Jabalpur Engineering College, Jabalpur

Semester III Credit Based Grading System (CBGS) w.e.f. July 2017
Scheme of Examination
Bachelor of Engineering B.E. (Electrical Engineering)
Subject wise distribution of marks and corresponding credits

Scheme of Examination w.e.f. July-2017 Academic Session-2017-18

S. No.	Subject Code	Subject Name & Title	Theory			Practical		Total Marks	Hours / week.			Total Credits	Total Marks
			End Sem	Mid Sem. MST	Quiz, Assign ment	End Sem.	Lab Work		L	T	P		
1	CH3001	Energy, Environment, Ecology & Society	70	20	10	-	-	100	3	1	-	4	
2	EE3002	Circuit Theory & Network Analysis	70	20	10	30	20	150	3	1	2	6	
3	EE3003	Analog Electronics	70	20	10	30	20	150	3	1	2	6	
4	EE3004	Electrical Measurement	70	20	10	30	20	150	3	1	2	6	
5	EE3005	Electrical Engineering Materials	70	20	10	-	-	100	3	1	-	4	
6	CS3106	Programming-I	-	-	-	30	20	50	-	-	2	2	
7	EE3007	1.Rural Outreach/Social service Activities under digital India or clean India 2.Evaluation of Industrial training (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
8	EE3008	NSS/NCC/Professional society activities (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
		Total	350	100	50	120	180	800	15	5	12	32	800

MST: Minimum of two mid semester tests to be conducted.

L: Lecture   T: Tutorial   P: Practical

B.E.CBGS III SEMESTER
ENERGY, ECOLOGY, ENVIRONMENT & SOCIETY

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E.	Energy, Ecology, Environment & Society	CH3001	Min. "D"	Min. "D"	5.0

Unit -I : Energy Sources and Energy Storing Devices :
World and Indian energy scenario, types of energy sources – renewable and non-renewable energy sources. Solar energy storage, application & maintenance of solar cell panel, introduction & applications of hydro, wind, biomass, ocean, tidal, wave and geothermal. Synergy between energy and environment. Global environment issues, greenhouse gas emission, global warming, green energy solution. Batteries – Primary and Secondary batteries- Alkaline battery – Lead (Pb) acid storage battery , Ni-cadmium battery ,Lithium battery, Fuel cell , Hydrogen Oxygen fuel cell ,Photo galvanic cell.

Unit -II : Ecosystem :
Structure & scope of ecology, Natural cycles of the environment, Hydrogen cycle, Oxygen Cycle, Carbon cycle, Nitrogen cycle, Phosphate cycle, Sulphur cycle, Biodiversity.
Society:-
Environmental problems and impact of P.A.T(Population, Affluence and Technology). Environmentally beneficial and harmful technologies, environment impact assessment policies (EIA).Ethics and regulatory act of environment.
Soil Pollution :
Sources & control measures. MSW, HWM.

Unit -III : Air Pollution :
Chemical composition of atmosphere, -primary, secondary, pollutants, Chemical and photochemical reaction, effects of CO, SOx, NOx, HC and particulates. Causes & effects of acid rain, ozone depletion: Monitoring and control of air pollutants.
Noise Pollution :
introduction, physiological effect, measurement and control of noise pollutants.

Unit -IV : Water Pollution :
Sources causes of water pollution , types and nature of water pollutants. Pollution load determination i.e. particulates ,suspended matter, total dissolved solids ,dissolved gases DO, BOD & COD. EL NINO phenomenon. Waste water treatment Domestic – Aerobic & anaerobic treatment. Industrial waste water treatment (ETP plant.) Electro dialysis membrane technique and filtration by activated charcoal and synthetic resins.
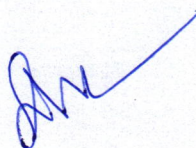
Unite -V : Corrosion & its Prevention:
Theories of Corrosion and Mechanism – Dry (Direct Chemical attack), Wet (Electro Chemical Theory) Atmospheric corrosion, Galvanic Series, Galvanic & Concentration Cell Corrosion, Corrosion by sea water. Factors Influencing & control of Corrosion – Proper Design, Use of pure metal and metal alloys, passivity, cathodes protection – Sacrificial anode and Impressed Current. Modifying the environment, Use of inhibitors.

Books References :

1. J.C. Kuriakose and J. Raja ram, "Chemistry in Engineering and Technology", Vol.1 & 2, Tata Mcgraw Hill Publishing
2. Company (P) Ltd., New Delhi
3. Mars G. Fontana, "Corrosion Engineering", Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi.
4. F.Chau, Y. Liang, J. Gao and X. Shao, "Chemometrics", Wiley Inter Science.
5. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi
6. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.
7. A text book of Environmental Chemistry and Pollution control by S.S. Dara & Dr. D. D. Mishra, S. Chand & Co, New Delhi
8. Energy,Environment Ecology and Society by Dr.Pushpendra,Vayu Education of India New Delhi .
9. Energy, Environment Ethics and Society, by Dr.S.Deswal & Dr.A.Deswal Dhanpat Rai Publishing Company, New Delhi.

B.E.CBGS III SEMESTER
CIRCUIT THEORY AND NETWORK ANALYSIS

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E.	Circuit Theory & Network Analysis	EE3002	Min. "D"	Min. "D"	5.0

Unit I: Review of Circuit Elements and Energy Sources

Circuit elements (series and parallel combination), Energy sources, Source transformation, Sources with periodic waveforms, AC in inductance and capacitance, star-delta connection, Kirchhoff's laws, current & voltage division rules, nodal & Mesh Analysis of electrical circuits(with Power and Energy calculation).

Unit II: Network Theorems in AC & DC Circuits

The venin's, Norton's, Superposition, maximum power transfer, Milliman's, reciprocity, Substitution, Compensation and Tellegen's theorem.

Unit III: Transient and Steady State Response for Arbitrary Inputs

Introduction to Transient and Steady State response of first order circuit (RL & RC) with dc and ac excitation, Transient and Steady State response of second order circuit (RLC) with dc and ac excitation, resonance (series and parallel).

Unit IV: Network Topology

Concept and terminology of network graphs (twigs, links, tree formation) formation of incidence, Tie-set matrix, Cut set matrix and their calculation.
Tow port Network: Z, Y, Hybrid and G (inverse of H) parameter.

Unit V: Network functions and Network Synthesis

Network functions Introduction to Laplace transformation and its application in electrical circuit analysis, driving point impedance and admittance, transfer impedance and admittance, introduction of passive filters (low pass, high pass, band pass, band stop).
Network synthesis: Reliability concept, Hurwitz polynomials and its properties, positive real functions, Synthesis of R-L, R-C and L-C networks, Foster and Cauer forms (1st and 2nd form).

Books References:

1. Circuit theory Analysis and Synthesis by Abhijeet Chakrabarti :Dhanpat Rai & Co.P.Ltd.
2. Network and Systems by D.Roy Choudhury Wiley Eastern Limited.
3. Network Analysis by ME Van-Valkeburg.

CIRCUIT THEORY AND NETWORK ANALYSIS

List of Experiments:

1. Verification of Kirchhoff's current Law in AC circuit.
2. Verification of Kirchhoff's voltage Law in AC circuit.
3. Verification of Superposition theorem in AC circuit.
4. Verification of The venin theorem in AC circuit.
5. Verification of Norton theorem in AC circuit.
6. Find out the resonance frequency in RLC series circuit.
7. Find out the resonance frequency in RLC parallel circuit.
8. Verification of Reciprocity theorem in AC circuit.
9. Measurement of phase angle, peak value of signal of AC circuit.

B.E.CBGS III SEMESTER
ANALOG ELECTRONICS

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E.	Analog Electronics	EE3003	Min. "D"	Min. "D"	5.0

Unit-I: Diode Circuits
P-N junction diode characteristics, Simple diode circuits-Rectifier, Half wave rectifier ,Full-wave rectifier-Center-tapped and Bridge rectifier. Clipper circuits - series and parallel, Clamper circuits - positive and negative clamper.

Unit-II: Transistor Circuits
Bipolar junction transistors (BJT) and their working, introduction to CC,CB & CE transistor configurations, Early effect, Relationship between α and β, Comparison of Characteristics of transistors in different Configurations, Transistor Biasing -Purpose of biasing, dc operating point, dc load line, different biasing techniques Thermal Runaway, Thermal stability. Enhancement MOSFET(n-Channel, p-Channel), Depletion type MOSFET (n-Channel, p Channel) and characteristics of FET-baising and small signal analysis.

Unit-III: BJT Small Signal Analysis
Transistor as an amplifier, ac equivalent circuits, analysis using h-parameters, r_e Model, π modle Analysis of transistor amplifier at high frequency, miller theorem, Feedback amplifier: General feedback structure, properties of negative feedback, Sinusoidal Oscillator-RC phase shift, wein bridge oscillator, Hartley & Collpitt's oscillators, crystal oscillator.

Unit-IV: Operational Amplifiers
Introduction to operational amplifiers: OPAmp Input and output resistance, open loop gain, bias currents, Offset currents and voltages, differential mode gain, common mode gain, CMRR concept of negative feedback and virtual short, , Inverting and non inverting amplifiers , Analysis of simple operational amplifier circuits, Differentiator, integrator & logarithmic amplifiers. Applications of OPAmp-Comparators, clippers, clampers, Monostable and astable multi.

Unit-V: 555 timer and Filters
555 timer-internal architecture, Application of 555 timer as Monostable and astable generators. Simple and Active Filters characteristics and applications, low pass, high pass and band pass filters.
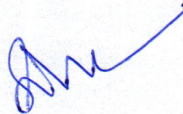
Books References:
1. R.A.Gayakwad, "Op amps and Linear Integrated Circuits" PH India.
2. Millman & Halkias, "Integrated Electronics" TMH.
3. Paul Horowitz & Winfield Hill, "The Art of Electronics".

ANALOG ELECTRONICS

LIST OF EXPERIMENTS

1. Study of semiconductor devices (like diode, transistor etc).
2. Study of various configurations of transistor connection.
3. Study of OP-AMPs.
4. Verification of characteristics of amplifiers.
5. Design & measure the frequency response of an RC coupled amplifier using discrete components.
6. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth.
7. Study the effect of voltage series, current series, voltage shunt and current shunt feedback on amplifier using discrete components.
8. Design & realize inverting, non-inverting and buffer amplifier using 741 op-amps.
9. Study of IC 555 as astable and monostable multivibrator.
10. Design & realize using op amp 741, wein-bridge oscillator

B.E.CBGS III SEMESTER
ELECTRICAL MEASURMENT

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E.	Electrical Measurement	EE3004	Min. "D"	Min. "D"	5.0

Unit-I: Errors in Measurement and Their statistical analysis

Limiting Errors, Types of Errors, statistical treatment of each data-Histogram, arithmetic mean, measure of   dispersion from mean,, range, deviation, average deviation, standard deviation, variance, normal and Gaussian curve of errors, precision index, probable error, average and standard deviation for normal curve, standard deviation of mean, standard deviation of standard deviation. Galvanometers – construction and torque equation. Introduction to unit system, dimension and standard.

Characteristic of instruments and measurement system- Static characteristic, errors in measurement, true value, static error, static correction, scale range and span, error calibration curve, Reproducibility and drift, repeatability, accuracy and precision, linearity, threshold, dead time, dead zone, resolution or discrimination.

Unit-II: Analog Instruments

Classification of analog instruments, Operating force (deflecting, Damping and controlling force), and typesof instruments (Permanent Magnet Moving Coil, Moving Iron, Electrodynamometer, Hotwire, thermocouple, Electrostatic, Induction, Rectifier type- construction, torque equation, advantage and disadvantage of each). Errors in ammeter and voltmeter, Extension of range of instruments using shunt & multiplier.

Unit-III: Measurement of Power and Wattmeter

Measurement of Power – Power in AC and DC Circuit, Electrodynamometer wattmeter, low power factor wattmeter, Measurement of Power using instrument transformers, Measurement of power in three phase circuit by one, two & three wattmeter, three phase wattmeter, Measurement of reactive power by single wattmeter, measurement of phase and frequency-power factor meter (single & three phase, electrodynamometer, moving iron).

Introduction to instrument transformer, Construction and working of instrument transformer, ration and phase angle errors in Current and Potential transformer, Methods to reduce both ration and phase angle errors, Difference between CT and PT, Testing of CT and PT, Measurement of power using CTs & PTs.

Unit-IV: Measurement of Energy

Single phase induction type energy meter, Polyphase meters, Single phase and three phase VARh meters, Measurement of Volt ampere-hours, and Phantom loads.

Principle of Potentiometer, Slide Wire DC potentiometer, Crompton's potentiometer, potentiometer Calibration, Volt-ratio box, Practical application of DC potential meter. Introduction to AC Potentiometer.

Unit-V: Miscellaneous Instruments & Measurement

Measurement of frequency- Vibrating Reed, Weston Frequency meter Ratio Meter type. Power factor meter- Dynamometer type Single phase and three phase, Moving iron. Synchroscopes, Measurement of Low Resistance- Ammeter Voltmeter Method, Potentiometer method, Kelvin's double bridge, Ohm meter. Measurement of Medium Resistance- Ammeter Voltmeter Method, Substitution method, Wheatstone Bridge, Carey Foster Bridge Method. Measurement of High Resistance- Direct Deflection Method, Megger & loss of charge methods, Ohm meters (Series & Shunt Type)

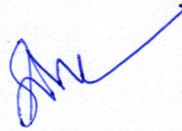Multimeter, Earth resistance measurement. Q meters.

Books References :
1. E W Golding & F C Widdis, Vedition, ," Electrical Measurement & Measuring Instruments ",Wheeler Publishing
2. A.K. Sawhney," Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai & Sons Publications
3. Buckingham & Price ,"Electrical Measurements", Prentice Hall

ELECTRICAL MEASURMENT

List of Experiments:

1. Measurement of resistance by Wheatstone bridge.
2. Measurement of low resistance by Kelvin's double bridge.
3. To calibrate AC watt-hour meter by a standard wattmeter.
4. Study of Llyod's Fischer square method.
5. To plot the following characteristics of a given CT. Burden V/S Secondary current Burden V/S Secondary voltage
6. Measurement of three phase power by two wattmeter method.
7. Measurement of high resistance by using megger.
8. Study of earth tester and measurement of earth resistance.
9. Testing of energy meter.

B.E.CBGS III SEMESTER
ELECTRICAL ENGINEERING MATERIALS

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E.	Electrical Engineering Materials	EE3005	Min. "D"	Min. "D"	5.0

Unit–I: Conducting Materials

Electron theory, conductivity, factor affecting conductivity, classification & properties of conducting materials. Effect of temperature variation, Alloys and their properties. Application of conducting materials with their suitability in – Electrical Machines, power Systems, Electrical instruments etc. super conducting materials, their properties & Applications.

Unit–II : Semiconducting Materials

General concepts , variation of electrical conductivity, Elements having semiconducting properties, general application, Hall effect & energy levels, conduction in semiconductors, Impurities, mobility, current flow in semi conductors, P-N Junction formation by alloying, Zener effect, Hall effect & its applications.

Unit- III: Magnetic Materials

Magnetism, classification of magnetic materials, properties & applications of magnetic materials, magnetic hysteresis, eddy currents, magnetostriction, Hysteresis loop for hard and soft magnetic materials.
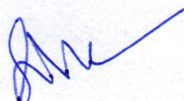
Unit – IV: Insulating Materials

Electrical, mechanical & chemical properties of insulating materials, volume & surface resistivity, classification of insulating materials . Dielectric materials : solid liquid and gaseous, their properties & application.

Unit–V:

General properties of transformer oil, commonly used varnishes, solidifying insulating materials, resins, bituminous waxes, drying oils, insulating textiles, varnished adhesive tapes, inorganic fibrous materials & other insulting materials such as mica, ceramic, Bakelite, abonite, glass, PVC, Rubber, and other plastic molded materials.

Books References :

1. Electrical Engineering Materials by Kortisky
2. Electrical Engineering Materials by A.J. Deccker
3. Di-electrics by Anderson
4. Materials for Electrical Engineering by B.M. Tareev

B.E.CBGS III SEMESTER
PROGRAMMING – I (PROGRAMMING IN C++)

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E.	Programming – I (Programming in C++)	CS3106	Min. "D"	Min. "D"	5.0

Unit I: Fundamental Concepts of Object-Oriented Programming (OOP):
Object, Class, message passing, abstraction and data hiding, encapsulation, modularity, inheritance, and polymorphism. Difference between Procedure Oriented Programming and Object Oriented Programming.

Unit II: Beginning With C++:
What is C++, Difference between C and C++, Classes and Objects in C++, defining classes, access specifier (i.e. Private, public, protected), defining member functions, creating objects of a class, access to member variables from objects etc. Friend functions and inline functions. Different types of function calls: call by value, call by address and call by Reference.

Unit III: Static Data Members, Constructor and Destructor in C++:
Default constructor, parameterized constructors and copy constructs.

Unit IV: Inheritance in C++:
Introduction, types of inheritance: single inheritance, multiple inheritance, multilevel inheritance, hierarchical inheritance and hybrid inheritance. Abstract class and Virtual base class.

Unit V: Polymorphism in C++:
Types of polymorphism, function overloading, operator overloading. Function overriding:- introduction to pointers, pointers to objects, this pointer, pointers to derived class, virtual functions, pure virtual function.

Books Reference:
1. Object Oriented Programming with C++ by E Balagurusamy, TMH.
2. Object Oriented Programming in C++ by Robert Lafore, Sams publishing.
3. Object Oriented Programming with C++, A. K. Sharma, Pearson.

PROGRAMMING – I (PROGRAMMING IN C++)

List of Experiments:

1. Write a C++ program to find the largest of three numbers using inline function.
2. Write a C++ program to sort an array of integer in ascending order using a function called exchange( ) which accepts two integer arguments by reference.
3. Create a class 'COMPLEX' to hold a complex number. Write a friend function to add two complex numbers. Write a main function to add two COMPLEX objects.
4. Write a C++ program to illustrate multiple inheritance.
5. Write a C++ program to illustrate 'this' pointer and pointers to derived classes.
6. Create a base class called 'SHAPE' having – two data members of type double – member function get-data( ) to initialize base class data members – pure virtual member function display – area( ) to compute and display the area of the geometrical object. Derive two specific classes

'TRIANGLE' and 'RECTANGLE' from the base class .Using these three classes design a program that will accept dimension of a triangle / rectangle interactively and display the area

7. Write a C++ program that uses function using overloaded functions
   a) To swap two integers,
   b) To swap two characters ,
   c) To swap two real numbers.
8. Write a C++ program to illustrate the use of overloaded constructor.
9. Write a C++ program to overload unary and binary operator, using a simple example.
10. Write a C++ program to calculate marks of postgraduate and graduate students using virtual function.
11. Write a C++ program to illustrate the use of static member function.