

**IIIrd & IV Semester B.E.  
Electrical Engineering  
(Electronics & Power)**

Prospectus No. **091713**

**SANT GADGE BABA AMRAVATI UNIVERSITY**

(FACULTY OF ENGINEERING & TECHNOLOGY)

## **PROSPECTUS**

PRESCRIBED FOR  
FOUR YEAR DEGREE COURSE  
BACHELOR OF ENGINEERING  
**ELECTRICAL ENGINEERING  
(ELECTRONICS & POWER)**  
THIRD & FOURTH SEMESTER  
EXAMINATIONS, 2008-2009  
SEMESTER PATTERN



2008

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Amravati University,  
Amravati 444 602

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## SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

- (1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.
- (2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinance Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	: Enrolment of Students.
Ordinance No. 2	: Admission of Students
Ordinance No. 4	: National cadet corps
Ordinance No. 6	: Examinations in General (relevent extracts)
Ordinance No. 18/2001	: An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No. 9	: Conduct of Examinations (relevent extracts)
Ordinance No. 10	: Providing for Exemptions and Compartments
Ordinance No. 19	: Admission of Candidates to Degrees.
Ordinance No. 109	: Recording of a change of name of a University student in the records of the University.

- Ordinance No. 138 : For improvement of Division/Grade.
- Ordinance No.19/2001 : An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dr. K.G.Khamare  
Registrar,  
Sant Gadbe Baba  
Amravati University

## PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM

The pattern of question paper as per unit system will be boradly based on the following pattern.

- (1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.
- (2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.
- (3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.
- (4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60.
- (5) Each short answer type question shall Contain 4 to 8 short sub question with no internal choice.

## PRESCRIBED FOR

## THIRD &amp; FOURTH SEMESTER B. E. EXAMINATIONS

## ELECTRICAL ENGG (ELECTRONICS &amp; POWER)

## SEMESTER PATTERN

## THIRD SEMESTER

3SE 1

## MATHEMATICS-III

## SECTION-A

UNIT-I: Ordinary differential equations:- Completer solution, Operator D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variations of parameters, Cauchy's and Legendre's linear differential equations. Simultaneous linear differential equations with constant co-efficient, Applications to electrical circuits.

UNIT-II : Laplace transforms: definition, standard forms, properties of Laplace transform, inverse Laplace transform, initial and final value theorem, Convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function.

UNIT-III : a) Application of L.T. to linear differential equations with constant coefficients & Simultaneous linear differential equations. b) Fourier transforms- Definition, standard forms, inverse Fourier transform, Properties of Fourier transforms, Convolution theorem, Fourier sine and Fourier cosine transforms and integrals.

## SECTION-B

UNIT-IV : a) Difference equation:- solution of difference equations of first order, Solution of difference equations of higher order with constant co-efficients.

b) Z-transform: Definition, standard forms, Z-transform of impulse function, Unit step functions, Properties of Z-transforms (Linearity, shifting, multiplication by k, change of scale), initial and final values, inverse Z-transforms (by direct division and partial fraction), Solution of difference equation by Z-transforms.

UNIT-V : Vector calculus: Scalar and vector point functions, Differentiation of vectors, Curves in space, Gradient of a scalar

point function, and their physical meaning, expansion formulae (with out proof).

UNIT-VI : Line, surface, volume integrals, irrotational and solenoidal vector fields, Stoke's and Divergence theorem (with out proof).

## BOOKS RECOMMENDED:-

- 1) Elements of Applied Mathematics by P.N. Wartikar and J.N. Wartikar
- 2) A text book of Differential Calculas by Gorakh Prasad.
- 3) Engg. Mathematics by Chandrika Prasad.
- 4) Advancing Engg. Mathematics by E.K. Kreyzig.
- 5) A text book of Applied Mathematics by J.N. Wartikar and P.N. Wartikar.
- 6) Higher Engg. Mathematics by B.S. Grewal.
- 7) Control System by Gopal and Nagrath
- 8) Integral Transforms by Goyal & Gupta.

3SE2

## POWER PLANT ENGINEERING I

## SECTION A

Unit I Basic Concepts: Thermodynamic systems, properties and state of a system. Point and Path Function, processes and cycles, difference between work and heat, First and second law of thermodynamics

Unit II (a) Properties of Steam: Triple point, Critical point, Sensible heat, latent heat, superheat, specific volume, internal energy, dryness fraction.

(b) Boilers: Babcock Wilcox, Lancashire boiler, mountings and accessories, boiler efficiency.

Unit III Modern Steam Power Plant: Rankine Cycle, modifies rankine cycle, basic components and layouts, classification of steam turbines, difference of impulse and reaction turbines, efficiency and power developed, Cooling tower types Condenser types (no analytical treatment)

## SECTION B

Unit IV (a) Diesel Engine Power Plant: Engine Classification, diesel cycle, site selection and layout of diesel power plant, essential components of Diesel power plant, calculation of power developed and efficiency.

(b) Gas Turbine Power Plant: General aspects of Gas turbines, Brayton cycle, advantages and disadvantages of gas turbine power plants over diesel power plants, power developed and efficiencies.

Unit V Nuclear power Plants: Fission and Fusion reactions, main components of nuclear power plant, Nuclear power plant site selection, Boiling water reactor, pressurized water reactor, CANDU reactor.

Unit VI Economics and Environmental aspects of power plant:  
  
Principles of power station design feasibility of electric power station, load curve, demand factor, power station and maximum demand, average demand, diversity of load, load factor, diversity factor, plant factor, capacity factor, load duration curve, cost of generating station, factors influencing the rate of tariff design, tariff, types of tariff, types of loads and their characteristics, base load and peak load, load forecasting.  
  
Emissions of power plant and their ill-effects, constitute of atmosphere, greenhouse effect.

#### BOOKS RECOMMENDED:

- 1) Power plant technology by El-Wakil, Mc Graw Hill international Edn
- 2) Engineering Thermodynamics by Cengel & Boles, Tata-Mcgraw Hill
- 3) Thermal Power Plants by B K Sarkar, Tata Mc Graw Hill
- 4) Non Conventional energy sources by G D Rai, Khanna Publications
- 5) Power Plant Engineering by R K Rajput, Laxmi Publications
- 6) Power Plant Engineering by Arora domkundwar, Dhanpat rai and sons
- 7) Generation of Electrical Power by B. R. Gupta, S. Chand and Company, New Delhi
- 8) Elements of Power Station Design by M. V. Deshpande, Tata Mc Graw Hill

#### 3SE3

#### ELECTRICAL MACHINE-I SECTION-A

Unit I: D.C. Machines  
  
Construction, principle of operation, Emf equation, torque equation. Armature winding – Lap, wave, single layer, double layer. Armature reaction and commutation, method of improving commutation.

Unit II: D.C. Generators.  
  
Types, characteristics and applications of d.c. shunt, series and compound generators.  
  
Parallel operation of d.c. shunt, series and compound generators.  
  
Introduction for conducting and reporting the test on d.c. machines as per Indian standard.

Unit III: D.C. Motors  
  
Characteristics, applications of d.c. shunt, series and compound motors, starting and speed control, losses, efficiency and testing.

#### SECTION-B

Unit IV: Single phase Transformer.  
  
Heat run test, separation of core losses in to its component, parallel operation, equivalent circuit.  
  
Autotransformer - construction, working, merits, demerits and application.  
  
Introduction for conducting and reporting the test on transformer as per Indian standard.

Unit V: Three phase Transformer:  
  
Construction, working, types, connections, applications, testing, parallel operation, open delta, power transformer, distribution transformer construction.

Unit VI: Three phase to single phase, two phase, six phase, twelve phase conversion. Three-winding transformer and tap-changing transformer. Wave forms of no-load current and inrush current phenomenon.

**PRACTICALS:** Eight experiments based on above syllabus. Testing as per IS.

#### TEXT BOOKS:

1. Electrical Engineering Vol. I : Direct current by C. Dawes IV Edition.
2. Electrical Machinery by Nagrath, Kothari (Tata McGrawHill)
3. Electrical Machine by P. S. Bhimra.
4. Advance Electrical Technology by H. Cotton (Wheeler publication)
5. Substation Equipment by Satnam and Gupta.

**REFERENCE BOOKS:**

1. Theory of AC Machines by Langsdorf (Tata McGrawHill)
2. Principles and practice of Electrical Engineering by Gray Wallace (International student Ed. VIII Ed.)
3. Performance and design of d.c. machines by Claytonand and Hancokk.
4. Indian Standard Guide for testing DC Machine. IS: 9320-1979, By Indian Standards Institution, New Delhi.
5. Indian Standard Specification for safety transformer. IS: 1416-1972, By Indian Standards Institution, New Delhi.

**3 SE 4 ELECTRICAL MEASUREMENT & INSTRUMENTATION****SECTION-A**

UNIT-I: Galvanometer:Construction,Torque equation,deflection & sensitivity of D 'Arsonval, vibration & Ballistic type.

Application of galvanometer in magnetic measurement  
Ammeter & Voltmeter : Types : PMMC, MI, Electrodynamic, Rectifier&Electrostatic Construction, Theory of operation, torque equation, errors, merits & demerits of each type.

UNIT –II: Wattmeters & Energymeters: Electodynamic & Induction type, construction, Theory of operation, torque equation, errors & demerits, Electronics energy meter.

Analysis of three phase balanced load, Blondels Theorem, measurement of active & reactive power & energy in single ph. & three ph. Circuits

UNIT –III: Instrument Transformers: C.T.&P.T. Theory & construction , Phasor Diagram, Ratio & Phase Angle error causes of errors, applications Need of Extension of ranges using shunt & multipliers

Potentiometers: Principle, Construction, & Standardization of D C potentiometer & AC Potentiometers, Applications.

**SECTION-B**

UNIT-IV: Measurement of circuit parameters:Different methods of measurement of low,medium & high value of resistance,sensitivity & accuracy of different methods.

AC & DC Bridges: Wheeatstone, Kelvin, Maxwell, Wein,Hay, DeSauty, Anderson, Schearing.

UNIT-V: Generalised Instrumentation System,Charecteristics of measurement & Instrumentation system.

Transducers: Definition, Classification, Specification, Selection & Loading effect. Displacement , Velocity, Force & Torque Transducers: Resistive, Inductive, Capacitive, Strain Guage, piezoelectric, digital, fibre optic & Laser type, current and voltage transducers.

UNIT-VI: Transducers for pressure and temperature: Manometer , Elastic members (Bellows , Bourdon tube , Diaphragm), RTD, Thermo couple , Thermister , Infrared and crystal

Other Instruments: Maximum demand indicator , Trivector meter , Frequency meter, P.F. Meter, Phase sequence indicator , Synchroscope stroboscope.

**TEXT BOOKS:**

1. A.K.Sawhney : A course in Electrical ,Electronics measurement and Instrumentation.
2. Golding : Electrical measurement and measuring Instruments.
3. Cooper : Electronic Instruments and measuring Instruments.
4. Rangan , Mani , Sharma : Instrumentation systems.
5. R.K.Jain : Mechanical Industrial Measurements.

**REFERENCE BOOKS:**

1. Nakara , Chaoudhary : Instrumentation systems.
2. E.O.Doebelin : Instrumentation systems.
3. Patranabis : Principles of Industrial Instrumentation.
4. C.T.Baldwin : Electrical Measurements .

**PRACTICALS** : Minimum ten experiments based on above topics

**3 SE 5 ELECTRONIC DEVICES AND CIRCUITS****SECTION-A**

UNIT-I P-N Junction diode theory, Rectifiers - Half wave, full wave and bridge rectifier. Filters-C, LC and their analysis, Zener diode and its applications.

UNIT-II Theory and Analysis of BI Junction transistor, 'H' Parameter, methods of biasing, their needs, 'Q' and stability factors, compensation techniques.

UNIT-III Study of typical transistor amplifier circuits :

- i) Emitter follower,
- ii) Darlington emitter follower.
- iii) Bootstrap emitter follower,
- iv) RC coupled amplifier,
- v) Transformer coupled amplifier,
- vi) Cascaded amplifier,
- vii) Direct coupled amplifier,
- viii) Cascade stage.

### SECTION-B

- UNIT-IV Class 'A' 'B' 'AB' and 'C' amplifiers, configuration of audio amplifiers, Calculations of power gain, efficiency, dissipation and distortion, oscillators, their criteria, Hartley, Collpit and R-C oscillators, Crystal oscillator.
- UNIT-V Theory, construction and applications of Schottky diode, Tunnel diode, Varactor diode, Selenium diode, LED, Photo diode, PIN diode, photo-transistor.
- UNIT-VI FETs (JFET & MOSFET):  
Types, Characteristics and parameters ( $\mu$ ,  $g_m$  &  $R_{ds}$ ), Applications of FET amplifiers, UJT: Characteristics, working, UJT as relaxation oscillator.

### BOOKS RECOMMENDED:

- 1) Millman H. and Halkies: "Integrated Electronics", Tata Mc-Graw Hill Book Co., New Delhi.
- 2) Mottershead Allen: "Electronics Devices & Circuits" Prentice Hall of India Private Limited, New Delhi, 1986.
- 3) Boylestad R. and "Electronics Devices & Circuits", Prentice Hall of India Private Limited, New Delhi (Fifth Edition), 1993.
- 4) Ramanan K.V.: "Functional Electronics", Tata Mc-Hill Publication Co. Ltd., New Delhi, 1989.
- 5) Millman S., Taub H. and Halkies: "Electronics Devices & Circuits", Mc-Graw Hill Int. Co., Auckland, 1982.

### PRACTICALS:-

### LIST OF EXPERIMENTS

Experiments based on -

Topic	Nos.
1) Characteristics of Devices (Such as diode BJT, FET etc.)	02
2) Rectifiers & Filters	03
3) Transistorized Amplifiers	02
4) Oscillators	03
5) Special Devices	02

Minimum 8 Experiments to be conducted from above. Minimum one experiment from each topic

### FOURTH SEMESTER

#### 4 SE 1

#### POWER PLANT ENGINEERING - II

##### SECTION A

- Unit-I: Introduction: Fundamentals of Fluid Mechanics, Definition of fluid, Units and dimension-basic concepts applicable to fluid mechanics. Properties of fluid.
- Fluid Statics- I: Pascal's Law, Hydrostatic law of pressure variation. Measurements of pressure -Piezometers and U-tube manometers. Forces on immersed areas- plane and curved.
- Unit-II: Fluid Statics-II: Buoyancy, Equilibrium of floating bodies, Metacenter.
- Kinematics: Types of flow- Steady-unsteady, Uniform-non uniform, 1-2-3 dimensional flow, Stream line, Streak line, pathline, stream tube.
- Euler's equation of motion along a stream line and its integration to prove Bernoulli's theorem, Applications- Venturimeter.
- Pipe Flow: Darcy Weisbach equation (no proof), Introduction to minor losses.
- Unit-III: Impact of Jet: Impact of jet on stationary and moving plates and vanes: Moment of momentum equation (statement only), Velocity diagrams.
- Hydraulic Machines: Pumps: Types -Centrifugal Pump and Reciprocating Pump and its working principle, Component parts, Workdone, efficiency.

**SECTION B**

Unit-IV: Hydraulic Turbines: Classification of turbines, Description of Pelton wheel and Francis Turbine, Calculation of work done, power and efficiencies, specific speed and selection of turbines, cavitation.

Hydro-Electric Power Plant: Gross head, net head, Calculation of power (KW), General layout of hydroelectric power plant, Selection site for a Hydro-electric plants, Merits and demerits of Hydroelectric power plant, Safety measures and preventive maintenance of hydro plant, Combined operation of Hydro-Thermal power plant.

**Unit - V : Introduction to non-conventional power plants - I**

Solar power plant: Solar energy introduction and basic concepts, Low temperature thermal power generation, High temperature thermal power generation, power from solar photovoltaics, Solar energy storage.

Unit-VI: Introduction to non-conventional power plants- II

- a) Wind Power plant: Principles of wind power, wind turbine operation, site characteristics, Types of wind mills, wind power battery chargers, wind electricity in small independent grids.
- b) Basics of Tidal power plant, simple single pool tidal system, two pool tidal system, geothermal power plant, biogas plant.

**BOOKS RECOMMENDED:**

1. Hydraulics and Fluid Mechanics: P. N. Modi & Seth, Standard Book House, Delhi-6
2. Fluid Mechanics & Hydraulics Machines by R.K. Rajput, S. Chand & Co., Delhi
3. Hydraulic Machines Theory & Design by V. P. Vasandani, Khanna Pub., Delhi
4. Fluid Mechanics by Streeter, Wylie, Tata McGraw Hill Co. Limited, Delhi.
5. A text Book of Power plant Engineering By R. K. Rajput, Laxmi Publications, New Delhi
6. Non conventional sources by G. D. Rai
7. Basic principles and utilization by Sukhatme

**SIGNALS AND SYSTEMS****SECTION A****4 SE 2**

Unit I : Linear time Invariant systems: Continuous time and discrete time signals, transformation of the independent variable, exponential and sinusoidal signals, unit impulse and unit step functions, continuous time and discrete time systems, basic system properties, discrete time LTI systems, Continuous time LTI systems, Properties of linear time invariant systems, Causal LTI systems described by differential and difference equations, Singularity functions

Unit II : Fourier Series representation of periodic signals: Response of LTI systems to complex exponentials, fourier representation of continuous time periodic signals, convergence of the fourier series, Properties of continuous time fourier series, fourier series representation of discrete –time periodic signals, properties of discrete time fourier series, fourier series and LTI systems, filterin

Unit III : Continuous –Time Fourier Transform: Development of the fourier transform representation of an aperiodic signal, the Fourier transform for periodic signals, properties of the continuous time Fourier transform, the convolution property, multiplication property, Linear constant coefficient differential equations.

**SECTION B**

Unit IV: Sampling: Representation of continuous time signals by its samples, reconstruction of a signal from its samples, aliasing, discrete time processing of continuous time signals, sampling of discrete time signals

Unit V: Communication Systems: Complex exponential and sinusoidal amplitude modulation, demodulation for sinusoidal AM, frequency division multiplexing, Single sideband sinusoidal amplitude modulation, amplitude modulation with a pulse train carrier, pulse amplitude modulation, sinusoidal frequency modulation, discrete time modulation

Unit VI: Z- Transform: Z- transform, the region of convergence for the z-transform, Inverse z- transform, properties of Z transform, analysis and characterization of LTI systems using z transforms, System function algebra and block diagram representations, the unilateral z –transform

**BOOKS RECOMMENDED:**

1. 'Signals and Systems', Oppenheim, Willsky, Nawab, Pearson Education
2. 'Principles of Signals and Systems', Fred Taylor, TMH
3. 'Electronic Communication Systems', Kennedy, TMH
4. 'Principles of communication systems', Taub and Schilling, TMH
5. 'Signals and Systems', Nagrath, Sharan, Ranjan Rakesh and Kumar Sukhbinder, TMH
6. 'Signals and Systems' Sudhakar, TMH
7. 'Network and Systems', D. Roy Choudhary, New-Age International

**4SULEI3****NETWORK ANALYSIS****SECTION-'A'**

- Unit-I : Basic Circuit elements: Circuit components- assumptions for Circuit analysis, sources of electrical energy-standard input signals- Kirchoff's laws-source transformation- mesh and node analysis-network equation for RLC network-magnetic coupling. (10)
- Unit-II : Graph theory and network equation:- Graph of a network-Tress and loops, cut set of a network, Tie-set matrix and loop currents- analysis of network, Network equilibrium equation,dualit-network trasformation. (10)
- Unit-III : Laplace transformation and its applications:- Laplace transformations-basic theorems-gate function-Impulse function-Laplace transform of periodic functions.  
Solution of linear differential equations-Heaviside's partial fraction expansion-Solution of network problems. (10)

**SECTION-'B'**

- Unit-IV : Network theorems:- Superposition theorem-Reciprocity theorem, Thevenin's theorem-Norton's theorem-Milliaman's theorem-Max. power transfer theorem-Substitution theorem-Compensation theorem, Tellegen's theorems. (10)
- Unit V : Twoport network:- Open circuit impedance parameters-short circuit admittance parameters-Transmission parameters-Inverse transmission parameters-Hybrid and inverse hybrid

parameters. interrelationship between the parameters-two port symmetry interconnection of two port networks, input impedance in terms of two-port parameters output impedance-image impedance. (10)

- Unit-VI : Network functions:- Ports and terminal pairs-network functions-poles and zeros-necessary conditions for driving point function-necessary conditions for transfer function-Applications of network analysis in driving network functions-positive real functions-driving point and transfer impedance funcion-LC net work (10)

**TEXT BOOK :**

Network and Systems-D.Roy Choudhary (Wiley Eastern Ltd.1988)

**REFERENCES-**

1. Circuit Theory-ISKV Iyer (Tata Mcgraw Hill)
2. Network Analysis, M.E.Van Valkenburg (Prentice Hall India) 3rd Ed.

**PRACTICALS-**

About 10 experiments based on above syllabus.

**4 SE 4****ELECTRICAL MACHINES****SECTION-A**

- Unit I : Fundamentals of AC rotating machines. AC windings- integral slot, fractional slot and fractional pitch windings- distribution factor, pitch factor and winding factor-harmonic mmf of distributed windings, EMF equation.
- Unit II : Synchronous Generators : constructional details, armature reaction-circuit models and phasor diagram of salient and non salient pole machines - determinations of parameters of the circuit models - methods of determining regulations and efficiency, transient and subtransient reactances.
- Unit III : A) Synchronous Motors : principle of operation - torque equation - circle diagrams- V-curves - hunting and damping starting applications.  
B) Methods of synchronization - synchronous machine on infinite busbars - parallel operation of generators. Introduction to conducting and reporting the test on synchronous machine as per IS.

**SECTION - B**

- Unit IV : Three phase induction motor : rotating magnetic fields, principles of operation-constructural details - circuit models and phasor diagram, performance equations direct and indirect testing-circle diagram.
- Unit V : Methods of starting and speed control of 3 phase IM-double cage motor-methods of braking-single phasing, cogging and crawling, scharge motor.
- Unit VI : A) Single phase IM : different types - starting methods - characteristics and applications.  
 B) AC commutator machines-series motors - characteristics and applications.  
 C) Small machines-principle of operation, construction characteristics and applications of Printed Circuit Motor (PCM), Syn, ind motor, reluctance motor and hysteresis. Introduction to conducting and reporting the test on single phase induction motor as per IS.

Practicals : At least eight experiments based on the above syllabus.

**TEXT BOOKS :**

1. Theory of AC Machines : A.S.Langsdorf (McGraw Hill)
2. Performance and Design of AC Commutator Motors - Openshov - Taylor (McGraw Hill)
3. Performance and Design of Alternating Current Machines : M.C.Say,
4. Electrical Machines - Nagrath, Kothari. (Tata McGraw Hill)
5. Latest Indian Standard guide for testing synchronous machine and single phase induction motor.

**4 SE 5 ANALOG AND DIGITAL CIRCUITS****SECTION-A**

- Unit I : Introduction to IC's : Monolithic IC technology the planner process, Fabrication, BJT, FETs, CMOs, Technology, Characteristics of IC components, Operation amplifier; Block schematic internal circuits, Level shifting, overload protection, study of IC 741 op-amo, Measurement of op-amp parameter. (10)
- Unit II : Linear and Non-linear Application of Op-amp:- Inverting and noninverting amplifiers, voltage follower, integrator, differentiator differential amplifier, Sinusoidal RC-phaseshift and Wein bridge oscillators, clipping, clamping and

comparator circuits using op-amps. Astable, bistable and monostable multivibrator using op-amps. (10)

- Unit III : Other linear IC's : Block schematic of regulator IC 723, and its applications, study of 78 \*\*, 79 \*\* and its applications, SMPS,Block schematic of timer IC 555 and its applications as a timer, astable, monostable, bistable multivibrator and other applications, Operation of phase lock loop system and IC 565 PLL, its application. (9)

**SECTION-B**

- Unit IV : Basic Logic Circuits : Logic gate characteristics, NMOS inverter, propagation delay, NMOS logic gate, CMOS inverter, CMOS logic gates, BJT inverter, TTL, NAND gate, TTL output, state TTL logic families, ECL circuits, composition logic families. (10)
- Unit V : Combinational Digital Circuits: Standard gate assemblies, Binary adder, Arithmetic functions, Digital comparator, Parity check generator, Decoder / demultiplexer, Data selector / multiplexer, Encoder, ROM, Two dimensional addressing of ROM, ROM applications, PROM, EPROM, PAL AND PLAS. (10)
- Unit VI : Sequential Circuits and Systems: Bistable Latch, Flip-Flop clocked SR, J-K, T, D type shift Registers, counter. design using filp-flops, Ripple and synchronous types, application of counters, Dynamic MOS shift registers, RAM, Bipolar RAM Cells. (9)

**BOOKS:-**

1. Millaman, Microelectronics, 2nd Ed., McGraw Hill.
2. Gayakwad, Op-Amp & LLG, 2nd Ed.
3. Malvino & Leach, Digital Principles & Applications, 4th Ed., McGraw Hill.
4. K.B.Botkar, Integrated Electronics (Khanna Publishers.)

**LABORATORY****List of Experiments:**

1. INV-NON INV Amplifier using IC 741.
2. Integrator & Differentiator using IC 741.
3. Voltage follower using IC 741.
4. Weinbridge oscillator using IC 741.

5. Astable Multivibrator using IC 741.
6. Astable Multivibrator using IC 555.
7. Voltage Regulator using IC 723.
8. Verification of MUX using IC 74151.
9. Study of various DEMUX chips & verification of DEMUX using IC 74155.
10. Verification of transistor inverter.
11. Verification of BCD to seven segment using IC 7447.
12. Verification of J-K FF by using IC 776.
13. Verification of Comparator using IC 7485.
14. Verification of BCD to decimal decoder using IC 7442.
15. Verification of decade counter.
16. Code Convertors using PLAs.

**NOTE :** Any five from Sr.No.1 to 7, and five from Sr.No.8 to 16.

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**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**  
**\* ORDINANCE NO. 42 OF 2005**

**Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005**

Whereas it is expedient to frame an Ordinance relating to Examination in Environmental Studies leading to Bachelor Degree level, hereinafter appearing, the Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called "Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005."
2. This Ordinance shall come into force from the Academic session 2005-06.
3. In this Ordinance and in other ordinances relating to the examination, unless there is anything repugnant in the subject or context :-
  - (i) "Academic session" means a session commencing on such date and ending with such date of the year following as may be appointed by the Management Council.
  - (ii) "Admission to an examination" means the issuance of an admission card to a candidate in token of his having complied with all the conditions laid down in the relevant ordinance, by a competent officer of the University.
  - (iii) "Applicant" means a person who has submitted an application to the University in the form prescribed for admission to an examination.
  - (iv) "Candidate" means a person who has been admitted to an examination by the University.
  - (v) "Regular Candidate" means an applicant who has applied for admission to a University examination through an affiliated college, Department or Institute in which he/she has prosecuting a regular course of study.
  - (vi) "Examinee" means a person who present himself/herself for an examination to which he/she has been admitted.
  - (vii) "Examination" means an examination prescribed by the University under the relevant Ordinance.
  - (viii) "External Candidate" means a candidate who is allowed to take a University examination in accordance with the provision of Original Ordinance No. 151.
  - (ix) " Non-Collegiate Candidate" means a candidate who is not a collegiate candidate.

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\* As amended vide Ordinance Nos. 7 of 2006 & 10 of 2007.

- (x) An "Ex-student" is a person who having once been admitted to an examination of this University, is again required to take the same examination by reason of his failure or absence thereat and shall include a student who may have joined a college, Department or Institute again in the same class.
  - (xi) "Bachelor Degree Examination" means an examination leading to Bachelor Degree of the University.
  - (xii) "Previous Year" means a year following by final year of Bachelor Degree.
4. Save as otherwise specifically provided, the conditions prescribed for admission to the examination under this Ordinance shall apply to all persons who wish to take the examination to the Degrees of the University mentioned in para 5 below.
  5. The conditions prescribed for admission to examination under this Ordinance shall apply to following degrees of the University :-
    - 1) Bachelor of Arts
    - 2) Bachelor of Performing Arts
    - 3) Bachelor of Fine Arts
    - 4) Bachelor of Mass Communication
    - 5) Bachelor of Social Work
    - 6) Bachelor of Commerce
    - 7) Bachelor of Business Administration
    - 8) Bachelor of Science
    - 9) Bachelor of Computer Science
    - 10) Bachelor of Computer Applications
    - 11) Bachelor of Pharmacy
    - 12) Bachelor of Science (Home Science)
    - 13) Bachelor of Technology (Cosmetics)
    - 14) Bachelor of Engineering
    - 15) Bachelor of Engineering (Part Time) (Civil)
    - 16) Bachelor of Textile
    - 17) Bachelor of Technology (Chemical Technology)
    - 18) Bachelor of Technology (Chemical Engg.)
    - 19) Bachelor of Architecture, and
    - 20) Bachelor of Laws (Five Year Course)
  6. i) Environmental Studies shall be a compulsory subject for a previous year examination of the following Bachelor Degrees of the University,
    - 1) Bachelor of Arts
    - 2) Bachelor of Performing Arts
    - 3) Bachelor of Fine Arts
    - 4) Bachelor of Mass Communication

- 5) Bachelor of Social Work
  - 6) Bachelor of Commerce
  - 7) Bachelor of Business Administration
  - 8) Bachelor of Science
  - 9) Bachelor of Computer Science
  - 10) Bachelor of Computer Applications
  - 11) Bachelor of Pharmacy
  - 12) Bachelor of Science (Home Science)
  - 13) Bachelor of Technology (Cosmetics)
  - 14) Bachelor of Engineering (Part Time) (Civil)
- ii) Environmental Studies shall be a compulsory subject for IIIrd & IVth Semester of the following Bachelor Degrees of the University,
- 1) Bachelor of Engineering
  - 2) Bachelor of Textile
  - 3) Bachelor of Technology (Chemical Technology)
  - 4) Bachelor of Technology (Chemical Engineering)
  - 5) Bachelor of Architecture, and
- iii) Environmental Studies shall be a compulsory subject for Vth & VIth Semester of the Degree of Bachelor of Laws (Five Year Course)
- iv) Students admitted to Second Year/Third Year/IVth Semester/ VIth Semester of various degree examination courses in different Faculties in the academic session 2005-06 or thereafter shall have to appear for examination in the subject Environmental Studies.
7. The main examination leading to Environmental Studies shall be held in Summer and supplementary examination in Winter every year, at such places and on such dates as may be appointed by Board of Examinations.  
**Explanation:-** Examination shall be conducted on the basis of one common question paper for all Bachelor Degree Examination courses irrespective of annual or semester pattern.
8. Scope of the subject for annual pattern examination and or semester pattern examination shall be as provided under the syllabus.
9. Common question paper for all courses covered under this Ordinance alongwith answer books shall be supplied by the University to the Colleges, Departments and Institutes for conducting the examination of the subject.
10. Valuation of the answer books relating to this subject shall be done at College/Department/Institution level only. Remuneration for valuation of answer books shall not be paid by the University.  
Provided that prescribed evaluation fee for evaluation of each answer

book/s of an external examinee/s appeared from the examination centre shall be paid to each examination centre.

11. It shall be obligatory on the part of the College/Department/Institute to submit candidate wise following information to the University on or before the date as may be prescribed by the University :-

Sr. No.	Grade/Category	Marks secured
1.	“A”	- 60 and above
2.	“B”	- 45 to 59
3.	“C”	- 35 to 44
4.	“D”	- 25 to 34
5.	“Fail”	- 24 and below
6.	“Absent”	

12. For the purposes of teaching, learning and examination, the Committee consisting of three teachers shall be appointed by the Principal/ Head of the Department/Head of the Institution under his/her Chairmanship/ Chairpersonship. While appointing three teachers on the said committee, the Principal shall take care that the teachers to be appointed on the committee, if necessary, shall be from different faculty.
13. i) Duration of theory examination of this subject shall be three hour.  
ii) For all Bachelor Degree examinations, common question paper of 100 marks shall be provided by the University.  
iii) Distribution of these 100 marks shall be as follows :-
- |   |   |          |
|---|---|----------|
| a) Part-A, Short Answer Pattern           | - | 25 Marks |
| b) Part-B, Essay type with inbuilt choice | - | 50 Marks |
| c) Part-C, Essay on Field Work            | - | 25 Marks |
14. Medium of instruction shall be English or Marathi or Hindi. Question paper shall be supplied in English and Marathi and Hindi. A candidate shall have option to write answers in English or Marathi or Hindi.
15. Examination for the subject Environmental Studies shall be compulsory for external candidates appearing as a fresh candidate at Winter and/or summer examination.
16. For teaching of the subject, there shall be atleast two hour per week. For teaching the subject to the regular candidates, a full time approved teacher of the University and or a person having Postgraduate Degree in any faculty with second class shall be considered elligible.

17. For teaching of the subject, additional fee to be charged to regular candidate shall be as prescribed by the University.
18. Every College/ University Teaching Department shall charge additional fee of Rs. 100/- to every Student of the subject Environmental studies. Out of this Rs. 100/-, the College/University Teaching Department shall have to pay Rs. 25/- to the University as an examination fee of each candidate for the subject environmental studies.
19. The Grade secured by an examinee in the examination of this subject shall not be considered for providing the facility of A.T.K.T. in next higher class.
20. The provisions of Ordinance No. 18/2001 shall not be applicable for securing a grade or higher grade in the examination of this subject.
21. Result of the Final Year of the respective Degree shall not be declared of an examinee unless he/she secures any one of the grade in the examination of subject.

Provided an examinee admitted to Five Year LL.B. course desiring not to continue his/her education beyond Sixth Semester of the said course shall have to secure any one of the grade in the examination of the subject otherwise his/her result of Sixth Semester for awarding B.A. degree shall not be declared.

22. Certificate shall be issued, to the successful examinees in the subject Environmental Studies, after the examination.

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## APPENDIX-B

## FOUR YEAR B.E. DEGREE COURSE

## SEMESTER PATTERN

## SEMESTER : THIRD

## BRANCH : ELECTRICAL ENGINEERING (ELECTRONICS &amp; POWER)

## ABBREVIATIONS :-

S - SEMESTER PATTERN

E - Electrical (Electronics &amp; Power)

L : Theory Lecture  
T : Tutorial  
P : Practical  
D : Drawing / Design

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme											
			L	T	P/D	Theory					Practical						
						Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks	Max. Marks College Assessment	Total	Minimum Pass Marks		
1.	3SE1	Mathematics-III	4	1	-	5	3	80	20	100	40	—	—	—	—		
2.	3SE2	Power Plant Engineering-I	4	1	-	5	3	80	20	100	40	—	—	—	—		
3.	3SE3	Electrical Machines-I	4	1	2	7	3	80	20	100	40	25	25	50	25		
4.	3SE4	Electrical Measurement Instrumentation	4	1	2	7	3	80	20	100	40	25	25	50	25		
5.	3SE5	Electronic Devices & Circuits	4	1	2	7	3	80	20	100	40	25	25	50	25		
TOTAL			20	5	6	31						500	150				

**GRAND TOTAL : 650**

## SEMESTER : FOURTH

1.	4SE1	Power Plant Engineering-II	4	1	-	5	3	80	20	100	40	—	—	—	—		
2.	4SE2	Signals & Systems	4	1	-	5	3	80	20	100	40	—	—	—	—		
3.	4SULEI3	Network Analysis	4	1	2	7	3	80	20	100	40	25	25	50	25		
4.	4SE4	Electrical Machines-II	4	1	2	7	3	80	20	100	40	25	25	50	25		
5.	4SE5	Analog Devices & Circuits	4	1	2	7	3	80	20	100	40	25	25	50	25		
TOTAL			20	5	6	31						500	150				

**GRAND TOTAL : 650**

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**SYLLABUS FOR  
ENVIRONMENTAL STUDIES  
AT BACHELOR DEGREE LEVEL**

**Total Marks : 100**

**PART-A**

**SHORT ANSWER PATTERN                      25 Marks**

**1. The Multidisciplinary nature of environmental studies**

- . Definition, scope and importance.
- . Need for public awareness.

(2 lecture hours)

**2. Social Issues and the Environment**

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

(7 lecture hours)

**3. Human Population and the Environment**

- . Population growth, variation among nations.
- . Population explosion - Family Welfare Programme.
- . Environment and human health.
- . Human Rights.
- . Value Education.
- . HIV / AIDS.
- . Women and Child Welfare.
- . Role of Information Technology in Environment and human health.
- . Case Studies.

(6 lecture hours)

**PART-B**

**ESSAY TYPE WITH INBUILT CHOICE                      50 Marks**

**4. Natural resources :**

- . **Renewable and non-renewable resources :**
- . Natural resources and associated problems.

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

(8 lecture hours)

**5. Ecosystems**

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

(6 lecture hours)

**6. Biodiversity and its conservation**

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

(8 lecture hours)

**7. Environmental Pollution**

- . Definition
    - . Causes, effects and control measures of :-
      - Air pollution
      - Water pollution
      - Soil pollution
      - Marine pollution
      - Noise pollution
      - Thermal pollution
      - Nuclear hazards
    - . Solid Waste Management : Causes, effects and control measures of
      - . Role of an individual in prevention of pollution.
      - . Pollution case studies.
      - . Diaster management : floods, earthquake, cyclone and landslides.
- (8 lecture hours)

**PART-C****ESSAY ON FIELD WORK****25 Marks****8. Field work**

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

- (Notes :**
- i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.
  - ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and
  - iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

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

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