One who live in Orphanage- Orphan
34. A study of ancient things - Archaeology
35. One who designs buildings - Architect
36. A place where government and public records are kept - Archive
37. A government by the nobility - Aristocracy
38. A study of stars and planets and their influence on human affairs - Astrology
39. One who is unable to pay off one's debt - Bankrupt
40. A building used for lodging soldiers - Barrack
41. Hastily erected barrier across a street - Barricade
42. One who is engaged to be married - Betrothed

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43. A great lover of books - Bibliophile
44. One who can speak two languages - Bilingual
45. An instrument used by both the eyes to see a distant object in an increased shape - Binocular
46. A record of one's life written by somebody else - Biography
47. A study of plants - Botany
48. A bunch of flowers - Bouquet
49. A collection of flags - Bunting
50. A government by the officials - Bureaucracy
51. A list which contains dates and days - Calendar
52. Thing which is very necessary- Mandatory
53. One who cannot die- Immortal
54. The place where books are kept for reading- Library
55. The art of beautiful writing - Calligraphy
56. One who flies a space vehicle - Astronaut
57. One who is unmarried - Celibate
58. One who is more than hundred years old - Centenarian
59. Situation in which everything happens in a confused way - Chaotic
60. One who mends shoes - Cobbler
61. The study of stars - Astronomy
62. Animals that live in water - Aquatic
63. Space or room which is immediately below the roof of a house - Attic
64. Something that can be heard - Audible
65. A record of one's life written by oneself - Autobiography
66. A government by one - Autocracy
67. The right of self-government - Autonomy
68. A place for keeping birds - Aviary
69. An unmarried man - Bachelor
70. One who eats human flesh - Cannibal

71. The dead body of an animal - Carcass
72. One who lives on flesh - Carnivorous
73. A place with gambling tables - Casino
74. Soldiers on horses - Cavalry
75. The world in miniature - Microcosm
76. One who imitates voice and gestures of another person - Mimic
77. A place where money is coined - Mint
78. One who hates mankind - Misanthrope
79. A person who loves money and hates spending it - Miser
80. A hater of women - Misogynist
81. A rule by the mob - Mobocracy
82. One for whom the world is home - Cosmopolitan
83. One who easily believes what others say - Credulous
84. A number of sailors working on a ship - Crew
85. A war of religion - Crusade
86. One who questions everything in a negative manner - Cynic
87. A person who has been appointed or selected to attend or speak at a conference - Delegate

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88. A government by the people - Democracy
89. A language of a region with its own way - Dialect
90. Shy, timid unwilling to face a situation - Diffident
91. A book which contains telephone addresses - Directory
92. A game in which no one wins - Draw
93. Extremely dry weather without rainfall - Drought
94. A person who is slow in learning - Dunce
95. One who has strange habits - Eccentric
96. Something that can be eaten - Edible
97. something that cannot be repaired: Irreparable
98. A statement open to more than one interpretations - Equivocal
99. The act of spying - Espionage
100. A study of the origin of words - Etymology
101. The science of insects: Entomology
102. The doctor who treats children: pediatrician
103. To shift people from a place of danger to a safer place - Evacuate
104. A speech made without preparation - Extempore
105. Short stories with an element of moral - Fable
106. One who is not easily pleased - Fastidious
107. One who is curious- Inquisitive
108. One who is born in a good family- Noble
109. who is omnipresent- Omnipresent
110. One who knows everything- Omniscient
111. One who is all powerful-Omnipotent
112. A disease which ends in death - Fatal
113. One who believes in fate - Fatalist
114. Animals of a certain region - Fauna
115. One who champions the rights of women - Feminist
116. One who is engaged to marry - Fiancé/Fiancée
117. A person with showy character - Flamboyant
118. A number of battle ships - Fleet
119. A number of sheep - Flock
120. Plants and vegetation of a certain region - Flora
121. Murder of a brother - Fratricide
122. Large band of stars encircling the heavens - Galaxy
123. The study of rocks and soil - Geology
124. One who thinks and talks too much about himself/herself - Egoist
125. A poem written to mourn the death of someone - Elegy
126. The most capable part of group, class of society or a country - Elite
127. The art of effective speaking - Elocution
128. A book containing information on all branches of knowledge - Encyclopaedia
129. One who is given to the pleasures of flesh - Epicurean
130. A speech made by the dramatist at the end of the play - Epilogue
131. Words inscribed on a tomb about the person buried therein - Epitaph
132. One who eats too much - Glutton

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133. Storehouse of grains - Granary
134. One who is easily deceived - Gullible
135. Language that has been very much used - Hackneyed
136. A cluster of houses in a village - Hamlet
137. One who travel at night- Noctivagant
138. Whose boundary cannot be found, boundless- Boundless
139. A place for shelter of ships - Harbour
140. A place for the collection of dried plants - Herbarium
141. Descending from father to son - Hereditary
142. One who acts against religion - Heretic
143. Murder of a human being - Homicide
144. Something that cannot be described - Indescribable
145. Something that cannot be eaten - Inedible
146. Something that cannot be avoided - Inevitable
147. One who does not make mistakes - Infallible
148. Murder of an infant - Infanticide
149. The soldiers on foot - Infantry
150. Liable to catch fire - Inflammable
151. Something which cannot be imitated - Inimitable
152. Something which cannot be satisfied - Insatiable
153. To examine one's thoughts and feelings - Introspect
154. Having no force, null and void - Invalid
155. Something which cannot be conquered - Invincible
156. A decision that cannot be taken back - Irrevocable
157. A plan for the route to be followed - Itinerary
158. A professional rider in horse races - Jockey
159. One who has an irresistible tendency to steal - Kleptomaniac
160. A place where food is kept - Larder
161. A book of account showing debit and credit - Ledger
162. Something which is lawful - Legal
163. Something which can be read - Legible
164. Number of books housed in one building - Library
165. A document allowing persons to travel abroad - Passport
166. Murder of a father - Patricide
167. One who loves one's own country - Patriot
168. One who shows too much concern for small details of learning or teaching - Pedant
169. One who walks on foot - Pedestrian
170. A doctor who specializes in the treatment of children - Paediatrician
171. One who looks at the dark side of things - Pessimist
172. One who loves mankind - Philanthropist
173. One who collects postage stamps - Philatelist
174. The study of languages - Philology
175. A study of human body - Physiology
176. One who doesn't want to work- Doodle
177. One who is cruel- Ruthless, Merciless
178. Pertaining/related to moon - Lunatic

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179. The house of an Eskimo - Igloo
 180. Something which is unlawful - Illegal
 181. Something which cannot be read - Illegible
 182. One who cannot read or write - Illiterate
 183. One who settles in another country - Immigrant
 184. Free from infection - Immune
 185. Not planned ahead of time - Impromptu
 186. Something which cannot be heard - Inaudible
 187. Not of good omen - Inauspicious
 188. Something that cannot be corrected - Incurable
 189. A place where mad men are kept - Lunatic asylum
 190. Name shared by all the members of a family - Surname
 191. A person's last utterance - Swan Song
 192. One who always keeps to himself - Taciturn
 193. One who does not drink wine - Teetotaler
 194. An instrument used to send messages to long distances - Telegraph
 195. An instrument which transmits spoken words to long distances - Telephone
 196. One who believes in God - Theist
 197. Something through which light can partly pass - Translucent
 198. Something through which light can pass - Transparent
 199. One who changes sides - Turncoat
 200. A decision on which all agree - Unanimous
 201. A place where everything is perfect - Utopia
 202. A person who lives a wandering life - Vagabond
 203. A speech made for the first time - Maiden
 204. Animals that suckle their young ones - Mammals
 205. A book or a paper written by hand - Manuscript
 206. Killing on a large scale - Massacre
 207. Murder of a mother - Matricide
 208. Negotiating between the opposite parties to settle their dispute - Mediate
 209. Personal reminiscences in a narration form - Memoir
 210. A government by a king or a queen - Monarchy
 211. A treatise on a subject - Monograph
 212. A speech delivered by one person - Monologue
 213. A government by the few - Oligarchy
 214. Flesh- and vegetable-eating animals - Omnivorous
215. Something through which light cannot pass - Opaque
 216. One who is able to make an eloquent speech - Orator
 217. Curved path of a planet, satellite - Orbit
 218. An authoritative decree or law of the government - Ordinance
 219. A place where clothes are kept - Wardrobe
 220. A woman whose husband is dead - Widow
 221. A man whose wife is dead - Widower
 222. An unexpected piece of good fortune - Windfall
 223. Highest point in the sky directly above the observer - Zenith

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224. Deeply religious - Pious
225. A writer who steals ideas from another writer - Plagiarist
226. A government by the rich - Plutocracy
227. The science of government - Political science
228. Mental derangement confined to one idea - Monomania
229. Exclusive possession or control of any one thing - Monopoly
230. A place where dead bodies are kept before they are cremated or buried - Mortuary
231. A place where ancient works are kept - Museum
232. Favouring one's friends and relatives - Nepotism
233. Taking neither side in the dispute, remaining impartial - Neutral
234. A hollow space in a wall for a statue - Niche
235. One who is new to a profession - Novice
236. A word no longer in use - Obsolete
237. One who is 80-years old - Octogenarian
238. Something which can be carried or moved easily - Portable
239. Occurring after death - Posthumous
240. Examination of a dead body - Post-mortem
241. A child of unusual or remarkable talent - Prodigy
242. A speech made by the dramatist in the beginning of the play - Prologue
243. A person who preaches religion and is considered to be a messenger of God - Prophet
244. To write under a different name - Pseudonym
245. A doctor who specializes in mental illness - Psychiatrist
246. The study of human mind - Psychology
247. One who retires from society to live a solitary life - Recluse
248. Too much official formality - Red-tapism
249. Bitter or ironic remark, specially one ironically worded - Sarcasm
250. Person who is made to bear blame due to others - Scapegoat
251. Someone who knows a lot about the subject - Scholar
252. One who carves in stones - Sculptor
253. A state in which all the religions have equal freedom - Secular
254. A case in which sword is kept - Sheath
255. A speech made to one self - Soliloquy
256. One who walks in one's sleep - Somnambulist
257. One who talks in one's sleep -Somniloquist
258. An older woman who is unmarried and is not likely to get married - Spinster
259. A sudden rush of a large number of frightened people or animals - Stampede
260. Social position or rank - Status
261. One who loads and unloads ships - Stevedore
262. One who is indifferent to pain and pleasure - Stoic
263. Murder of self - Suicide
264. To spend life without purpose and initiative - Vegetate
265. One who is gifted with several talents - Versatile
266. One who offers one's services - Volunteer
267. One who is given to the sensual pleasures of body -Voluptuary
268. An institution meant for reforming young offenders - Reformatory

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269. Murder of the king - Regicide
 270. A place for improving one's health - Resort
 271. One who speaks less - Reticent
 272. A person who lives in a countryside far from the humdrum of society - Rustic
 273. One who gets pleasure in others' trouble or pain - Sadist
 274. A room where idols of God are kept - Sanctorum
 275. A very private room - Sanctum
 276. A study of animals - Zoology
 277. Words different in meaning but similar in sound - Homophones
 278. Serving without pay - Honorary
 279. One who is sympathetic to mankind - Humanitarian
 280. Payment for a specific work done- Remuneration
 281. One who pretends to be what he/she is not - Hypocrite
 282. A study of birds - Ornithology
 283. The study of mountains - Orology
 284. A place where orphans are housed - Orphanage
 285. One who looks at the bright side of things in life - Optimist
 286. A cure for all diseases - Panacea
 287. Belief of God in nature - Pantheism
 288. One that lives on others - Parasite

Phrasal Verbs (with examples)

1. Account for--To explain the reason for(Increased pollution may *account for* climate change)
2. Adhere to—Obey (You must *adhere to* the terms of the contract.)
3. Allude to--Mention in an indirect way (She kept *alluding to* our agreement, but she didn't want to reveal it.)
4. Bring on--To cause something bad to happen, especially illness
(His heart condition was *brought on* by his diet.)
5. Bring up-- To start discussing a subject
(She *brought* the matter *up* very late so they didn't have time to discuss it properly.)
6. Come about-- To happen, especially by chance
(Increased unemployment has *come about* through automated production.)
7. Cut back-- To reduce
(They are *cutting back* expenses.)
8. Do without-- To succeed in living or working without
(We can *do without* help from you.)
9. Embark on-- To start a new project or activity, usually one that will be difficult or take time (After graduating from university, she *embarked on* a career in banking.)
10. Follow through-- To continue doing something until it has been completed (You will need to *follow through* with some reading if you want to master the subject.)
11. Frown upon--To not approve of something (Failure to attend classes is *frowned upon*.)

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12. Get across-- To make people understand something
(The teacher managed to *get across* how important it was to attend lectures.)
13. Get around-- To be heard by a lot of people
(News of his promotion *got around* very fast.)
14. Get at-- To try to suggest something without saying it directly (What are you *getting at*? Was my presentation too long?)
15. Get back-- To start doing something again after not doing it for a period of time (Let's *get back* to discussing how this happened.)
16. Look forward to-- To feel happy about something that is going to happen (I'm *looking forward to* meeting you later.)
17. Look into-- To try to discover facts about something
(After several customers complained about late deliveries, they decided to *look into* the matter.)
18. Make of-- To understand someone or something in a certain way (What do you *make of* the teacher's decision to shorten this course?)
19. Map out-- To plan in detail how something will happen
(Her career was *mapped out* for her when she decided to take that job.)
20. Meet up-- To come together with someone
(Let's *meet up* and discuss how we are going to go about this project.)
21. Narrow down-- To reduce the number of possibilities
(The detectives *narrowed down* the list of suspects to just two.)
22. Put forward-- To suggest an idea, opinion so that it can be discussed
(The proposals were *put forward* last week, but the committee didn't have time to discuss them.)
23. Put off-- To delay doing something especially when you don't want to do it
(Are you *putting off* writing that essay because you can't concentrate right now?)
24. Resort to-- To do something unpleasant in order to solve a problem (We must resort to *legal action* if they don't offer compensation.)
25. Rule out-- To stop considering something as a possibility
(The CEO said that yearly bonuses can be *ruled out* in light of the financial crisis.)
26. Run by-- To tell someone your ideas so they can give you their opinion (I have a few ideas for tomorrow's meeting. Can I *run* them *by* you?)
27. Talk out of-- To persuade someone not to do something
(Her parents *talked her out of* living in a rented flat.)
28. Think over-- To consider a problem carefully
(You should *think* it *over* before handing in your resignation.)
29. Turn out-- To develop in a particular way
(The presentation *turned out* well, considering how little you prepared for it.)
30. Verge on-- To almost be in a particular state
(His speech was so good, it was *verging on* genius.)

Some More Phrasal Verbs (with meaning only)

1. Abide by- Respect or obey the law, a decision, a rule
2. Account for- Explain, give a reason
3. Add up- Make sense, seem reasonable
4. Agree with- Have the same opinion as somebody else.
5. Allow for- Take advantage of something (an opportunity)
6. Answer back- Reply rudely
7. Apply for- Make a formal request for something (job, permit, loan, etc.)
8. Avail (oneself) of- Take into consideration, include in a calculation
9. Back away- Move backwards, in fear or dislike
10. Back down-Withdraw, concede, defeat
11. Blow up-Explode; be destroyed by an explosion
12. Back up-Give support or encouragement; make a copy of (file, program, etc.)
13. Black out-Faint, lose consciousness
14. Block off-Separate using a barrier
15. Boil down to-Be summarized as
16. Break down- Go out of order, cease to function; lose control of one's emotions
17. Break out- Start suddenly
18. Break into- Enter by force
19. Bump into- Meet by accident or unexpectedly
20. Burn out- Stop (something) working; become exhausted from overworking
21. Butt in (on something)- Interrupt impolitely
22. Call back- Return a phone call
23. Call off- Cancel
24. Call on/upon something- Formally invite or request
25. Calm down- Become more relaxed, less angry or upset
26. Carry on- Continue
27. Carry out- Do something as specified (a plan, an order, a threat); perform or conduct(test, experiment)
38. Cut down on- Reduce in number or size
39. Cut out- Remove using scissors; stop doing something
40. Deal with- Handle, take care of (problem, situation)
41. Die down- Calm down, become less strong
42. Dress up- Wear elegant clothes; disguise oneself
43. Do without- Manage without
44. Drag on- Last longer than expected
45. Draw up- Write (contract, agreement, document)
46. Drop in- Visit, usually on the way somewhere
47. Drop out- Leave school without finishing
48. Drop off- Deliver someone or something; fall asleep
49. Ease off- Reduce, become less severe or slow down (pain, traffic, work)
50. Even out- Eliminate differences of opinion; become level or regular
51. Fall through- Fail; doesn't happen
52. Figure out- Understand, find the answer

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53. Fill out- Complete (a form/an application)
54. Find out- Discover or obtain information
55. Focus on- Understand; find a solution
56. Figure out- Concentrate on something
57. Get at- Imply
58. Check in- Register at a hotel or airport
29. Check out- Pay one's bill and leave (a hotel); investigate
30. Clam up- Refuse to speak
31. Close down- Stop operating (company, restaurant, cinema)
32. Come across- Find by chance; appear
33. Come forward- Present oneself
34. Conk out- Stop working; stop or fall asleep from exhaustion
35. Come up against- Be faced with or opposed by
36. Count on- rely or depend on (for help)
37. Cross out- Remove by drawing a line through
66. Get on (well) with (somebody)- Have a good relationship with
67. Get out of- Avoid doing something
68. Get over- Recover from (illness, disappointment)
69. Give up- Stop doing something
70. Get rid of- Eliminate
71. Get together- Meet each other
72. Get up- Rise, leave bed
73. Go through- Experience
74. Grow up- Spend one's childhood; develop; become an adult
75. Hand in- Distribute
76. Hand out- Submit (report, homework)
77. Hang out- Spend time in a particular place, or with a group of friends
78. Hang up- End a phone conversation
79. Hit at- Aim a blow at
80. Hit back- Retaliate; reply to an attack
81. Hit on/upon- Find unexpectedly or by inspiration
82. Hold on- Wait; grip tightly
83. Hurry up- Be quick, act speedily
84. Iron out- Resolve by discussion, eliminate differences
85. Join in- Participate
86. Get away- Escape
59. Get back at- To get revenge on somebody
60. Get in- Enter
61. Get into (+noun)- Manage to cope or to survive
62. Get off- Leave (bus, train, plane); remove
63. Get on- Board (bus, train, plane)
64. Get on with (something)- Continue to do; make progress
65. Get out- Leave
66. Join up- Engage in, become a member of, meet and unite with
87. Keep on- Continue doing something

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- 88. Keep up with- Stay at the same level as someone or something
- 89. Kick off- Begin, start
- 90. Leave out- Omit, not mention
- 91. Let down- Disappoint
- 93. Look after- Take care of
- 94. Look ahead- Think of the future
- 95. Look down on- Consider as inferior
- 96. Look on- Be a spectator at an event
- 97. Look for- Try to find something
- 98. Look forward to- Await or anticipate with pleasure
- 99. Look up to- Admire
- 100. Make fun of- Laugh at/ make jokes about
- 101. Make up- Invent (excuse, story)
- 102. Mix up- Mistake one thing or person for another
- 103. Move in- Arrive in a new home or office
- 104. Move out- Leave your home/office for another one.
- 105. Nod off- Fall asleep
- 106. Note down- Write something
- 107. Opt out- Leave a system or decide not to participate
- 108. Own up- Admit or confess something
- 109. Pass away- Die
- 119. Rule out- Eliminate
- 120. Run away- Escape from a place or suddenly leave
- 121. Run into- Meet by accident or unexpectedly (also- bump into)
- 122. Run out of- Have no more of something.
- 123. Set off- Start a journey
- 124. Set up- Start a business
- 125. Shop around- Compare prices
- 126. Show off- Brag or want to be admired
- 127. Show up- Appear/arrive
- 128. Stick up for- Defend
- 129. Take after- Resemble, in appearance or character
- 130. Take care of- Look after
- 131. Take off- Leave the ground
- 132. Take on- Hire or engage staff
- 133. Tell off- Reprimand/criticize severely
- 134. Think over- Consider.
- 135. Pass out- Faint
- 111. Pay back- Reimburse
- 112. Put off- Postpone, arrange at a later date
- 113. Put on- Turn on, switch on
- 114. Put out- Extinguish
- 115. Put up- Accommodate, give somebody a bed
- 116. Pick up- Collect somebody
- Point out- Indicate/direct attention to something

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- . Rely on- Count on, depend on, trust
- 135. Try on- Wear something to see if it suits or fits
- 136. Turn down- Refuse
- 137. Use up- Finish a product (so that there's none left)
- 138. Vouch for- Express confidence in, or guarantee something
- 139. Watch out- Be careful
- 140. Wear out- Become unusable, Become very tired
- 141. Work out-Do physical exercise, Find a solution or calculate something
- 142. Wipe off- Clean (board, table)

Commonly Used Idioms

1. As easy as pie - very easy (same as "a piece of cake")
2. Be sick and tired of -- to detest, to abhor (also "can't stand")
3. Bend over backwards-- try very hard (maybe too much!)
4. Bite off more than one can chew- "take responsibility for more than one can manage"
5. Broke- to have no money
6. A bed of roses- A comfortable position
7. A bed of thorns- An uncomfortable position.
8. A bird in the hand is worth two in the bush- Having something that is certain is much better than taking a risk for more.
9. A bird's eye view- A brief general view
10. A blessing in disguise- Something good that isn't recognized at first
11. A bolt from the blue- Any calamity that overtakes somebody suddenly.
12. A chicken-hearted fellow- A timid person.
13. 13. Achilles heel- A point of vulnerability
14. A red letter day- An important day
15. A slap on the wrist- A very mild punishment
16. A snake in grass- A deceitful person
17. A taste of your own medicine- When you are ill-treated the same way you ill-treat others.
18. At loggerheads- Engaged in a head-on dispute.
19. Actions speak louder than words- It's better to do something in reality than just talk about it.
20. Add fuel to the fire- To do something to make a bad situation even worse than it is.
21. Against the clock- To do something fast to finish it before a particular time.
22. All bark and no bite- Someone is threatening or aggressive but not willing to engage in a fight.
23. All Greek to me- Meaningless and incomprehensible like someone who cannot read, speak, or understand any of the Greek languages.
24. All in the same boat- When everyone is facing the same challenges.
25. An axe to grind- To have a dispute with someone.
26. An apple of someone's eye- Someone who is cherished above all others.
27. As high as a kite- Anything that is high up in the sky.
28. At the drop of a hat- Willing to do something immediately.
29. Back-seat driver- People who criticize from the sidelines, much like someone giving

- unwanted advice from the back seat of a vehicle to the driver.
30. Back to square one- Having to start all over again.
 31. Beat a dead horse- To force an issue that has already ended.
 32. Beating about the bush- Avoiding the main topic, not speaking directly about the issue.
 33. Between a rock and a hard place- Stuck between two very bad options.
 34. Burn the midnight oil- To stay awake late at night to work or to study.
 35. By hook or by crook- By whatever means possible, fair or unfair.
 36. A doubting Thomas- A skeptic who needs physical or personal evidence to believe something.
 37. A drop in the bucket- A very small part of something.
 38. A fair weather friend-One who betrays in difficulty
 39. A fish out of water- A person in uncomfortable surroundings.
 40. A fool and his money are easily parted- It is easy for a foolish person to lose his/her money.
 41. A hen-pecked husband- A person servile to his wife.
 42. A leopard can't change his spots- You cannot change what you are.
 43. A penny saved is a penny earned- Saving money little by little.
 44. A picture paints a thousand words- A visual presentation is far more descriptive than words.
 45. A piece of cake-A task that can be accomplished very easily.
 46. Chew someone out- To scold someone verbally.
 47. Cock and bull story- An unbelievable tale.
 48. Crocodile tears- Pretending to be sad, in an attempt to manipulate the situation.
 49. Cross your fingers- To hope that something happens the way you want it to.
 50. Cry over spilt milk- When you complain about a loss from the past.
 51. Cry wolf- Intentionally raise a false alarm.
 52. Curiosity killed the cat- Being inquisitive can lead you into a dangerous situation.
 53. Dark horse- One who was previously unknown and is now prominent.
 54. Devil's advocate- Someone who takes a position for the sake of argument without believing in that particular side of the argument.
 55. Don't count your chickens before they hatch- Don't rely on something until you are sure of it.
 56. Don't put all your eggs in one basket- Do not put all your resources in one possibility.
 57. Drastic times call for drastic measures- When you are extremely desperate you need to take extremely desperate actions.
 58. Draw the line- To set a limit, as of accepted behaviour.
 59. Drink like a fish- To drink very heavily.
 60. Bite off more than you can chew- To take on a task that is way to big.
 61. Bite your tongue- To avoid talking.
 62. Black sheep- A person who is considered a disgrace to a family.
 63. Blood is thicker than water- The family bond is closer than anything else.
 64. Blow one's own horn- To praise your own abilities and achievements.
 65. Blue moon- A rare event or occurrence.
 66. Break the ice- To remove the tension, hesitation at the first meeting or at the opening of a party, etc.
 67. Drive someone up the wall- To irritate and/or annoy very much.
 68. Dropping like flies- A large number of people either falling ill or dying.
 69. Every cloud has a silver lining- Be optimistic, even difficult times will lead to better days.

70. Everything but the kitchen sinks- Almost everything and anything has been included.
71. Eye for eye- Revenge.
72. Feather in one's hat- An accomplishment a person can be proud of.
73. Field day- An enjoyable day or circumstance.
74. Finding your feet- To become more comfortable in whatever you are doing.
75. Fixed in your ways- Not willing to change from your normal way of doing something.
76. Flash in the pan- Something that looks promising in the beginning but fails to deliver anything in the end.
77. Flesh and blood- Material of which people are made of, or it can refer to someone's family.
78. Fools' gold- A worthless rock that resembles real gold.
79. From pillar to post- From one place or thing to another.
80. From rags to riches- To go from being very poor to being very wealthy.
81. Fuddy-duddy- An old-fashioned and foolish type of person.
82. Chip on his shoulder- Angry today about something that occurred in the past.
83. Chip off the old block- People who closely resemble their parents in some way or the other.
84. Change one's mind - decide to do something different from what had been decided earlier
85. Cut it out! - stop doing something bad
86. Drop someone a line- send a letter or email to someone
87. Figure something out means- come to understand a problem
88. Fill in for someone-- do their work while they are away
89. Clean slate- To make a new start by clearing records
90. Get over it- To move beyond something that is bothering you
91. Get up on the wrong side of the bed- Someone who has a horrible day
92. Give him the slip- To get away from, to escape.
93. Go down like a lead balloon- To be received badly by an audience.
94. Go out on a limb- Put yourself in a tough position to support someone/something.
95. Go the extra mile- Making extra efforts for the task at hand.
96. Great minds think alike- Intelligent people think like each other.
97. Green room- The waiting room, especially for those who are about to go on stage, a TV or radio.
98. Gut feeling- A personal intuition that something may not be right.
99. Hit the books- To study, especially for a test or exam
100. Hit the nail on the head- Do something exactly right or say something exactly right
101. Hold your horses- Be patient
102. Icing on the cake- Something extra that is added to an already good situation
103. Idle hands are the devil's tools- You are more likely to get into trouble if you have nothing to do
104. Smell a rat- To detect someone in the group who is betraying others
105. Coming events cast their shadows before- Significant *events* are often preceded by signs that they are about to happen
106. Smell something fishy- Detecting something isn't right
107. Southpaw- Someone who is left handed
108. Spitting image- The exact likeness or kind
109. Start from scratch- To do it all over again from the beginning

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110. Strike while the iron is hot- Act quickly when the opportunity is still available
111. The ball is in your court- It is your decision this time
112. The best of both worlds- There are two choices and you have them both
113. The bigger they are the harder they fall- While the bigger and stronger opponent might be a lot more difficult to beat
114. If it's not one thing, it's another- When one thing goes wrong, then another, and another.
115. In the heat of the moment- Overwhelmed by what is happening in the moment.
116. Haste makes waste- Quickly doing things results in a poor ending
117. Hat trick- Three scores made continuously without break in a sport, such as three wickets in cricket or three soccer goals.
118. Have a finger in every pie- To be involved in a lot of different activities and have influence over them
119. He lost his head- Angry and overcome by emotions
120. Head over heels- Very excited and/or joyful, especially when in love
121. Hell in a hand basket- Deteriorating and headed for complete disaster
122. Hit below the belt- An unfair or cruel remark
123. It takes two to tango- A two-person conflict where both people are at fault.
124. It's a small world- You frequently see the same people in different places.
125. It's anyone's call- A competition where the outcome is difficult to judge or predict.
126. Jack of all trades master of none- Someone good at many things but excellent at nothing.
127. Keep an eye on somebody- You should watch a person carefully.
128. In ages - for a very long time
129. Give someone a hand - to help
130. Hit the hay - go to bed (also hit the sack)
131. In the black - the business is making money, it is profitable
132. In the red - the business is losing money, it is unprofitable
133. Keep body and soul together- To earn a sufficient amount of money to keep yourself alive.
134. Keep your chin up- To remain joyful in a tough situation
135. Kitty-corner- Diagonally across, sometimes called Catty-Corner as well
136. Knee jerk reaction- A quick and automatic response
137. Knock on wood- Knuckle tapping on wood to avoid some bad luck
138. Know the ropes- To understand the details
139. Last but not the least- An introduction phrase to let the audience know that the last person mentioned is no less important than those introduced before him/her.
140. Off the hook- No longer have to deal with a tough situation
141. Off the record- Something said in confidence that the one speaking doesn't want attributed to him/her
142. Practice makes perfect- By constantly practicing, you will become better.
143. Pull the plug- To stop something, to bring something to an end
144. Pulling your leg- Tricking someone as a joke
145. Put a sock in it- To tell noisy person or a group to be quiet
146. Queer the pitch- Destroy or ruin a plan
147. Raining cats and dogs- A very loud and noisy rain storm
148. Read between the lines- To pay attention to what is implied in writing or speech
149. Ring fencing- To protect a particular sum of money by putting restrictions on its use
150. Rise and shine- Time to get out of bed and get ready for work/school

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151. Rome was not built in one day- If you want something to be completed properly, then it is going to take time.
152. On pins and needles- Anxious or nervous, especially in anticipation of something
153. On the fence- Undecided
154. On the same page- When multiple people all agree on the same thing
155. Let the cat out of the bag- To share a secret that wasn't supposed to be shared
156. Level-playing field- A fair competition where no side has an advantage
157. Like a chicken with its head cut off- To act in a frenzied manner
158. Liquor someone up- To get someone drunk
159. Loose cannon- Someone who is unpredictable and can cause damage if not kept in check
160. Maiden speech- The first speech made by a person
161. Lend me your ear- To politely ask for someone's full attention
162. Let bygones be bygones- To forget about a disagreement or argument
- Let sleeping dogs lie- To avoid restarting a conflict

Nest egg- Savings set aside for future use

165. Never bite the hand that feeds you- Don't hurt anyone who helps you.
166. New kid on the block- Someone new to the group or area
167. No dice- Not to accept a proposition
168. No room to swing a cat- An unusually small or confined space
169. Not playing with a full deck- Someone who lacks intelligence
170. Off on the wrong foot- Getting a bad start on a relationship or task.
171. Make no bones about- To state a fact so there are no doubts or objections
172. Mumbo jumbo- Nonsense or meaningless speech
173. Out of the blue- Something that suddenly and unexpectedly occurs.
174. Out on a limb- When people put themselves in a risky situation.
175. Out on the town- To enjoy yourself by going out
176. Rule of thumb- A rough estimate
177. Run out of steam- To be completely out of energy
178. Saved by the bell- Saved at the last possible moment
179. Scapegoat- Someone else who takes the blame
180. Show your true colours- To reveal your true intentions, personality or behaviour
181. Sick as a dog- To be very sick (with the flu or a cold)
182. Sitting shotgun- Riding in the front passenger seat of a car
183. Sixth sense- Intuition; a special ability to know something without using any of the five senses
184. The last straw- When one small burden after another creates an unbearable situation, the last straw is the last small burden that one can take.
185. The whole nine yards- Everything
186. Third times a charm- After no success the first two times, the third try is a lucky one.
187. Tie the knot- To get married
188. Turn a blind eye- Refuse to acknowledge something you know is real or legitimate
189. Under the weather- Feeling ill or sick
190. Up a blind alley- Going down a course of action that leads to a bad outcome
191. Use your loaf- Use your head / Think smart
192. Over the top- Highly excessive

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193. Pass the buck- Avoid responsibility by giving it to someone else
194. Pedal to the metal- To go full speed, especially while driving a vehicle
195. Peeping Tom- Someone who observes people in the nude or sexually active people, mainly for his own gratification.
196. Pick up your ears- To listen very carefully
197. Pig out- To eat a lot and eat it quickly
198. Pipe down- To shut up or be quiet
199. Pour oil on troubled waters- To calm a disturbance
200. Variety is the spice of life- The more experiences you try the more exciting life can be
201. Wag the dog- A diversion away from something of greater importance
202. Water under the bridge-Anything from the past that isn't significant or important anymore
203. Wear your heart on your sleeve- To openly and freely express your emotions
204. When pigs fly- Something that will never ever happen
205. Wild and woolly- Uncultured and without laws
206. Wine and dine- When somebody is treated to an expensive meal
207. Without a doubt- For certain
208. X marks the spot- A phrase that is said when someone finds something he/she has been looking for
209. You are what you eat- To stay healthy you must eat healthy food
210. You can't judge a book by its cover- Decisions shouldn't be made primarily on appearance.
211. Your guess is as good as mine- I have no idea.
212. Young Turk- An insurgent person trying to take control of a situation
213. Zero tolerance- The policy of applying laws very strictly so that people are punished even for mild offences
214. To be in one's good books- To be favoured
215. To build castles in the air- Imaginary projects
216. To nip in the bud- To put a stop to a thing in the beginning
217. To call a spade a spade- To be plain and outspoken
218. To carry the day- To be victorious
219. To eat humble pie- To have to apologize
220. To pay lip service- To pretend to be faithful
221. To steal someone's thunder- To take the credit for something someone else did
222. To the backbone- Thoroughly
223. Tongue and cheek- Humour, not to be taken seriously

B.Tech. Semester-I (Computer Science & Engg.)**MATH 101C MATHEMATICS-I****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Course Objectives:

1. To give adequate exposure of basics of Engineering Mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies.
2. To familiarize the students with techniques in basic calculus and linear algebra.
3. To equip the students with standard concepts and tools at an intermediate to advanced level.
4. To know the advanced level of mathematics and applications that they would find useful in their disciplines.
5. Students will demonstrate the ability to apply the techniques of multivariable Calculus to problems in mathematics, the physical sciences, and engineering.

Unit-I (12 Lectures)

Matrices addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

Unit-II (12 Lectures)

Eigen values, Eigen vectors, Cayley Hamilton Theorem symmetric, skew-symmetric, and orthogonal Matrices, Eigen space. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Unit-III (12 Lectures)

Taylor's and Maclaurin theorems with remainders; Maxima and minima of function of single independent variable.

Curvature & Asymptotes (Cartesian and polar form), Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit-IV (12 Lectures)

Vector space, linear dependence and independence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank-nullity theorem, composition of linear Maps, Matrix associated with a linear map.

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Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson Education.
2. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
3. Veerarajan T., Engineering Mathematics for firstyear, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East-West press, Reprint 2005.

Course Outcomes:

1. The students will learn to apply differential and integral calculus to notions of curvature and to improper integrals.
2. They will have a basic understanding of Beta and Gamma functions.
3. They will understand essential tools of matrices and determinant to solve system of algebraic equation.
4. To know the basic concepts of linear algebra i.e., linear transformations, eigen values, diagonalization and orthogonalization to solve engineering problems.
5. Apply Taylor series to approximate functions and estimate the error of approximation

Note:

1. The paper setter will set two questions (with/without parts) from each units, & a ninth compulsory question comprising of 6 to 10 sub-parts, covering the entire syllabus. The examinee will attempt 5 questions in all, along with the compulsory question (with all its sub-parts), selecting one question from each unit.
2. The use of programmable devices such as programmable calculators, etc. is not allowed during the exam.

B.Tech. Semester-I (Bio-Technology)**MATH103C MATHEMATIC-I****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Course Objectives:

1. To give adequate exposure of basics of Engineering Mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies
2. To familiarize the students with basic concepts of Trigonometric Functions.
3. To know the complex numbers system with their property.
4. To equip Two & Three Dimensional Geometry.
5. To introduce to student rank of matrix, solution of simultaneous equations, Eigen values and Eigen vectors.

Unit-I (12 Lectures)

Review of trigonometric functions, sum and product formulae for trigonometric functions, Trigonometric Equations.

Unit-II (12 Lectures)

Complex Numbers and Quadratic Equations, Permutations and combinations, Binomial Theorem, sequences and series .

Unit-III (12 Lectures)

Matrices, Operations on Matrices, Determinants, singular and non-singular matrices, Adjoint and inverse of a matrix , Solution of system of linear equations using Cramer rule and Matrix inversion method.

Unit-IV (12 Lectures)

Co-ordinate Geometry: Rectangular Coordinate system, Straight lines, Circles and family of circles, Parabola, Ellipse and Hyperbola-their equations in standard form.

Text Books:

1. Mathematics, A Text book for Class XI, NCERT, New Delhi.
2. Mathematics, A Text book for Class XII, NCERT, New Delhi.

Reference Books:

1. Mathematics for class XI of Vol. I & II by R.D. Sharma., Dhanpat Rai Publication
2. Mathematics Text Book for class XI by R.S. Aggarwal, S Chand Publication
3. Comprehensive Mathematics for class XI volume I & II by Luxmi Publication

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4. Elements of Mathematics for class XI by M.L. Bhargava, Janardan Dinodia, Jeevansons Publication

Course outcomes:

1. The students will understand the basic concepts of trigonometric functions.
2. The students will be familiar with the concepts of Complex Numbers, Permutations and combinations, Binomial Theorem, sequences and series .
3. The students will learn the basic concepts and applications of matrices and linear Algebra.
4. The students will be aware of the concepts of Co-ordinate Geometry and apply it in various branches of engineering.

Note:

1. The paper setter will set two questions (with/without parts) from each units, & a ninth compulsory question comprising of 6 to 10 sub-parts, covering the entire syllabus. The examinee will attempt 5 questions in all, along with the compulsory question (with all it sub-parts), selecting one question from each unit.
2. The use of programmable devices such as programmable calculators, etc. is not allowed during the exam.

B.Tech. Semester-I (Common for all Branch except Bio-Tech. and CSE)**MATH105C MATHEMATICS-I****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Course objectives:

1. To familiarize the students with tools and Techniques in calculus and analysis.
2. To equip the students with standard concepts towards tackling various applications that are useful in several disciplines.
3. To understand liner algebra concepts and their application in different fields of engineering.
4. To have the idea of vector calculus and its applications
5. To give adequate exposure of basics of Engineering Mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies.
6. To introduce to students the concept of convergence of sequences and series.

Unit-I (12 Lectures)

Determinants; Inverse and rank of a matrix, System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigen vectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Matrix representation, Rank-nullity theorem of a Linear Transformation, Orthogonal transformation.

Unit –II (12 Lectures)

Convergence of sequence and series, tests for convergence of sequence and series ; Power series, Taylor's and Maclaurin series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-III (12 Lectures)

Taylor's and Maclaurin theorems with remainders; (one variable).Asymptotes, Curvature ,Evolutes and involutes, Curve Tracing; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit-IV (12 Lectures)

Function of several variables: Limit, continuity and partial derivatives, Total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers; Differentiation under Integral Sign., Vector Calculus: Gradient, Directional derivative, curl and divergence.

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson Education.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Course outcomes:

1. The students will understand the basic properties of Determinants and matrices & apply these concepts in solving linear simultaneous equations.
2. They will learn the basic concepts regarding convergence of series.
3. The students will learn concepts of vector calculus and apply it in most of the branches of engineering.
4. They will be able to solve Eigen value problems and apply Cayley-Hamilton theorem.

Note:

1. The paper setter will set two questions (with/without parts) from each unit, & a ninth compulsory question comprising of 6 to 10 sub-parts, covering the entire syllabus. The examinee will attempt 5 questions in all, along with the compulsory question (with all its sub-parts), selecting one question from each unit.
2. The use of programmable devices such as programmable calculators, etc. is not allowed during the exam.

B.Tech. Semester-I/II (Common for ECE, ME, AE and AERO)**PHY101C INTRODUCTION TO ELECTROMAGNETIC THEORY****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Course Objectives:

1. To Provides knowledge on Electromagnetism in different mediums
2. To develop and design various engineering applications involving Electromagnetic fields.
3. To provides good knowledge on magnetic materials.
4. To get aware the students with Maxwell's equations and their significance.
5. To study propagation of EM waves in different mediums.

Course Outcomes:

1. Success to analyze the different forms of Maxwell equations in different mediums
2. Students should be able to apply Maxwell equations as per their course or practical application requirements.
3. Can differentiate between the materials based on its magnetic properties.
4. Understood the basic difference between different mediums and how the medium can effect the electric and magnetic field.

Syllabus:**UNIT – I****Electrostatics in vacuum and linear dielectric medium**

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential Boundary conditions of electric field and electrostatic potential; energy of a charge distribution and its expression in terms of electric field.

Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement.

UNIT - II**Magnetostatics**

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

Magnetostatics in a linear magnetic medium: Magnetization and associated bound currents; auxiliary magnetic field; Boundary conditions on \mathbf{B} and \mathbf{H} . Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials.

UNIT - III

Faraday's law and Maxwell's equations

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Electromagnetic braking and its applications; Differential form of Faraday's law; energy stored in a magnetic field.

Continuity equation for current densities; Modified equation for the curl of magnetic field to satisfy continuity equation; displacement current and magnetic field arising from time-dependent electric field; Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector.

UNIT - IV

Electromagnetic waves and Transmission lines

The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure.

Introduction, Basic Principles of Transmission Lines, Equivalent Circuit Representation, General Transmission Line Equation, Wave Characteristics on Finite Transmission Lines, Transients on Transmission lines, Primary Constant.

Suggested Reference Books

1. David Griffiths, Introduction to Electrodynamics, Pearson Publisher
2. Resnick and Halliday, Physics, Wiley Publisher
3. W. Saslow, Electricity, magnetism and light, Elsevier Publisher

B.Tech. Semester-I/II (Civil Engineering)**PHY103C MECHANICS****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Pre-requisites: (i) High-school education

Course Objectives:

1. To have basic understanding vector mechanics,
2. To study various frame of references.
3. To get aware about Harmonic motion,
4. To gain knowledge on rigid body mechanics.
5. To study solid body motion and different frictional forces.

Course outcomes

Students will be familiar with

1. Newton's Law
2. Frame of references
3. Harmonic motion
4. Rigid body and its mechanics
5. solid body motion and different frictional forces

Syllabus:**UNIT I****Vector Mechanics of Particles**

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates.

UNIT II**Mechanics of Particles in Motion and Harmonic Motion**

Potential energy function; $F = - \text{Grad } V$, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite manoeuvres;

Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula. Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;

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Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.

UNIT III

Rigid Body Mechanics

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.

Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed — only need to show that this motion looks two-dimensional but is three-dimensional, and two dimensional formulation fails.

UNIT IV

Statics of Solids

Free body diagrams with examples on modelling of typical supports and joints; Condition for equilibrium in three- and two- dimensions; Friction: limiting and non-limiting cases; Force displacement relationship; Geometric compatibility for small deformations; Illustrations through simple problems on axially loaded members like trusses.

Suggested Reference Books

- (i) Engineering Mechanics, 2nd ed. — MK Harbola, Cengage Learning India publisher
- (ii) Introduction to Mechanics — MK Verma, CRC Press
- (iii) An Introduction to Mechanics — D Kleppner & R Kolenkow, University Printing House, Cambridge
- (iv) Principles of Mechanics — JL Synge & BA Griffiths, McGraw-Hill
- (v) Mechanics — JP Den Hartog, Dover Publication
- (vi) Engineering Mechanics - Dynamics, 7th ed. - JL Meriam, Wiley Publisher
- (vii) Mechanical Vibrations — JP Den Hartog, Dover Publication
- (viii) Theory of Vibrations with Applications — WT Thomson, Pearson Publisher

B.Tech. Semester-I/II (CHE, BT and BME)**PHY105C OPTICS, FIBRE OPTICS, MAGNETISM AND QUANTUM MECHANICS****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Course Objectives:

1. To have basic understanding of optics and its applications,
2. To study light propagation through optical fibres.
3. To get aware about different laws of electricity and magnetism,
4. To gain knowledge on magnetic materials.
5. To have basic knowledge about Quantum Mechanical phenomena's.

Course outcomes

Students will be familiar with

1. Bragg's Law
2. principles, types of lasers and applications of lasers
3. Various terms related to properties of materials viz. permeability, polarization, etc.
4. Some basic laws related to quantum mechanics
5. about magnetic and dielectric properties of materials
6. Simple quantum mechanics calculations

Syllabus:**UNIT – I****Optics**

Diffraction: Introduction to interference and example; concept of diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits; diffraction grating, characteristics of diffraction grating and its applications.

Polarisation: Introduction, polarisation by reflection, polarisation by double refraction, scattering of light, circular and elliptical polarisation, optical activity.

UNIT – II**Fibre Optics and Lasers**

Recommended by corresponding Board of Undergraduate studies and Faculty of Engineering and Technology

Approved in 13th meeting of The Academic Council held on 18th June 2018

Fibre Optics: Introduction, optical fibre as a dielectric wave guide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, application of optical fibres.

Lasers: Introduction to interaction of radiation with matter, principles and working of laser: population inversion, pumping, various modes, threshold population inversion, types of laser: solid state, semiconductor, gas; application of lasers.

UNIT – III

Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's Faraday's laws. Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, applications of dielectrics.

Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.

UNIT – IV

Quantum Mechanics

Introduction to quantum physics, black body radiation, explanation using the photon concept, photoelectric effect, Compton effect, de Broglie hypothesis, wave-particle duality, Born's interpretation of the wave function, verification of matter waves, uncertainty principle, Schrodinger wave equation, particle in box, quantum harmonic oscillator, hydrogen atom.

References:

1. I. G. Main, "Vibrations and waves in physics", Cambridge University Press, 1993.
2. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006.
3. E. Hecht, "Optics", Pearson Education, 2008.
4. A. Ghatak, "Optics", McGraw Hill Education, 2012.
5. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
6. D. J. Griffiths, "Quantum mechanics", Pearson Education, 2014.
7. R. Robinett, "Quantum Mechanics", OUP Oxford, 2006.
8. D. McQuarrie, "Quantum Chemistry", University Science Books, 2007.
9. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago, 1997.
10. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore, 1988.
11. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995..

B.Tech. Semester-I/II (For EE and EEE)**PHY107C WAVES OPTICS AND QUANTUM MECHANICS****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Course Objectives:

1. To have basic understanding of optics and its applications,
2. To study light propagation.
3. To get aware about wave optics and lasers,
4. To have basic knowledge about Quantum Mechanical phenomena's.
5. To gain knowledge on solids and semiconducting materials.

Course outcomes

Students will be familiar with

1. Wave motion
2. principles, types and applications of lasers
3. basic laws related to quantum mechanics
4. Simple quantum mechanics calculations
5. Various terms related to semiconducting properties of materials

Syllabus:**UNIT – I****Wave and Light Motion**

Waves: Mechanical and electrical simple harmonic oscillators, damped harmonic oscillator, forced mechanical and electrical oscillators, impedance, steady state motion of forced damped harmonic oscillator

Non-dispersive transverse and longitudinal waves: Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their Eigen frequencies, longitudinal waves and the wave equation for them, acoustics waves.

Light and Optics: Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evanescent wave.

UNIT – II**Wave Optics and Lasers**

Wave Optics: Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh

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criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

UNIT – III

Introduction to Quantum Mechanics

Wave nature of Particles, Time-dependent and time-independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

Solution of stationary-state Schrodinger equation for one dimensional problems—particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator. Scattering from a potential barrier and tunneling; related examples like alpha- decay, field-ionization and scanning tunneling microscope, tunneling in semiconductor structures.

UNIT – IV

Introduction to Solids and Semiconductors

Free electron theory of metals, Fermi level, density of states in 1, 2 and 3 dimensions, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands.

Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p -n junction.

References:

1. I. G. Main, "Vibrations and waves in physics", Cambridge University Press, 1993.
2. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006.
3. E. Hecht, "Optics", Pearson Education, 2008.
4. A. Ghatak, "Optics", McGraw Hill Education, 2012.
5. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
6. D. J. Griffiths, "Quantum mechanics", Pearson Education, 2014.
7. R. Robinett, "Quantum Mechanics", OUP Oxford, 2006.
8. D. McQuarrie, "Quantum Chemistry", University Science Books, 2007.
9. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago, 1997.
10. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore, 1988.
11. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.

B.Tech. Semester-I/II (Computer Science & Engineering)**PHY109C SEMI CONDUCTOR PHYSICS****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25
3	1	0	4	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

Pre-requisite: “Introduction to Quantum Mechanics” Desirable

Course Objectives:

1. To give the detailed idea how the electronic bands are formed
2. To characterize materials based on band gap.
3. To provide the sound knowledge on semiconductor physics
4. To study light semiconductor interactions.
5. To know how the band gap and defects concentration can be find out.

Course Outcomes:

1. Able to differentiate how the band originated
2. Successfully differentiate the materials types based on their band gap values and use this knowledge as per their requirements.
3. Know about how the junctions are formed in PN diode and its theory.
4. Students have the idea of solar cell and it's working with advantages.
5. Successfully find the band gap, reflection and transmission percentage of a grown film over substrate with contents of defects.

Syllabus**UNIT - I****Electronic Materials**

Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT - II**Semiconductors**

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

UNIT - III**Light-Semiconductor Interaction**

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Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

UNIT - IV

Measurements & Engineered Semiconductor Materials

Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.

Density of states in 2D, 1d and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band-diagrams

References:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

B. Tech. Semester – I/II (Common for all Branches)**CH101C CHEMISTRY****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
3	1	0	4	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To give students in-depth knowledge of Atomic and molecular structures.
2. To make students understand and analyse periodic properties and related concepts.
3. To give knowledge of Stereochemistry, Organic reactions and synthesis of a drug molecule.
4. To apprise students of Intermolecular forces and potential energy surfaces and use of free energy in chemical equilibria.

UNIT-I

Atomic and molecular structure: Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations(derivation excluded). Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Molecular orbital energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene . Crystal field theory and the energy level diagrams for transition metal ions . Band structure of solids and the role of doping on band structures.

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-II

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers Configurations, symmetry chirality, enantiomers, diastereomers. Optical activity, absolute configurations and conformational analysis.

Organic reactions and synthesis of a drug molecule: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule (Asprin/Paracetamol).

UNIT-III

Intermolecular forces and potential energy surfaces: Ionic, dipolar and van der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces (with example).

Use of free energy in chemical equilibria: Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base equilibria, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

UNIT-IV

Spectroscopic techniques and applications : Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules and its applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

Suggested Text Books:

- (i) University Chemistry by Bruce M. Mahan, 4th Edition, Pearson Education.
- (ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- (iii) Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- (iv) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
- (v) Physical Chemistry, by P. W. Atkins
- (vi) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.
- (vii) Organic chemistry, by R.T Morrison, R.N Boyd, 7th Edition, Pearson Education.

Course Outcomes

1. The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Students will be able to understand these concepts upto advanced level
2. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, students will be able to understand the description of all chemical processes at molecular levels.

3. The course will enable the student to: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. Rationalise bulk properties and processes using thermodynamic considerations.
4. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

Notes:

1. The paper setter will set two questions (with /without parts) from each of the four units, a ninth compulsory question comprising of 6 to 10 sub parts, covering the entire syllabus. The examinee will attempt 5 questions in all, along with the compulsory question (with all its subparts), selecting one question from each unit.
2. The use of programmable devices such as programmable calculators, etc is not allowed during the exam.
3. A specific note shall be inserted in relevant question paper where ever the use of graph papers, semi-log papers, steam tables, etc. shall be allowed during the examination.

B. Tech. Semester – I/II (Common for all Branches except Chemical Engineering)**EE101C BASIC ELECTRICAL ENGINEERING
CATEGORY : ENGINEERING SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
3	1	0	4	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To analyze dc and ac circuits.
- 2 To design and analyze RLC networks.
3. To appreciate basic knowledge of electric machines.
4. To assimilate elementary knowledge of electric installations.

UNIT-1

D.C. Circuits & Theorems: Basics of electric circuit elements, Kirchhoff's laws & its applications including those based on dependent sources, Nodal and Loop methods of Analysis, Star-Delta and delta-star transformations. Network Theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum Power transfer theorem. **(11 Hours)**

UNIT-2

Single A.C. Circuits: Sinusoidal signal, instantaneous & peak values, average and RMS values, form factor, peak factor. Concept of Phasors: Rectangular & Polar, Trigonometric & Exponential forms. Behaviour of R, L, C components in ac circuits. Time domain analysis of first-order RL and RC circuits. Series and parallel circuits: Active and reactive power, power factor, Resonance in series and parallel circuits. Q-factor, cut off frequencies and bandwidth. Three Phase Circuits: Phase and line voltages and currents, balanced star and delta circuits. **(11 Hours)**

UNIT-3

Electrical Machines: Construction, working principle, type, & equation of Single phase Transformer, Ideal Transformer, Phasor diagrams of Single-phase Transformer at no load and on load, Equivalent circuit, losses, efficiency. Three phase Transformer connections. single phase Autotransformer. Rotating Machines: Construction, operating principle of d.c. motors and its torque speed characteristics. Construction and working principle & type of single phase Induction motor & Three-phase Induction motor, concept of slip & torque-speed characteristics, construction and working of synchronous generators. **(11Hours)**

UNIT-4

Electrical and electronics components: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB(Miniature Circuit Breaker), ELCB(Earth Leakage Circuit Breaker), MCCB(Moulded Case Circuit Breaker), Types of Wires and Cables, Earthing. Types of Batteries,

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Important Characteristics of Batteries. Elementary calculations for energy consumption. Introduction to power factor improvement and battery backup. **(11 Hours)**

Course Outcomes:

1. Students will be able to analyze dc and ac circuits.
2. Students will be able to solve, design and synthesize electrical networks mathematically.
3. Obtain basic knowledge of electric installations.
4. Imbibe elementary knowledge of electric machines.

TEXT BOOKS:

1. Del Toro, "Principles of Electrical Engineering", 2nd Edition, Pearson Education.
2. D.P.Kothari & I. J. Nagarath, "Basic Electrical Engg", TMH, New Delhi, 3rd edition.
3. B.L. Theraja & A. K. Theraja, "Electrical Technology", (Vol-I, Vol-II), S.Chand.
4. Edward Hughes, "Electrical & Electronics Technology", 10th Edition, Pearson Education.

REFERENCE BOOKS:

1. T.K. Nagsarkar & M.S Sukhija, "Basic Electrical Engineering", OXFORD Uni. Press.2004.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press.
3. D.C. Kulshreshtha, "Basic Electrical Engineering", Mc Graw Hill.
4. Hayt & Kemmerly, "Engineering Circuit Analysis", Mc Graw Hill.
5. "Schaum's Outline of Electric Circuits", Mc Graw Hill.
6. A.K.Sawhney. A Course in Electronic Measurements and Instrumentation", Dhanpat Rai & Co.
7. S.K. Sahdev, "Basic Electrical Engineering" Pearson Education.

Note:

- 1. The paper setter will set two questions (with/without parts) from each unit, and a ninth compulsory question comprising of 6 to 10 sub parts (short questions), covering the entire syllabus. The examinee will attempt five questions in all, along with the compulsory question (with all its sub parts), selecting one question from each unit.**
- 2. The use of programmable devices such as programmable calculators etc. is not allowed during the exam. Sharing of materials will not be permitted during examination.**

B. Tech. Semester – I/II (For Chemical Engineering Only)**EE103C ELECTRICAL & ELECTRONICS ENGINEERING
CATEGORY : ENGINEERING SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
3	1	0	4	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 hrs

Course Objectives:

1. To understand and analyze electrical circuits.
- 2 To design and synthesise resonant circuits networks.
3. To appreciate basic knowledge of electric machines.
4. To understand basic insight into power supplies and basic electronics devices.

UNIT- 1

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and Voltage laws, Nodal and Loop methods of Analysis, Star-Delta and delta-star transformations. Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum Power transfer theorem, Reciprocity theorem, Millman's theorem, Introduction to digital circuits. **(11 Hours)**

UNIT- 2

Phasor representation of AC circuits, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance, to study step response in RL, RC, RLC circuits. Resonance in series and parallel circuits. Q-factor , cut off frequencies and bandwidth. Three Phase Circuits: Phase and line voltages and currents, balanced and unbalanced star and delta circuits, power equation, measurement of power and p. f. by two wattmeter method **(11 Hours)**

UNIT-3

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. Electromechanical energy conversion: principles and examples. Rotating Machines: Construction, operating principle of d.c. motors and its torque speed characteristics. Construction and working principle & type of single phase Induction motor & Three-phase Induction motor, concept of slip & torque-speed characteristics, construction and working of synchronous generators. **(11 Hours)**

UNIT- 4

Two port networks, study of diode, BJT, CE, and small signal model, operational amplifiers, model and applications. Introduction to Logic Gates, Basic principle, Construction, Theory & Applications of PMMC, moving iron, Electrodynamics type, voltmeters & ammeters, induction type wattmeter, energy meter, Elementary calculations for energy consumption, power factor

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improvement and battery backup. **(12 Hours)**

Suggested Text / Reference Books

- (1) E. Hughes, “Electrical and Electronics Technology”, 10th Edition, Pearson Education.
- (2) Del Toro, “Electrical Engineering Fundamentals”, 2nd Edition, Pearson Education.
- (3) D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill 2010.
- (4) D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
- (5) L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011
- (6) R.P.Jain “ Modern Digital Electronics”, McGraw Hill.
- (7) S.K. Sahdev, “Basic Electrical Engineering” Pearson Education.

Course Outcomes

1. Understand the basic concepts of D.C. circuits, single phase and three phase A.C. supply and circuits, and solve basic electrical circuit problems.
2. Understand the basic concepts of transformers and motors.
3. To understand the working of electronics devices.
4. Understand the concept of power factor improvement for industrial installations.

Note:

- 1. The paper setter will set two questions (with/without parts) from each unit, and a ninth compulsory question comprising of 6 to 10 sub parts, covering the entire syllabus. The examinee will attempt five questions in all, along with the compulsory question (with all its sub parts). Selecting one question from each unit.**
- 2. The use of programmable devices such as programmable calculators etc. is not allowed during the exam. Sharing of calculators will not be permitted during examination.**

B. Tech. Semester – I/II (Common to all Branches)**CSE101C PROGRAMMING FOR PROBLEM SOLVING****CATEGORY : ENGINEERING SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
3	0	0	3	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To make students understand basics of parts of computers and the programming.
2. To give knowledge of basic constructs of computer programming.
3. To make students understand Recursion.
4. To impart knowledge of Basic Algorithms.

Unit I (10 Lectures)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), Introduction to Programming ,Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. ,From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

Unit II (10 Lectures)

Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching ,Iteration and loops Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Unit III (10 Lectures)

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Structure: Defining structures and Array of Structures, Pointers :Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Unit IV (10 Lectures)

Basic Algorithms: Searching (Linear and binary search), Basic Sorting Algorithms (Bubble, Insertion, Quick sort), Finding roots of equations, notion of order of complexity through example

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programs (no formal definition required) File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books :

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition, Pearson Education.

Course Outcomes:

The student will learn

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

Note: The paper setter will set two questions (with or without parts) from each of four units , & a ninth compulsory question comprising of 5 to 10 sub-parts , covering the entire syllabus . The examinee will attempt 5 questions in all, alongwith the compulsory question (with all its sub-parts), selecting one question from each unit.

B. Tech. Semester – I/II (Common to all Branches)**ME101C ENGINEERING GRAPHICS AND DESIGN****CATEGORY : ENGINEERING SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
1	0	4	3	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Pre-requisites : Nil

Objectives All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a CAD laboratory using engineering software. This course is designed :

- To prepare the students to communicate effectively through Traditional Engineering Graphics and using Computer Graphics Software.
- To prepare the students to use the techniques, skills, and modern engineering graphics tools necessary for engineering practice.

Detailed Contents

S. No.	Contents (L-12/P-48)	Contact Hours
1	Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.	L-2 P-4
2	Orthographic Projections: Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes.	L-1 P-6
3	Projections of Regular Solids: those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.	L-1 P-6
4	Sections and Sectional Views of Right Angular Solids: Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only).	L-1 P-4
5	Isometric Projections covering: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa,	L-1 P-4

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- Conventions.
- 6 Overview of Computer Graphics:** L-2
P-4
Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects, Isometric Views of lines, Planes, Simple and compound Solids.
- 7 Customisation & CAD Drawing:** L-2
P-4
Consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.
- 8 Annotations, layering & other functions:** L-1
P-8
Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling.
- 9 Demonstration of a simple team design project** that illustrates L-1
P-8
Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Text Books

S. No.	Title	Author(s)	Publisher
1	Engineering Drawing	Bhatt N.D., Panchal V.M. & Ingle P.R.	Charotar Publishing House
2	Engineering Drawing and Computer Graphics	Shah, M.B. & Rana B.C.	Pearson Education

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Reference Books

S. No	Title	Author(s)	Publisher
1	Engineering Graphics	Agrawal B. & Agrawal C.M.	TMH Publication
2	CAD Software Theory and User Manuals		

Course Outcomes All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a computer designed CAD laboratory using engineering software.

This course is designed :

- to prepare the students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare the students to communicate effectively to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

The student will learn:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design and engineering graphics standards
3. Exposure to solid modelling and computer-aided geometric design
4. Exposure to creating working drawings
5. Exposure to engineering communication

B. Tech. Semester – I/II (Common to all Branches)**ME103C WORKSHOP/MANUFACTURING PRACTICES****CATEGORY : ENGINEERING SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
1	0	4	3	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Pre-requisites : Nil

Objectives This course is aimed to provide:

- Knowledge of different methods employed by manufacturing industries in the production/fabrication process and measurement of their quality parameters.
- Knowledge to decide about the appropriate methods and tool for manufacturing a given product/job.
- Training to fabricate components with their own hands safely while working with different machine tools and hand tools.
- Training to produce small devices through assembly of different components.

Detailed Contents (L-10/P-48)

S. No.	Contents	Contact Hours
1	Lectures & videos: (10 hours)	
i.	Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods	3
ii.	CNC machining, Additive manufacturing	2
iii.	Fitting operations & power tools	1
iv.	Carpentry	1
v.	Welding (arc welding & gas welding), brazing	1
vi.	Metal casting	1
vii.	Plastic moulding, glass cutting	1
2	Workshop Practice: (48 hours)	
i.	Machine shop	12
ii.	Fitting shop	6
iii.	Carpentry	6
iv.	Welding shop	6
v.	Casting	6
vi.	Smithy	6
vii.	Plastic moulding & Glass Cutting	6

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Text Books

S. No.	Title	Author(s)	Publisher
1	Elements of Workshop Technology, Vol. I and II	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K.	Media promoters and publishers (P) limited
2	Manufacturing Engineering and Technology	Kalpakjian S. And Steven S. Schmid	Pearson Education India

Reference Books

S. No.	Title	Author(s)	Publisher
1	Manufacturing Technology – I	Gowri P. Hariharan and A. Suresh Babu	Pearson Education, India
2	Processes and Materials of Manufacture	Roy A. Lindberg	Prentice Hall, India
3	Manufacturing Technology, Vol. I and II	Rao P.N.	Tata McGraw Hill

Course The content delivery through lectures will enable the student to learn:

- Outcomes**
- The knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.
- The laboratory practices will enable the student:
- To decide about the appropriate methods and tool for manufacturing a given product/job which gives the desired dimensional accuracies and dimensional tolerances.
 - Fabricate components with their own hands safely while working with different machine tools and hand tools.
 - By assembling different components, they will be able to produce small devices of their interest.

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

B.Tech. Semester I/II (Common for All Branches)**HUM103C ENGLISH LANGUAGE LAB****CATEGORY : HUMANITIES**

L	T	P	Credits	Class Work	:	25 Marks
0	0	2	1	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To develop English language skills especially speaking and listening of the students
2. To make the students excel in their professional lives through proficiency in communication
3. To enhance the students linguistic and communicative competence
4. To enable them to face the challenges of professional and social life

Course Outcomes:

The Students will be able to

1. Acquire basic proficiency in Spoken English
2. Enhance their listening skills with listening comprehension exercises
3. Polish their speaking skills in English both at social and professional platforms
4. Present themselves confidently and meaningfully in professional and social circles.

Course Contents:

- (i) Listening comprehension
- (ii) Recognition of phonemes in International Phonetic Alphabet
- (iii) Self introduction and introduction of another person
- (iv) Conversation and dialogues in common everyday situations
- (iv) Communication at work place (Standard phrases and sentences in various situations)
- (vi) Telephonic communication
- (vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation speeches and Farewell speeches)
- (viii) Tag Questions
- (ix) Formal Presentations on literary texts prescribed in theory paper

Note: Three hour time to each segment is recommended for instruction and practice.

Approved by Board of UG Studies, Department of Humanities on 19 March 2018

Scheme of End Semester Practical Exam:

Recommended by corresponding Board of Undergraduate studies and Faculty of Engineering and Technology
Approved in 13th meeting of The Academic Council held on 18th June 2018

1. A small passage may be read out to the examinees and they will have to write the answers to the questions asked at the end of the passage. Questions will be short answer type.
2. Examinees may be asked to identify the sounds of phonemes in given words.
3. Examinees may be asked to introduce themselves or others, participate in role play activities in mock situations, give short responses, engage in hypothetical telephonic conversation or supply the tag questions to statements etc.
4. Examinees may also be asked to deliver speeches on given situations or make presentation on the literary texts prescribed in Unit IV of theory paper.

Recommended Readings:

1. Bhatnagar, Nitin and Mamta Bhatnagar. *Communicative English for Engineers and Professionals*. Pearson Education, 2013.
2. Swan, Michael. *Practical English Usage*. OUP, 1995.
3. Gangal, J.K. *Practical Course in Spoken English*. New Delhi: PHI Learning, 2015.
4. Konar, Nira. *Communication Skills for Professionals*. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison. *Spoken English*. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. *Communication Skills for Engineers and Scientists*. Delhi: PHI Learning Pvt. Ltd., 2015.

Approved by Board of UG Studies, Department of Humanities on 19 March 201

B. Tech. Semester – I/ II (For ECE, ME, AE and AERO)**PHY111C INTRODUCTION TO ELECTROMAGNETIC THEORY LAB.****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
0	0	2	1	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To make aware the students about very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. To understand precision and error calculation in measurements.
3. To perform, take reading, do calculations and analyze the results obtained for the experiments related to electricity and magnetism.
4. To seek and co-relate the application of studied practical's in daily life.

Course Outcomes:

1. Students will be able to understand to take readings on very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. Students will be aware about precision and error in measurements.
3. Students can take reading, do calculations and analyze the results obtained for the experiments related to electricity and magnetism.
4. Students are expected to co-relate the results of performed practicals in daily life and can also seek new applications.

Syllabus:

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)

1. To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
2. Calculation of radius of curvature of a convex surface using spherometer.
3. Angel measurement using spectrometer.

List of Subject related Experiments:

1. To study Hall effect in semiconductors and measure the Hall coefficient.
2. To find frequency of AC mains using sonometer.

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3. To study the magnetic properties of materials using B-H curve.
4. To study the Curies temperature of materials using Dielectric set up.
5. To verify the inverse square law with the help of a photovoltaic cell.
6. To determine Planks constant using photocell.
7. To study the characteristics of Solar cell and find out the fill factor.
8. To design and study Active and Passive filters.
9. To find impedance and Q factor using LCR circuit.
10. To study resonance phenomena in LCR circuit.
11. To measure e/m of electron using helical method.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To study the forward and reverse characteristics of P-N junction diode.
14. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.

B. Tech. Semester – I/ II (For Civil Engineering)**PHY113C MECHANICS LAB.****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
0	0	2	1	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To make aware the students about very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. To understand precision and error calculation in measurements.
3. To perform, take reading, do calculations and analyze the results obtained for the experiments related to mechanics.
4. To seek and co-relate the application of studied practical's in daily life.

Course Outcomes:

1. Students will be able to understand to take readings on very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. Students will be aware about precision and error in measurements.
3. Students can take reading, do calculations and analyze the results obtained for the experiments related to mechanics.
4. Students are expected to co-relate the results of performed practical in daily life and can also seek new applications.

Syllabus:

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)

1. To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
2. Calculation of radius of curvature of a convex surface using spherometer.
3. Angel measurement using spectrometer.

List of Subject related Experiments:

1. To find the moment of inertia measurement of a fly wheel.

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2. To find acceleration due to gravity using bar pendulum.
3. To study resonance phenomena in mechanical oscillators.
4. To examine the behaviour of coupled pendulum.
5. To examine air track experiment and study Collisions between objects, governed by the laws of momentum and energy.
6. To find the modulus of rigidity of a wire using Maxwell's Needle.
7. To determine the moment of inertia of the given disc using Torsion pendulum.
8. To perform experiment on Rotation and Gyroscopic Precession.
9. To measure spring constant using Hook's Law.
10. To measure height of a distant object using sextant.

B. Tech. Semester – I/ II (For BME, BT and CHE)

**PHY115C OPTICS, FIBRE OPTICS, MAGNETISM AND QUANTUM
MECHANICS (OFMQ) LAB.**

CATEGORY : BASIC SCIENCE COURSE

L	T	P	Credits	Class Work	:	25 Marks
0	0	2	1	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To make aware the students about very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. To understand precision and error calculation in measurements.
3. To perform, take reading, do calculations and analyze the results obtained for the experiments related to optics, magnetism and quantum mechanics.
4. To seek and co-relate the application of studied practical's in daily life.

Course Outcomes:

1. Students will be able to understand to take readings on very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. Students will be aware about precision and error in measurements.
3. Students can take reading, do calculations and analyze the results obtained for the experiments related to optics, magnetism and quantum mechanics.
4. Students are expected to co-relate the results of performed practical in daily life and can also seek new applications.

Syllabus:

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)

1. To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
2. Calculation of radius of curvature of a convex surface using spherometer.
3. Angel measurement using spectrometer.

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List of Subject related Experiments:

1. To find out wavelength of monochromatic light using Newton's ring experiment.
2. To find out wavelength of monochromatic light using Diffraction grating.
3. To find out wavelength of monochromatic light using Fresnel's bi-prism
4. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.
5. To find specific rotation of sugar using Polarimeter
6. To study Hall effect in semiconductors and measure the Hall coefficient.
7. To study the magnetic properties of materials using B-H curve.
8. To determine Planks constant using photocell.
9. To verify the inverse square law with the help of a photovoltaic cell.
10. To measure e/m of electron using helical method.
11. To find temperature co-efficient of platinum using Callender Griffith bridge.
12. To study Zeeman splitting using EPS/ ESR.

B. Tech. Semester – I/ II (For EE and EEE)**PHY117C WAVES, OPTICS & QUANTUM MECHANICS LAB****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
0	0	2	1	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To make aware the students about very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. To understand precision and error calculation in measurements.
3. To perform, take reading, do calculations and analyze the results obtained for the experiments related to optics and quantum mechanics.
4. To seek and co-relate the application of studied practical's in daily life.

Course Outcomes:

1. Students will be able to understand to take readings on very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. Students will be aware about precision and error in measurements.
3. Students can take reading, do calculations and analyze the results obtained for the experiments related to optics and quantum mechanics.
4. Students are expected to co-relate the results of performed practical in daily life and can also seek new applications.

Syllabus:

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)

1. To make aware the students about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
2. Calculation of radius of curvature of a convex surface using spherometer.
3. Angel measurement using spectrometer.

List of Subject related Experiments:

4. To find out wavelength of monochromatic light using Newton's ring experiment.

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5. To find out wavelength of monochromatic light using Diffraction grating.
6. To find out wavelength of monochromatic light using Freshnel's bi-prism
7. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.
8. To find specific rotation of sugar using Polarimeter
9. To find thickness of hair using He-Ne laser.
10. To find Cauchy's constants of a prism by using spectrometer.
11. To find resolving power of a telescope
12. To determine Planks constant using photocell.
13. To study the characteristics of solar cell and find out the fill factor.
14. To verify the inverse square law with the help of a photovoltaic cell.
15. To study Zeeman splitting using EPS/ ESR.

B. Tech. Semester – I/ II (For Computer Science & Engineering)

PHY119C SEMI CONDUCTOR PHYSICS LAB.

CATEGORY : BASIC SCIENCE COURSE

L	T	P	Credits	Class Work	:	25 Marks
0	0	2	1	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To make aware the students about very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. To understand precision and error calculation in measurements.
3. To perform, take reading, do calculations and analyze the results obtained for the experiments related to semiconductor physics.
4. To seek and co-relate the application of studied practical's in daily life.

Course Outcomes:

1. Students will be able to understand to take readings on very basic apparatuses like vernier calipers, screw gauge, spherometer, spectrometer etc.
2. Students will be aware about precision and error in measurements.
3. Students can take reading, do calculations and analyze the results obtained for the experiments related to semiconductor physics.
4. Students are expected to co-relate the results of performed practical in daily life and can also seek new applications.

Syllabus:

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)

1. To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
2. Calculation of radius of curvature of a convex surface using spherometer.
3. Angel measurement using spectrometer.

List of Subject related Experiments:

1. To study the forward and reverse characteristics of P-N junction diode.
2. To study the characteristics of transistor in common base configuration.
3. To study the characteristics of transistor in common emitter configuration.
4. To study the characteristics of Junction field effect (JFET) transistor.
5. To study the characteristics of Metal oxide semiconductor field effect (MOSFET) transistor.
6. To study the characteristics of Solar cell and find out the fill factor.
7. To design and study Active and Passive filters.
8. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.
9. To determine Planks constant using photocell.
10. To measure e/m of electron using helical method.
11. To find capacitance of condenser using fleshing and quenching experiment.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To find out low resistance by Carry Foster bridge.
14. To find resistance of galvanometer by post office box.
15. To compare the capacitance of two capacitors using De'Sauty Bridge.

B. Tech. Semester – I/II CHEMISTRY LAB (COMMON FOR ALL BRANCHES)**CHE103C CHEMISTRY LAB
CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25 Marks
0	0	2	1	Examination	: 75 Marks
				Total	: 100 Marks
				Duration of Exam.	: 3 Hrs.

LIST OF EXPERIMENTS:

1. Determination of surface tension of given solvent by stalgmometer.
2. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
3. Calculate the R_f value of given sample using thin layer chromatography.
4. Calculate the strength of strong acid by titrating it with strong base using conductometer.
5. Calculate the emf value of given cell.
6. Prepare the sample of urea formaldehyde and phenol formaldehyde.
7. Determination of chloride content in given water sample.
8. To study the kinetics of ethyl acetate with NaOH.
9. Preparation of aspirin.
10. Calculate the saponification value of given oil sample.
11. Chemical analysis of two anions and two cations in given sample of salt.
12. Determination of the partition coefficient of a substance between two immiscible Liquids.
13. Determine the alkalinity of given water sample.
14. Study the adsorption phenomena using acetic acid and charcoal.
15. Lattice structures and packing of spheres.
16. Determine the viscosity of given liquid using Ostwald viscometer.

Course Outcomes:

1. The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.
2. The students will learn to: Estimate rate constants of reactions from concentration of reactants/products as a function of time.
3. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.

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4. Synthesize a small drug molecule and analyse a salt sample

Note: At least 10-12 experiments are to be performed by the students.

1. Each laboratory class/section shall not be more than about 20 students.

2. To allow fair opportunity of practical hands on experience to each student, each experiment may either be done by each student individually or in groups of not more than 3-4 students. Larger groups are strictly discouraged/disallowed.

3. Pre-experimental & post-experimental quiz/questions may be offered for each lab experiment to reinforce & aid comprehension of the experiment.

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.Virman, A.K. Narula (New Age).

B. Tech. Semester – I/II (Common for all Branches except Chemical Engg.)**EE105C BASIC ELECTRICAL ENGINEERING LAB.****CATEGORY : ENGINEERING SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25 Marks
0	0	2	1	Examination	: 75 Marks
				Total	: 100 Marks
				Duration of Exams.	: 3 Hrs.

LIST OF EXPERIMENTS

1. To study frequency response of a series R-L-C circuit and determine resonant frequency & Q-factors for various Values of R, L, C.
2. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q-Factors for various values of R, L, C.
3. To perform Open circuit & Short circuit Tests on single phase Transformer.
4. To plot torque- speed characteristic of separately excited DC motor.
5. Demonstration of a DC-DC convertor and DC to AC Convertor and also draw PWM waveform.
6. Speed control of induction motor using DC-AC convertor.
7. Demonstration of Components of LT switch gear like MCB, MCCB, SFU, ELCB and earthing.
8. To obtain torque-slip characteristics of three phase induction motor.
9. To perform voltage control of synchronous generator through field excitation.
10. To study transient and steady state time response of RLC series circuits.

Laboratory Outcomes

1. Get an exposure to common electrical components and their ratings.
2. Understand the usage of common electrical measuring instruments.
3. Student will be able to understand and design resonant circuits.
4. Understand the basic characteristics of transformers and electrical machines.

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.**

B. Tech. Semester – I/II (Chemical Engg.)**EE107C ELECTRICAL & ELECTRONICS ENGINEERING LAB.****CATEGORY : ENGINEERING SCIENCE COURSE**

L	T	P	Credits	Class Work	: 25 Marks
0	0	2	1	Examination	: 75 Marks
				Total	: 100 Marks
				Duration of Exams.	: 3 Hrs.

List of experiments/demonstrations:

1. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope; resistors, capacitors and inductors.
2. To Study and verify truth table of gates –AND, OR, NOT, NAND, NOR, EX-OR, EX NOR.
3. To design and verify operation of
(a) Half wave rectifier. (b) Full wave central tap rectifier. (c) Bridge rectifier.
4. To verify KCL, KVL.
5. To verify Thevenin's & Norton's Theorems.
6. To verify maximum power transfer theorem in DC circuits
7. To verify Reciprocity & Superposition theorems.
8. To study frequency response of a series R-L-C circuit and determine resonant frequency & Q-factors for various values of R, L, C.
9. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q-Factors for various values of R, L, C.
10. To perform Open circuit & Short circuit tests on single phase Transformer.
11. Three phase power and power factor measurement by two wattmeter method.
12. To measure energy with the help of Electronic Energy Meter.

Course Outcomes:

1. Get an exposure to common electrical components and their ratings.
2. Understand the usage of common electrical measuring instruments.
3. Understand the basic characteristics of transformers.
4. Get an exposure to the working of power electronic devices.

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.**

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

CSE103C PROGRAMMING FOR PROBLEM SOLVING LAB.

CATEGORY : ENGINEERING SCIENCE COURSE

L	T	P	Credits	Class Work	: 25 Marks
0	0	2	1	Examination	: 75 Marks
				Total	: 100 Marks
				Duration of Exams.	: 3 Hrs.

The laboratory should be preceded or followed by one hour of tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers:

Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:

Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:

Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:

Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings

Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:

Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):

Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls

Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation

Lab 11: Pointers and structures

Tutorial 12: File handling:

Lab 12: File operations

Course Outcomes:

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program To be able to correct syntax errors as reported by the compilers
3. To be able to identify and correct logical errors encountered at run time
4. To be able to write iterative as well as recursive programs
5. To be able to represent data in arrays, strings and structures and manipulate them through a program
6. To be able to declare pointers of different types and use them in defining self-referential structures.
7. To be able to create, read and write to and from simple text files.

B. Tech. Semester – II (Computer Science & Engineering)**MATH102C MATHEMATICS-II****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
3	1	0	4	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To give adequate exposure of basics of Engineering Mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies
2. To familiarize with the uses of measure of dispersion and central tendency.
3. To equip with various types of Probability distributions.
4. To familiarize the analysis of statistical data using various distributions.
5. To form a specific relation for the given data using Principle of least square method.

UNIT-I (12 Lectures)

Measures of Central tendency: Moments, skewness and Kurtosis- Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameter for these three distributions, Correlation and regression — Rank correlation.

UNIT-II (12 Lectures)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

UNIT-III (12 Lectures)

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

UNIT-IV (12 Lectures)

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Reference Books:

1. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
2. S. Ross, A First Course in Probability, 9th Ed., Pearson Education.
3. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
4. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

Course Outcomes:

1. The students will be able to apply the concepts of Central tendency in practical work.
2. The students will learn the concept of probability, probability distribution.
3. The students will understand and apply the concept of curve fitting
4. They will be to understand the concept related to , hypothesis tests and bivariate distributions techniques in engineering problems.

Note:

1. The paper setter will set two questions (with/without parts) from each units, and a ninth compulsory question comprising of 6 to 10 sub-parts, covering the entire syllabus. The examinee will attempt 5 questions in all, along with the compulsory question (with all it sub-parts), selecting one question from each unit.
2. The use of programmable devices such as programmable calculators, etc. is not allowed during the exam.

B. Tech. Semester – II (For Bio-Technology)**MATH104C MATHEMATICS-II****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
3	1	0	4	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To familiarize the students with basic concepts of functions, limits, continuity.
2. To equip with differential and integral calculus .
3. To know how to use differential and integral calculus in engineering problems.
4. To familiarize with the application of differential equation.
5. To give adequate exposure of basics of Engineering Mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies

Unit-I (12 Lectures)

Continuity and Differentiability: Introduction, Limits, Continuity, Differentiability, Exponential and Logarithmic Differentiation, Derivative of a functions, Indeterminate forms, Second order derivative.

Unit-II (12 Lectures)

Application of derivative: Increasing and decreasing functions, Maxima and Minima, Rolle's Theorem (without proof). Mean Value Theorem, Taylor and Maclaurin series (without proofs).

Unit-III (12 Lectures)

Integral Calculus: Integral as antiderivative. Integration: method of substitution, use of partial fractions and by parts. Definite integral and its properties, Integral as a limit of sum, Fundamental theorem of integral calculus.

Unit-IV (12 Lectures)

Differential Equations: Introduction & Basic concepts of differential equations, Formation of differential equation, General and particular solutions of a differential Equation.. Methods of solving First order and First degree Differential equations.

Text Books:

1. Mathematics, A Text book for Class XI, NCERT, New Delhi.
2. Mathematics, A Text book for Class XII, NCERT, New Delhi.

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Reference Books:

1. Calculus by Thomas & Finney, 9th Edition, Pearson Education.
2. Mathematics for class XII volume I & II by R.D. Sharma, Dhanpat Rai Publication
3. Comprehensive Mathematics for class XII volume I & II by Luxmi Publication
4. Elements of Mathematics for class XII by M.L. Bhargava, Janardan Dinodia, Jeevansons Publication

Course Outcomes:

1. The students will understand the basic concepts of Continuity, Differentiability and apply these concepts in engineering.
2. The students will learn the basic concepts of Integral Calculus and differential equations and apply to various problems.
3. The students will be able to solve various problems related to problems application of derivatives.
4. They will be able to know physical and geometrical interpretation of mean value theorems.

Note:

1. The paper setter will set two questions (with/without parts) from each units, & a ninth compulsory question comprising of 6 to 10 sub-parts, covering the entire syllabus. The examinee will attempt 5 questions in all, along with the compulsory question (with all it sub-parts), selecting one question from each unit.
2. The use of programmable devices such as programmable calculators, etc. is Not allowed during the exam.

B. Tech. Semester – II (Common for all Branches except Bio-Tech. & CSE)**MAT`H106C MATHEMATICS-II****CATEGORY : BASIC SCIENCE COURSE**

L	T	P	Credits	Class Work	:	25 Marks
3	1	0	4	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course objectives:

1. To familiarize the students with techniques in multivariate integration, ordinary and partial differential equations and complex variables.
2. To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Unit-I (12 Lectures)

Multiple Integration: Double integrals, change of order of integration, Triple integral and application, Change of variables, Applications to areas and volumes, Centre of mass and Gravity (constant and variable densities) of solids of revolution, orthogonal curvilinear coordinates, vector line integrals, surface integrals, Volume integral Theorems of Green, Gauss and Stokes.

Unit II (12 Lectures)

Ordinary differential Equations of first order and first degree: Exact, linear and Bernoulli's equations, Equations of first order but not of first degree, equation solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Unit III (12 Lectures)

Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Unit IV (12 Lectures)

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, Laurent's series; zeros of analytic functions, singularities, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Course outcomes:

1. The students will learn evaluating multiple integrals and apply it in calculating area and volumes.
- 2 They will solve first and second order differentiation equations.
- 3 They are familiar with analytical functions and their applications.
4. The students will know the concepts of singularity and residue and apply these concepts in evaluating definite integrals

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson Education.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed. Mc-Graw Hill, 2004.

Note:

1. The paper setter will set two questions (with/without parts) from each units, & a ninth compulsory question comprising of 6 to 10 sub-parts, covering the entire syllabus. The examinee will attempt 5 questions in all, along with the compulsory question (with all it sub-parts), selecting one question from each unit.
2. The use of programmable devices such as programmable calculators, etc. is not allowed during the exam.

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