**BACHELOR OF ENGINEERING (ELECTRICAL & ELECTRONICS)
VIII SEMESTER**

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**Elective-I**

(i) *Electrical Machine Design*

(ii) *High Voltage AC-DC*

(iii) *Advance Control Systems*

**Elective-II**

(i) *Wireless Communication*

(ii) *Optical Communication*

*A student can exercise option I and Option II according to the following:*

A student may opt for one semester training in lieu of subjects of 8th Semester. The marks for six months training will be equal to the total marks of 8th Semester study. A student can opt for six semester training under following conditions:-

1. The student got selected for job in campus placement and the employer is willing to take that student for the training.
2. The student got offer of pursuing training from reputed government research organization/govt. sponsored projects/govt. research institution provided that student should not be paying any money to get trained. For pursuing this training student needs the prior approval from the Chairperson/Coordinator of the respective branch.
EE-801
Non – Conventional Energy Sources

External: 50  L T P
Sessional: 50  3 1 0
Credits: 4

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and two from Part B.

Part-A

INTRODUCTION: Limitation of conventional energy sources, need and growth of alternative energy source, basic scheme and application of direct energy conservation.

(4)

MHD GENERATORS: Basic principles, gaseous, conduction and hall effect, generator and motor effect, different types of MHD generator, types of MHD material, conversion effectiveness, analysis of constant area MHD generator, practical MHD generator, application and economic aspects.

(8)

THERMO-ELECTRIC GENERATORS: Thermoelectric effects, Seebeck effect, Peltier effect, Thomson effect, thermoelectric converters, figures of merit, properties of thermoelectric material, brief description of the construction of thermoelectric generators, application and economic aspect.

(8)

PHOTO VOLTAIC EFFECT AND SOLAR ENERGY: Photovoltaic effect, different types of photovoltaic cells, cell fabrication, characteristics of photovoltaic cells, conversion efficiency, solar batteries, application, solar radiation analysis, solar energy in India, solar collectors, solar furnaces and applications.

(8)

Part-B

FUEL CELLS: Principle of action, Gibb's free energy, general description of fuel cells, types, construction, operational characteristics and application.

(6)

MISCELLANEOUS SOURCES: Geothermal system, characteristic of geothermal resources, choice of generator set, electric equipment precautions low hydro-plants, definition of low head hydrometer, choice of site, choice of turbine wind power, history of wind power, wind machines, theory of wind power, characteristic of suitable wind power site, tidal energy, idea of tidal energy, tidal electric generator.

(10)

Recommended Books:

EE-802 (a)

Electrical Machine Design

External: 50
Sessional: 50
Credits: 4

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and two from Part B.

Part-A

1. **Principles of design of Machines**: Specific magnetic and electric loadings output, Real and apparent flux densities, temperature rise calculation, Separation of main dimension for DC machines, Induction machines and synchronous machines. (8)

2. **Heating cooling and ventilation**: Cooling of machines, types of ventilation, continuous and intermittent rating. (4)

3. **Design of Transformers**: General considerations, output equation, emf per turn, choice of flux density and current density, main dimensions, leakage reactance and conductor size, design of tank and cooling tubes, calculation of losses, efficiency and regulation, forces winding during short circuit. (10)

Part-B

4. **Three Phase Induction Motors**: General considerations, output equation, choice of specific electric and magnetic loadings, efficiency, power factor, number of slots in stator and rotor, elimination of harmonic torques, Design of stator and rotor winding, slot leakage flux, leakage reactance, equivalent resistance of squirrel cage rotor, magnetizing current, efficiency from design data. (12)

5. **Alternators**: Types of alternators, comparison, specific loadings, output co-efficient, design of main dimensions. (8)

6. Introduction to Computer Aided Electrical Machine Design. (3)

Books Suggested:

2. Say M.G. The Performance and Design of A.C. Machines, PITMAN (ELBS).
EE-802 (b)  
High Voltage AC-DC

External: 50  
Sessional: 50  
Credits: 4

L T P
3 1 0

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and two from Part B.

Part-A

INTRODUCTION: Introduction of DC Power transmission technology – Comparison of AC and DC transmission – Application of DC transmission – Description of DC transmission system– Planning for HVDC transmission – Modern trends in DC transmission. (7)


HARMONICS AND FILTERS: Sources of harmonics in HVDC systems – Smoothing reactors – Corona and radio interference effects – harmonic distortion factor, types of AC filters, DC filters. (6)

Part-B

GENERATION OF IMPULSE VOLTAGE AND CURRENT: Introduction to standard lightning and switching impulse voltages, analysis of single stage impulse generator, expression for output impulse voltage, multistage impulse generator, components of multistage impulse generator, generation of switching impulse voltage, generation of high impulse current. (8)

MEASUREMENT OF HIGH VOLTAGES: Chubb for HVAC measurement. Standard sphere gap measurements of HVAC, HVDC and impulse voltages, Factors affecting the measurements, Surge current measurement-Klydanograph and magnetic links. (6)

NON-DESTRUCTIVE INSULATION TESTING TECHNIQUES: Dielectric loss and loss angle measurements using Schering Bridge, transformer ratio Arms Bridge, need for discharge detection, factor affecting the discharge detection, discharge detection methods-straight and balanced methods. (8)

TEXT BOOKS:


REFERENCE BOOKS:


EE- 802(c)
Advanced Control Systems

External: 50 L T P
Sessional: 50 3 1 0
Credits : 4

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and two from Part B.

Part A

Review of Control Engineering: Time response and Frequency response methods, Root locus method; Compensation Techniques and Controllers: Design of feedback control system; Types of compensation: Series or cascade, feedback, state feedback, series feedback; Lead compensator; Lag compensator; Lag-lead compensator, Controllers: PI, PD, PID.

(12)

State Space Techniques: Review of state space representation of systems by various methods. Solution of state equations-state transition matrix. Transfer function from state variable model; Controllability & observability of state variable model; optimal control systems; pole placement using state variable; limitations of state variable feedback.

(10)

Part B

Digital Control Systems: Introduction; sampled data control systems: Sampler and hold circuit; z-transform; Pulse transfer function; Stability analysis of discrete systems.

(10)

Robust Control Systems: Robust control systems and system sensitivity analysis of robustness; Systems with uncertain parameters; Design of Robust control systems; Three term PID controller.

(13)

Recommended Books:
1. Automatic Control Systems by B.C.Kuo, Prentice Hall of India
2. Modern Control Engineering by Ogatta, Prentice Hall of India.
4. Modern Control Systems by Dorf and Bishop, Addison Weslay.
EE-803
Entrepreneurship

External: 50       L T P
Sessional: 50     3 1 0
Credits: 4

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and two from Part B.

Part A

Understanding Ownership Structure: Definition of small scale, medium scale and large scale enterprises, role of small enterprises in economic development, policies governing SMEs, Steps in setting up a small unit, Sources of finance for SME’s,

Setting up of a small Business Enterprise:; Rationale for Small & medium enterprise; Objective; Scope; Role of SME in Economic Development of India, Identifying business opportunity in various sectors, SME Registration; NOC from Pollution Board; machinery and equipment selection; project report preparation; project planning and scheduling using networking techniques of PERT / CPM; Methods of Project Appraisal.

Institutional Supporting Small Business-Central / State level Institution, Preparation of a Business Plan – Elements of a Business Plan, Kinds of Business plans and overview of different aspects

Social Entrepreneurship-Definition, importance and social responsibilities-NGOs Problems of SMEs and prospects, Causes and Symptoms of sickness – cures of sickness, Govt. policies on revival of sickness and remedial measures, Turnaround strategies for SMEs

Part B

Understanding Entrepreneurship: concept and definitions, entrepreneurial characteristics and skills, importance and significance of growth of entrepreneurial activity, classification and types of entrepreneurs; entrepreneurial competencies, theories of entrepreneurship, factor affecting entrepreneurial growth – economic, non-economic factors; entrepreneurial training; entrepreneurial success and failures, Ethics and Social Responsibility of an Entrepreneur.


Suggested Readings:
1. Vasant, Desai; Entrepreneurship, Himalaya Publishing House
2. Taneja & S.L. Gupta.; Entrepreneurship Development,
3. I.M.Pandey, Venture Capital –The Indian Experience, Prentice Hall of India,
4. B.C.Tandon, Environment and Entrepreneur; Chug Publications, Allahabad
5. Siner A davis: Entrepreneurial Megabuks; John Wiley and Sons, New York
6. S.B. Srivastava A practical guide to industrial entrepreneurs, Sultan Chand & Sons,
EE-804 (a)
Wireless Communication

External: 50 L T P
Sessional: 50 3 1 0
Credits: 4

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and two from Part B.

Part-A

Introduction
Evolution of Mobile Communication Systems, Paging systems, cordless telephone systems, cellular telephone systems, comparison of common wireless communication systems, 2G cellular networks, 2.5 G wireless network, HSCSD, GPRS, EDGE technology, 3G wireless network, UMTS, 3G CDMA2000, 3G TD-SCDMA, Wireless Local Loop, Blue tooth and Personal Area Networks

Cellular System Design Fundamentals
Frequency reuse, Channel alignment strategies, handoff strategies, interference and system capacity, Near for problems, power control, improving coverage and capacity in cellular systems, parameters for mobile multipath channel, Small scale fading.

Modulation Techniques
Amplitude Modulation, Angle modulation, Digital Modulation, Spread Spectrum Modulation techniques

Part-B

Diversity Techniques for Mobile Radio Systems
Dispersive channels, space diversity, frequency diversity, Polarization diversity, Hybrid and quadruple diversity, RAKE receiver, Equalizer techniques. Fundamentals of channels coding.

Overview of Multiple Access Techniques
Simplex, Duplex TDD and Time Division Duplex, Time Division Multiple Access(TDMA), FDMA and OFDM, CDMA, Hybrid multiple access, Management of voice, Data and Video(Multimedia) information

Wireless Networking
Difference between wireless and fixed telephone networks, ISDN, Development of wireless networks.

Wireless Systems
GSM, GSM Architecture, CDMA Digital cellular standard, IS-95 system.

Books Recommended:
EE-854(a)
Wireless Communication Lab.

Sessional: 50
Credits : 1

Practicals related to Theory.
EE-804(b)
Optical Communication

External: 50 L T P
Sessional: 50 3 1 0
Credits: 4

Note: Examiner shall set eight questions, four from Part-A and four from Part-B of the syllabus. Candidate will be required to attempt any five questions selecting at least two questions from Part A and two from Part B.

Part-A

Overview Of Optical Fibre Communication:
Elements of basic communication system, communication system architecture and advantages of optical communication.

Optical fibre wave guides, transmission characteristics and fabrication techniques:
Ray Theory of Transmission, Electromagnetic mode theory for optical communication of both types of fibers viz step index fiber and graded index fibers Attenuation, Material absorption losses, linear and non linear scattering losses, fiber bend loss, dispersion viz intermodal dispersion and intramodal dispersion, overall fiber dispersion and polarization. Preparation of optical fiber: liquid-phase techniques, vapor phase deposition techniques

Couplers And Connectors:
Connector Principles, Fiber End Preparation, splices, connectors

Optical Fiber Sensors:
Intensity modulated sensor - general features, intensity modulation through light interruption, shutter multimode fiber sensors and reflective fiber optic sensors.

Part-B

Optical Sources And Detectors:
Sources: Basic principle of surface emitter LED and edge emitter LED- material used, structure, internal quantum efficiency and characteristics, LASER Diode - material used, structure, internal quantum efficiency and characteristics, working Principle and characteristics of Distributed feedback (DFB) laser. Detectors: PIN photodiode - material used, working principle & characteristics, Avalanche Photodiode: - material used, working principle and characteristics.

Optical Fiber Measurements:
Total Fiber attenuation measurement using cut back technique, dispersion measurement in frequency and time domain, fiber refractive index profile measurement using interferometric methods, Numerical Aperture measurement and fiber diameter measurement.

Books Recommended:
List of Experiments:

1. To determine the Numerical aperture of a given fibre & losses in optical fibre.
2. To determine the V-parameter, the core radius & core cladding dielectric constant difference of a step index single mode fibre.
3. To measure the cut of the wavelength of a single fibre.
4. To study fibre optical analog link
5. To study fibre optical digital link
6. To study the effect of EMI/RFI on a fibre medium.
7. To setup the multiplexer & observe the simultaneous transmission of several channels on fibre optical links.
8. To study Manchester coding/decoding of fibre optical link.
9. To study LASER communication system
10. Use the connecterisation/kit/splicing kit
11. To study the following instruments
    (a) Fibre optical power meter
    (b) Fibre optical power source
12. To study optical fibre system using laser
13. To study bending losses in OFC.