M.D.UNIVERSITY, ROHTAK
SCHEME OF STUDIES & EXAMINATION
B.Tech. IN BIOMEDICAL ENGINEERING
SEMESTER III
'F' Scheme effective from 2010-11

Course No	Subject	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam (in Hrs)
		L	T	P	Total		Theory	Practical		
HUM-201-F OR MATH-201-F	ENGG. ECONOMICS OR MATHEMATICS - III	3 3	1 2	- -	4 5	50	100	-	150	3
HUM-203-F	FUNDAMENTALS OF MANAGEMENT (COMMON FOR ALL BRANCHES)	3	1	-	4	50	100	-	150	3
BME 205 F	Introduction to Biomedical Engineering	3	1	-	4	50	100	-	150	3
BME 215 F	Human Anatomy & Physiology	3	1	-	4	50	100	-	150	3
EE-253-F	Electronics-I	3	1	-	4	50	100	-	150	3
BME-251- F	Biochemistry	3	1	-	4	50	100	-	150	3
BME 203 F	Biochemistry Lab	-	-	2	2	25	-	25	50	3
BME 207 F	Biomedical Engineering Lab	-	-	2	2	50	-	50	100	3
BME 213 F	Human Anatomy & Physiology Lab	-	-	2	2	50	-	50	100	3
	Total	**18**	**7**	**6**	**30 or 31**	**425**	**600**	**125**	**1150**	

Note:

1. **Students are allowed to use single memory, non-programmable scientific calculator during exam and sharing of calculators and other materials is not allowed.**

HUM-201-F   <u>**ENGINEERING ECONOMICS**</u>

L T P   Class Work marks   : 50
3 1 0   Theory marks   : 100
                                 Total marks   : 150
                                 Duration of Exam   : 3 hr

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

Section-A

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

Section-B

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Section-C

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.
Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Section-D

Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand and supply on prices.

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

TEXT BOOKS :
1.   Principles of Economics : P.N. Chopra (Kalyani Publishers).
2.   Modern Economic Theory – K.K. Dewett (S.Chand)

REFERENCE BOOKS :

1.   A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2.   Micro Economic Theory – M.L. Jhingan (S.Chand)
3.   Micro Economic Theory - H.L. Ahuja (S.Chand)
4.   Modern Micro Economics : S.K. Mishra (Pragati Publications)
5.   Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6.   Indian Economy : Rudar Dutt & K.P.M. Sundhram

MATH-201-F   **MATHEMATICS-III**
(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)

L T P   Class Work marks   : 50
3 1 0   Theory marks   : 100
                                                          Total marks   : 150
                                                          Duration of Exam   : 3 hr

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

Section-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.
Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Section-B

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity.
Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and fourmula.

Section-C

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).
Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Section-D

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.
Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

TEXT BOOKS :
1. Engg Mathematics By Babu Ram, Pearson India
2. Advanced Engg. Mathematics : F Kreyszig.
3. Higher Engg. Mathematics : B.S. Grewal.

REFERENCE BOOKS :
1. Advance Engg. Mathematics : R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics : Michael D. Greenberg.
3. Operation Research : H.A. Taha.
4. Probability and statistics for Engineers : Johnson. PHI.

HUM-203-F   <u>**FUNDAMENTALS OF   MANAGEMENT**</u>

L T P	Class Work marks : 50
3 1 0	Theory marks : 100
	Total marks : 150
	Duration of Exam : 3 hr

NOTE: For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Meaning of management, Definitions of Management, Characteristics of management, Management Vs. Administration. Management-Art, Science and   Profession.   Importance of Management. Development of Management thoughts.
Principles of Management. The Management Functions, Inter-relationship of Managerial functions.
Nature and Significance of staffing, Personnel management, Functions   of personnel management, Manpower   planning, Process   of manpower planning, Recruitment,   Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

Section-B

Production Management : Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods**.**

Section-C

Marketing   Management - Definition of marketing, Marketing concept, objectives & Functions of marketing.
Marketing Research - Meaning;   Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

Section-D

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

BOOKS RECOMMENDED :
TEXT BOOKS :

1.   Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla.
         (Kalyani Publishers)
2.   Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

REFERENCE BOOKS :

1.   Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2.   Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3.   Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).
4.   Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5.   Management - James A.F. Stoner & R.Edward Freeman, PHI.

BME – 205-F   **INTRODUCTION TO BIOMEDICAL ENGINEERING**

L T P   Class Work marks   : 50
3 1 0   Theory marks   : 100
                                                    Total marks   : 150
                                                    Duration of Exam   : 3 hr

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

SECTION A
Generalized Instrumentation Systems: Medical instrumentation system, General properties of input transducers, Static and dynamic characteristics: First and second order characteristics, time delay, error free Instrument, Transfer functions, design criteria, generalized instrument specifications.

SECTION B

Displacement and Pressure Measurement: Wheatstone bridge, Resistive-potentiometers, strain gauges, LVDT, capacitive type, force type transducer, piezoelectric transducers, types of diaphragms, bellows, and bourdon tubes etc.
Temperature Measurement: Thermistor and its characteristics, linearization of thermistor, thermocouple and its properties, radiation thermometry, fiber optic sensor, Optical measurement.

SECTION C

Bipotential Electrodes: Properties of Electrodes and transducers used in biomedical measurement, Electrode-electrolyte interface, half cell potential polarization, polarizable and non-polarizable electrodes, calomel electrode, electrode circuit model, electrode skin interface and motion artifact, body surface electrodes, Internal electrodes: needle and wire electrodes, Micro electrodes, electrodes used for measurement of ECG, EEG, EMG.

SECTION D

Unit-4. Electrical properties of nerves: Generation of Action potential in a cell, Electrical properties of nerves, Introduction to EEG and EMG measurements with general block diagram studies.
ECG : Basic principles of ECG, ECG leads, Augmented Leads, ECG block diagram,
Imaging Modalities: Basic overview of the following imaging modalities: X-rays, CT, MRI, and PET.

TEXT
1. Intermediate Physics for Medicine and Biology By Hobbie RK**,** 2nd Edition Chichester Wiley
2. Clinical Chemistry : Interpretation and techniques By- A.Kaplan, S.Laverne and K.E. Opheim, Lean and Febige, Philadelphia.
3. Transducers in BME: Richard S. Cobbold
4. Medical Instrumentation.. applications and design byt John G. Webster. (Marcel Dekkar Pub)

References:
1.   Biomedical sensors-Fundamentals and applications by Harry N. Nortan (Plennum Press)
2.   Biomedical Instrumentation and measurements-by Leslie Cromwell, Fred J. Weibell

BME – 215-F   <u>**HUMAN ANATOMY AND PHYSIOLOGY**</u>

L T P	Class Work marks	: 50
3 1 0	Theory marks	: 100
	Total marks	: 150
	Duration of Exam	: 3 hr

NOTE: For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION A

Human Anatomy: Study of Cell structure and different types of tissues in human body with their functions.

SECTION B

Structure and Physiology I: Digestive System- different organs, digestion & absorption of food, Excretory System: Structure and function, Formation and composition of Urine, Reproductive System: Male and Female, human embryonic membranes and collection of stem cells, Sensory Organs - Ear, Eye and skin. Physiological aspects of skin resistance.

SECTION C

Structure and Physiology II: Cardiovascular system: Heart, Cardiac Cycle, Heart Valves, Systemic and Pulmonary Circulation, Blood Pressure Studies, Nervous System: Different parts and their function, reflex action, reflex arc, function of sympathetic and para-sympathetic nervous system, nervous conduction and action potential.

SECTION D

Structure and Physiology III: Endocrine System – all glands, their secretion. Control of secretions. Blood- composition and function. Respiratory System: Respiration, Exchange of gases in alveoli, Muscular System and physiology.

TEXT
1.   Anatomy and physiology in health and illness by : Ross and Wilson (ELBS pub)
2.   Human Phiosology by A. Vander, J. Sherman and D. Luciante.
3.   Basic Human theory By Charles E Tobin Mc Graw Hill
4.   Human Phiosology by A. Vander, J. Sherman and D. Luciano Mc Graw Hill
5   Basic Human Theory by Charles E Tobin Mc Graw Hill

REFERENCES

1.   Charles E Tobin , "Manual of Human Dissection", Mc Graw Hill, Edition 4, 1961
2.   J Gibson, " Modern Physiology and Anatomy of Nurses", Black Well, 1981.
3.   Physiology of Human Body: Guyton. (Prism books)
4.   Principles of Anatomy and Physiology: Tortora and Grabowski. (haper collin pub.)

EE-253-F   <u>**ELECTRONICS-I**</u>

L T P
3 1 0

Class Work marks	: 50
Theory marks	: 100
Total marks	: 150
Duration of Exam	: 3 hr

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

SECTION A

SEMICONDUCTOR MATERIALS & DIODES
Review of semiconductor materials & properties. The PN Junction, introduction to semiconductor diode theory. Diode circuits: DC Analysis & Models, AC Equivalent circuits, other diode types-solar cell, photodiode, light – emitting diode, Schottky Barrier diode, Zener diode, temperature effects, understanding Manufacturer's specifications.
DIODE CIRCUITS
Design of rectifier circuits' half wave Rectification, full wave rectification, filter, ripple voltage & diode current voltage Doubler circuit, Zener Diode circuits, clipper & clamper circuits, Multiple – diode circuits, photodiode & LED circuits.

SECTION B
THE BIPOLAR JUCTION TRANSISTOR
Basic bipolar junction transistor, Transistor Structures, NPN Transistor: forward active Mode Operation, PNP Transistor: Forward – active mode operation, circuit sytmbols & conventions, current-voltage characteristics, Non ideal Transistor leakage currents & Breakdowns, DC Analysis of Transistor circuits, common-Emitter circuits, Load Line & Models of Operation, common Bipolar circuits: DC analysis, Basic Transistor Applications-Switch, Amplifier, Bipolar Transistor Biasing-single Base Resistor Biasing, voltage Divider Biasing 7 bias stability, integrated circuit Biasing, Multistage circuits.

SECTION C
BASIC BJT AMPLIFFILERS
Analog Signals & Linear Amplifiers, The Bipolar Linear Amplifier, Graphical Analysis & AC Equivalent circuit, small signal Hybrid – a Equivalent Circuit of the Bipolar Transistor, Hybrid – a Equivalent Circuit Including the early Effect, Expanded Hybrid – a Equivalent Circuit, Other Small – Signal Parameters and Equivalent Circuits, Basic Transistor Amplifier Configurations, Common Emitter Amplifiers, AC Load Line Analysis, Common collector Emitter Follower Amplifier, Common base Amplifier, The three Basic Amplifier configurations, Summary comparison, Multistage Amplifiers, Power Considerations, Envoi mental Thermal considerations in Transistor Amplifiers, Manufacturer's Specifications.

SECTION D
THE FIELD EFFECT TRANSISTOR
Junction Field Effect Transistor, MOS Field Effect Transistor, MOSFET DC current Analysis, Basic MOSFET Applications: Switch Digital Logic Gate and Amplifier, Temperature Effects in MOSFETs, Input Protection in MOSFET, The Power FET (VMOS).
BASIC FET AMPLIFIERS
The MOSFET Amplifier, Basic Transistor Amplifier Configurations, The common source Amplifier, The Source Follower Amplifier, The common Gate configuration, The three Basic Amplifier configuration, Summary and Configuration, Single-stage Integrated Circuit MOSFET Amplifiers, Multistage Amplifiers, Basic JFET Amplifiers.

TEXT BOOKS:

1. Donald A. Neamen, Electronic Circuit Analysis and Design, Second Edition, McGraw Hill Internation edition 2001.

2. Martin Roden, Hordon Carpenter, William Wieserman, Electronic Design, Fourth edition, Shroff publisher, 2002,

REFERENCES:

1. Donald Schilling & Charles Belove, Electronics Circuits Discrete and Integrated, Their edition, McGraw Hill International edition, 1989.

2. Milliman Halkins

BME – 201 F **BIOCHEMISTRY**

L	T	P			
3	1	0	Class Work	:	50 Marks
			Theory	:	100 Marks
			Total	:	150
			Duration of Exam	:	3 Hrs

NOTE: For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION A

Unit-1. Introduction to Biochemistry: Cell, eukaryotic cell structure, functional role of each organelle, sub cellular fractionation: Differential centrifugation, transport of substances across biological membrane functions.

SECTION B

Unit-2. Enzymes (Proteins): Chemical nature of enzymes (Proteins), general properties of enzymes, diagnostic enzymes, spectrophotometric measurement of enzymes (proteins) isolation method study, enzyme biotechnology.
Nucleic Acids: Composition and functions of nucleic acids (A brief account) genes, outlines of DNA structure, recombinant DNA and its applications.

SECTION C

Unit-3. Instrumentation: Principles and applications of photometry, spectrophotometry, fluorometry, nephalometry and turbidimetry, Spectroscopy: Basic concepts and instrumentation, IR (IR FTIR), NMR (including FTNMR), and UV. Biochemical analysis carried out in the estimation of blood constituents like glucose, urea, creatinine, protein, cholesterol, bilirubin etc. and normal and abnormal contents of urine, Separation of serum proteins by electrophoresis, Automation in biochemical analysis.

SECTION D

Unit 4. Acid base Homeostasis: Acids, bases, measurement of pH and glass electrodes, role of kidney and lungs in acid base balance, biochemical measurement of acid base balance, disorders of acid-base balances using blood gas analyzer.
Isotopes: Definitions, units, radioactive isotopes, applications of isotopes in life sciences and medicine.

Texts:
1.	Organic Spectroscopy-Principles and applications by Jagmohan, Narosa Publish House
2.	A textbook of biochemistry-A.V.S.S. Rama Rao (UBSPD)
3.	Instant notes on Biochemistry-Hooper et.al.
4.	Enzymes-Biochemistry, Biotechnology, Clinical chemistry-Trenor Palmer(EWP)

Reference :

1.	Organic Analytical chemistry-Theory and practice by Jagmohan. Narosa publishing
2.	Harper's Biochemistry, 25th edition (McGraw Hill)
3.	Fundamentals of biochemistry-J.L. Jain, Sanjay Jain (S.Chand)

BME – 203 -F   **BIOCHEMISTRY LAB**

	Class Work	:	25 Marks
L T P	P/VV	:	25 Marks
0 0 2	Total	:	50
	Duration of Exam	:	3 Hrs

LIST OF EXPERIMENTS

1. Carbohydrates: Estimation of Blood Glucose.
2. Estimation of total protein, albumin and globulin.
3. Estimation of Blood Urea.
4. Estimation of Total serum Cholesterol.
5. Estimation of urine for albumin test.
6. Estimation of urine for reducing sugar.
7. Liver function test (SGOT & SGPT)
8. Study of abnormal urine content bile pigment salt.
9. Estimation of total serum bilirubin.
10. Estimation of gastric juices – pH and acidity test.

Note: **Ten experiments are to be performed selecting any seven experiments from the above list. Remaining three experiments may either be performed from the above list, or designed and set by the concerned institution as per the scope of the syllabus.**

BME – 207- F   **BIOMEDICAL ENGINEERING LAB**

	Class Work	:	50 Marks
L T P	P/VV	:	50 Marks
0 0 2	Total	:	100
	Duration of Exam	:	3 Hrs

LIST OF EXPERIMENTS

1. Introduction to different type of electrodes – surface electrodes, suction electrodes, floating electrodes, disposable electrodes, needle electrodes and microelectrodes.
2. Recording of ECG waveform from 12 limb leads and the interpretation of ECG waveform.
3. Demonstration of sphygmomanometer and stethoscope, measurement of systolic and diastolic arterial blood pressure using sphygmomanometer.
4. To study the placement of EEG electrodes, recording of EEG waveform and its interpretation
5. To study the placement of EMG electrodes, recording of EMG waveform and its interpretation.
6. Study of nerve muscle stimulator and its different waveforms.
7. Study of Wheatstone bridge and strain gauge transducers.
8. To study Troubleshooting of ECG machine.
9. Study of thermistor, its characteristics and its linearization.
10. Hospital Visit to study different imaging modalities: X-ray and C.T.

Note: Ten experiments are to be performed selecting any seven experiments from the above list. Remaining three experiments may either be performed from the above list, or designed and set by the concerned institution as per the scope of the syllabus.

BME – 213- F   **HUMAN ANATOMY AND PHYSIOLOGY LAB**

	Class Work	:	25 Marks
L T P	P/VV	:	25 Marks
0 0 2	Total	:	50
	Duration of Exam	:	3 Hrs

LIST OF EXPERIMENTS
1. To study simple and compound microscope.
2. To prepare the blood film of your own blood. Stain it and study the blood picture and identify the various blood cells.
3. To study blood composition (TLC, DLC, Eosinophil, RBC)
4. To study estimation of Erythrocyte Sedimentation Rate (ESR).
5. Estimation of hemoglobin percentage in given sample by Haemometer.
6. To determine your own blood group.
7. To determine the bleeding and clotting time of blood.
8. To study models of sensory organs available in the lab.
9. TS of Pancreas gland and Liver Gland
10. TS of Thyroid cord, Adrenal Gland and Spinal Cord.
11. To study the effect of acid and alkali on RBC

Note: **Ten experiments are to be performed selecting any seven experiments from the above list. Remaining three experiments may either be performed from the above list, or designed and set by the concerned institution as per the scope of the syllabus.**

Course No	Subject	Teaching Schedule				Marks of Class Work	Examination		Total Marks	Duration of Exam (in Hrs)
		L	**T**	**P**	**Total**		**Theory**	**Pract ical**		
HUM-201-F OR MATH-201-F	ENGG. ECONOMICS OR MATHEMATICS - III	3 3	1 2	- -	4 5	50	100	-	150	3
EE-210-F	Network Analysis & Design	3	1	-	4	50	100	-	150	3
EE-252-F	Digital Electronics	3	1	-	4	50	100	-	150	3
EE-264-F	Electronics-II	3	1	-	4	50	100	-	150	3
CSE-252-F	Computer Networks	3	1	-	4	50	100	-	150	3
BME-202-F	Biomedical Signal Analysis	3	1	-	4	50	100	-	150	3
EE-254-F	Digital Electronics Lab	-	-	2	2	25	-	25	50	3
EE-266-F	Electronics- Lab	-	-	2	2	25	-	25	50	3
CSE-254-F	Computer Networking Lab	-	-	2	2	25	-	25	50	3
BME-204-F	Bio Signal Analysis Lab	-	-	2	2	25	-	25	50	3
GPBME-202-F	General Proficiency	-	-	2	2	50	-	-	50	3
	Total	18	6 Or 7	10	34/35	450	600	100	1150	

Note:
1. **Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator and other materials will not be permitted in the examination.**
Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the V semester.

HUM-201-F   **ENGINEERING ECONOMICS**

L T P   Class Work marks   : 50
3 1 0   Theory marks   : 100
                                                   Total marks   : 150
                                                   Duration of Exam   : 3 hr

NOTE: For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and   their nature.   Relation between Science, Engineering, Technology and Economics.

Concepts   and   measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

Section-B

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

Section-C

Various concepts of cost - Fixed cost, variable cost, average   cost, marginal cost, money cost, real cost opportunity cost.   Shape of average cost, marginal cost, total cost etc. in short run and long run.
Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main features of these markets)

Section-D

Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effect of changes in demand and supply on prices.

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

TEXT BOOKS :
1.   Principles of Economics : P.N. Chopra (Kalyani Publishers).
2.   Modern Economic Theory – K.K. Dewett (S.Chand)

REFERENCE BOOKS :

1.   A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2.   Micro Economic Theory – M.L. Jhingan (S.Chand)
3.   Micro Economic Theory - H.L. Ahuja (S.Chand)

4.   Modern Micro Economics :   S.K. Mishra (Pragati Publications)
5.   Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6.   Indian Economy : Rudar Dutt & K.P.M. Sundhram

MATH-201-F   **MATHEMATICS-III**
                 (Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)
L T P   Class Work marks   : 50
3 1 0   Theory marks   : 100
                                                 Total marks   : 150
                                                 Duration of Exam   : 3 hr

NOTE: For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

Section-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and consine series.
Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Section-B

Functions of Complex Variable : Definition, Exponential function, Trignometric and Hyperbolic functions, Logrithmic functions. Limit and Continuity of a function, Differnetiability and Analyticity.
Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions.   Cauchy-Integral theorem and fourmula.

Section-C

 Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).
Probability Distributions and Hypothesis Testing : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Section-D

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.
Linear Programming : Linear programming problems formulation, Solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

TEXT BOOKS :
1. Engg Mathematics By Babu Ram, Pearson India
2. Advanced Engg. Mathematics : F Kreyszig.
3. Higher Engg. Mathematics : B.S. Grewal.

REFERENCE BOOKS :
1. Advance Engg. Mathematics : R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics : Michael D. Greenberg.
3. Operation Research : H.A. Taha.
4. Probability and statistics for Engineers : Johnson. PHI.

EE – 210- F   **NETWORK ANALYSIS AND DESIGN**

	Class Work	:	50 Marks
L T P	Theory	:	100 Marks
3 1 **- -**	Total	:	150
	Duration of Exam	:	3 Hrs

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

SECTION A

Network Topology: Graph of a Network, Concept of a Tree and Links, incidence Matrix, Tieset and Cutset Schedulues, solution of Networks, Principals of Duality and Network Transformation.

SECTION B

Review of Loops and Nodes: Linearly independent KVL & KCL equations, Methods of Analysis of DC and AC Networks. Network reduction using Y - D Transformations.

Theorems: SuperPosition, Reciprocity, Thevenin, Norton's, Maximum Power Transfer And Miller's Theorms, Tellegens Theorms.

SECTION C

Resonant Circuits: Series and Parallel resonance, Frequency response of series and parallel circuits, Q - Factor, Bandwidth.

Transient behaviour and initial conditions in networks: Behaviour of circuit element under switching condition and their representation. Evaluation of initial and final conditions in RL, RC and RLC circuits for AC&DC excitations.

SECTION D

.**Laplace transformation and its application**: Definition and Properties of Laplace Transforms. Inverslaplace transforms, initial and final value theorms, shifting theorms, convolution integral. Laplace transform of periodic and non - periodic signals.

One & two port network parameters.

TEXTS:

1. Network Analysis by Van Valkenburg(PHI)

2. A. Sudharkar & S.P. Shyam Mohan, Circuits and networks, Tata Mc Graw Hill, thirteenth reprint, 2000.

REFERENCES:

1. William Hayt, Kennedy, Durbin, Engg. ckt analysis McGraw Hill Internation, 6th edition, 2002.

2. Raymond.. De Carlo, P. Minlin, linear ckt, analysis, Oxford university press 2nd edition 2001

EE – 252- F   **DIGITAL ELECTRONICS**

Class Work	:	50 Marks
L T P	Theory	:	100 Marks
3 1 - -	Total	:	150
	Duration of Exam	:	3 Hrs

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

SECTION A

Basic Digital Circuits:
Digital Signals, logic gates: AND, OR, NOT, NAND, NOR, EX - OR, EX - NOR.
Number System And Codes:
Boolean Algebra, Binary, Octal and Hexadecimal Number systems, Conversion from one number system to another. Signed binary number, sign magnitude, 1's complement and 2's complement, BCD code, Excess - 3, Gray, EBDIC, ASCII, Error correction & error detection Codes.

SECTION B

Combinational Circuits:
Designing using gates, simplification by K - Map, Multiplexer, De - Mux, adders, Subtractors, BCD Arithmetic, Digital Encoder, Priority encoders, Decoders, Designing by MUX, & DEMUX

SECTION C
Sequential Circuits:
Flip - Flops, (JK, SR,T, D)Master Slave, Edge trigger, Shift Register, Counters, Asynchronous & synchronous ring & Johnson counters

SECTION D
Digital Logic Families:
Bipolar Logic Families: TTL, RTL, CMOS, ECL

TEXT
1. Digital Electronics **:** Tocii **-** PHI
2. Digital Electronics **:** R**.** P**.** Jain – TMH

EE- 264-F   **ELECTRONICS-II**

Class Work	:	50 Marks
L T P	Theory	: 100 Marks
3 1 - -	Total	: 150
	Duration of Exam	: 3 Hrs

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

SECTION A

Frequency response of Amplifiers

Amplifier frequency Response, System transfer functions, S-domain analysis, First Order functions, Bode Plots, Shot-circuit and open-circuit time constants, Frequency Response: Transistor amplifiers with Circuit Capacitors, Frequency Response: Bipolar Transistor, Frequency Response: The FET, High Frequency response of transistor circuits,. Sinusoidal Oscillators: The phase shift oscillator, The Wein Bridge oscillator, The tuned circuit oscillator, The Colpitts oscillator and Hartley oscillator.

SECTION B

Output stage and power amplifier

Power amplifiers, Power transistors-Power BJTs, Power MOSFETs, Heat sinks, design of heat sinks, classes of amplifiers-Class-A, Class-B Operation, Class AB operation, Class-C operation, Class-A power amplifiers, Class-AB push pull complementary output stages.

SECTION C

Differential and Multistage Amplifiers

The Differential amplifier, Basic BJT differential pair, Basic FET differential pair, differential amplifier with active load BICMOS circuits, Gain stage and simple output stage, Simplified BJT operational amplifier circuit, Differential amplifier frequency response. The Dartington amplifier and cascade amplifier.

SECTION D

Feedback and Stability

Introduction to feedback, Basic feedback concepts, ideal close-loop gain, Gain sensitivity bandwidth extension, Noise sensitivity. Reduction of nonlinear Distortion, Ideal feedback topologies, Series-shunt shunt-series, shunt-shunt configurations, voltage(series shunt) amplifiers, Current (Shunt- series) amplifiers, trans conductance (series-series) amplifiers, trans resistance (shunt-shunt) & Depletion mode, VMOS & CMOS, Biasing of FET, Application of FET as variable voltage resistor (VVR) & UJT amplifier loop gain, stability of the feedback circuit. The stability problem bode plots: one-pole two-pole and three-pole amplifiers, Nyquist stability criterion, Phase and gain margins, Frequency compensation basic theory, closed loop frequency response, miller compensation.

TEXT

1.   **Donald A. Neamen, Electronic Circuit Analysis and Design, Second Edition, McGraw Hill International edition 2001.**

2.   **Martin Roden, Hordon Carpenter, William Wieserman, Electronic Design, Fourth edition, Shroff publisher, 2002.**

   References:

      Donald Schilling & Charles Belove, Electronic Circuits Discrete and Integrated, Third edition, McGraw Hill International edition, 1989.

CSE- *252*- F   **COMPUTER NETWORKS**

	Class Work	:	50 Marks
L T P	Theory	:	100 Marks
3 1 **- -**	Total	:	150
	Duration of Exam	:	3 Hrs

NOTE: For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

SECTION A
Introduction: uses of computer network, network hardware & software, reference model (OSI & TCP - IP).

SECTION B
Physical Layer: Theoretical basis of Data Communication, Transmission media, wireless transmission, Telephone system.

SECTION C
Data link Layer: Design issues that is framing, error control & flow control. , Error detection & correction.

Media Access Sublayer: Channel Allocation (Static & Dynamic) multiple access protocols (ALOHA, CSMA, Collision Free protocol, WDM access protocol).

SECTION D
Network Layer: Network layer design issue i. e. services provided to transport layer, internal organization of N/W layer, Virtual circuit datagram subnet, Routing Algorithm.

TEXT
        Computer Network by Tanenbaum **-** PHI

BME – 202 -F   **BIOMEDICAL SIGNAL ANALYSIS**

	Class Work	:	50 Marks
L T P	Theory	:	100 Marks
3 1 - -	Total	:	150
	Duration of Exam	:	3 Hrs

NOTE: **For setting up the question paper, Question No 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

SECTION A

Digital Signals and Systems: Introduction to digital signals & systems, classification of signals, classification of systems- causal, non causal, time varying, time invariant, convolution, auto-correlation and cross correlation, characteristics of Bio - Signals, stationary and non – stationary process, Application areas of Bio – Signals analysis - EEG, ECG, Phonocardiogram, Spiro Gram, Evoked Signals.

Z transform introduction, definition, convergence. Inverse Z transform, Analysis of discrete time systems using Z transforms. Solutions of differential equations. Transfer functions and stability.

SECTION B

Digital filter design- Fourier transform for continuous signals. Energy spectrum, Properties (without proof), Discrete Fourier transforms. Properties (without proof), Inverse DFT. FFT, Decimation in time and frequency. Introduction to Digital Filters, Realization of Digital system, canonical form, direct form & Cascade Realization of IIR & FIR Filters. Design of IIR, FIR and Adaptive Filters, Gibbs phenomena, Low pass, High Pass, Band Pass Filters using windows – Hamming, hanning, Blackmann and Bartlett Windows.

SECTION C

ECG QRS Detection: Basics of Signal Averaging, Signal Averaging of Digital Filters, Typical Signal Averager, ECG QRS Detection Algorithm: Power spectrum analysis, Bandpass Filtering, Differentiation and Template Matching techniques, Sampling Theorem, aliasing Nyquist criteria, ADC's and DAC's.

SECTION D

Unit-4: Data reduction Techniques: Turning point algorithm, AZTEC algorithm, CORTES, FAN algorithm, Huffmann coding, use of MatLab signal processing toolbox on various bio - medical signals. ECG Analysis System: ECG Interpretation, ST segment analyzer, Portable Arrhythmia monitor.

TEXT
1.   Digital signal processing, Proakis (PHI)
2.   Signal Analysis By R. P. Singh , Second edition Tata McGraw – Hill
3.   Engineering Electronics By Mauro R Prentice – Hall
4.   Malmivuo, J. and Plonsey, R. Bioelectromagnetism: Principles and Applications of Bioelectric and Biomagnetic Fields, Oxford University Press, New York, 1995.

References
1.   Biomedical signal processing: Metin Akay (academic press)
2.   Biomedical signal processing: Tompkins (academic press)
3.   Theory and application of Digital signal processing: Rabiner and Gold (EEE pub)

EE- 254 F   **DIGITAL ELECTRONICS LAB**

Class Work	:	25 Marks
P/VV	:	25 Marks
Total	:	50
Duration of Exam	:	3 Hrs

L T P
0 0 2

LIST OF EXPERIMENTS

1. Study of TTL gates - AND, OR, NOT,NAND, NOR, EXNOR
2. Design & verify expression using K - MAP
3. To verify the operation of MUX & DEMUX
4. To verify the operation of a comparator
5. To verify the Truth tables of SR,JK,T,D FF
6. To verify the operation of Shift Register
7. To verify the operation of 3 - bit synchronous counter
8. To verify the operation of Up - Down decade counter
9. To verify the working of Ring counter
10. To verify the working of Johnson counter

Note: **Ten experiments are to be performed selecting any seven experiments from the above list. Remaining three experiments may either be performed from the above list, or designed and set by the concerned institution as per the scope of the syllabus.**

CSE-254- F   **COMPUTER NETWORKING LAB**

Class Work	:	25 Marks
P/VV	:	25 Marks
Total	:	50
Duration of Exam	:	3 Hrs

L T P
0 0 2

LIST OF EXPERIMENTS

1. Study of Internet Explorer and Netscape Navigator
2. Study of Network Neighborhood utility of Windows Operating System
3. Networking using Windows 98 Operating System
4. Implement the IP datagram header
5. Find the shortest path between two routers.
6. Construct the TCP/IP server using Socket Interface
7. Construct the TCP/IP client using Socket Interface
8. Construct the TIME server.
9. Construct the ECHO server and Client
10. Construct the TCP/IP Chat server for two users, using Socket Interface

Note: **Ten experiments are to be performed selecting any seven experiments from the above list. Remaining three experiments may either be performed from the above list, or designed and set by the concerned institution as per the scope of the syllabus.**

BME – 204 -F   <u>**BIO – SIGNAL ANALYSIS LAB**</u>

	Class Work	:	25 Marks
L T P	P/VV	:	25 Marks
0 0 2	Total	:	50
	Duration of Exam	:	3 Hrs

LIST OF EXPERIMENTS

1. Write a program for following Basic signals – unit step, unit ramp, and delta function by using MatLab.
2. Plot the following signals- exponential sequence, sinusoidal sequence, discrete cosine by using MatLab.
3. Convolution of two sequences, Correlation of two sequences.
4. Design a low pass filter and plot graph of gain versus frequency.
5. Design a high pass filter and plot graph of gain versus frequency.
6. Design a band pass filter and plot graph of gain versus frequency.
7. Generate a Huffman code for a waveform using Digiscope.
8. Using digiscope study waveform generation and power spectrum analysis
9. Study turning point compression of a noise signal using digiscope.
10. Design of FIR and IIR filters using Digiscope and MatLab.
11. To generate and study evoked EEG potentials (ERP).
12. Write a MATLAB program to compute RMS value at each instant for the EMG signal.

Note: **Ten experiments are to be performed selecting any seven experiments from the above list. Remaining three experiments may either be performed from the above list, or designed and set by the concerned institution as per the scope of the syllabus.**

EE –266-F   **ELECTRONICS- LAB**

	Class Work	:	25 Marks
L T P	P/VV	:	25 Marks
0 0 2	Total	:	50
	Duration of Exam	:	3 Hrs

LIST OF EXPERIMENTS

1 Study of Half wave and Full wave rectifier.
2. Study of diode as a clipper and clamper.
3. Study of CE amplifier for voltage, current and power gains and input, output impedances.
4. Study of FET common source and common drain amplifier.
5. Study and design of a DC voltage doubler and Wein bridge Oscillator
6. Study of transistor as a constant current source in CE configuration.
7. Frequency response of FET
8. Phase shift Oscillator using BJT
9. Frequency response of differential amplifier and study of Darlington pair Amplifier
10. Study of different feed back topologies.
11. Characteristics of Power MOSFET.
12. Gain of Power Amplifier (Class A/B/AB)

Note: Ten experiments are to be performed selecting any seven experiments from the above list. Remaining three experiments may either be performed from the above list, or designed and set by the concerned institution as per the scope of the syllabus.

GP-202 F   GENERAL PROFICIENCY

L. T. P   **Marks for Class Work ;50**
- - 2   **Total Marks: 50**

- Quiz & Aptitude
- Comprehension
- Communication for Specifics
- Lets Speak
- Composition Sills – Instead of the given content we should teach the students formal letter writing based on the trends in practice in corporate culture.
- Training on etiquettes & manners should be carried further and should be observed during the general classes, if required, even the faculty should imparted some training on the same.