

<b>L: 3</b>	<b>HU 501 Economics and Principles of Management</b>
<b>T: 1</b>	<b>Theory: 100 + 50</b>
<b>P: 0</b>	<b>Sessional: 50 + 25</b>
	<b>Time: 3 hours</b>

## **Part A. Economics**

1. Economics: Meaning, nature and scope;
2. Consumer behaviour and demand analysis: Alternate theories on consumer behavior.
3. Producer behaviour: Production function. Production analysis and input demand. Cost Analysis. Estimation of cost functions. Managerial uses of cost functions.
4. Price and output determination: Price concepts; Pricing under different objectives; Profit and break even analysis, Differential pricing; Alternative market models; Market structure and Government intervention.
5. Investment analysis: time value of money. Cash flows and measures of investment worth; investment analysis.
6. Money, Why money matters, value of money- Quantity theory of Money; index numbers. Interest rate determination.
7. The financial system- The Central bank, Stock Exchange and the market for securities, Money market instruments.
8. International trade- theories of international trade. The world Trading Environment- Multilateralism and Bilateralism.
9. Emerging Economic and Business environment

### **Books:**

1. Samuelson and Nordhaus: Economics. Irwin McGraw Hill
2. Gupta, G.S, Managerial Economics
3. H. Davis Managerial Economics
4. Sengupta, A.K and Agarwala M.K. Money Market Operations in India: Skylark Publications, New Delhi

## **Part B. Principles of Management**

1. Management- concepts, status and functions. Role of management. Management skills. Effective versus successful managerial activities. Motivation- early and contemporary theories on motivation- implication of managers and applications.
2. Group behaviour and group dynamics: foundations of group behaviour, Defining and classifying groups; stages of group development; group interaction; External conditions; Group member resources; Group structure; Group processes; tasks and decision making.
3. Leadership- Leadership theories. Recent approach to leadership and contemporary issues in leadership.
4. Organaisational dynamics- Organaisational change and stress management. Human factors in induatry- fatigue and symptoms. Fatigue control.
5. Human resource policies and practices- Selection practices, Training and development programmes; Performance Evaluation; Union- Management interface; Managing diversity in organizations.

6. Investment analysis: Time value of money. Cash flows and measures of investment worth; Investment analysis.
7. Projects and Project evaluation. Economic and financial evaluation of projects. Economic and social cost benefit analysis.

**Books**

1. Essentials of Management- J.L. Marcis
2. Organaisational behaviour. Concepts, Controversies and Applications- Stephen P. Robbins
3. Gupta, G.S, Managerial Economics

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**ET 562 Digital Electronic Circuits**

**Theory: 100 marks**

**Sessional: 50 marks**

**Practical: 50 marks**

**Time: 3 hours**

## **Number System and Codes**

Positional number systems - decimal, binary, octal and hexadecimal. Number base conversion. Representation of negative binary numbers. Codes - BCD, Gray, ASCII extended BCD.

## **Boolean algebra and logic circuits**

Axioms and basic theorems of Boolean algebra. Truth table, logic functions and their realization. Logic gates, standard representation (canonical forms) of logic functions - SOP and POS forms. Min terms and max terms.

## **Simplification of logic functions**

Karnaugh map of 2, 3 and 4 variables. Simplification by algebra and by map method. Function simplification when functions are incompletely specified. Synthesis using AND, OR and INVERT and then to convert to NAND or NOR implementation.

## **Logic families:**

The TTL family. Brief idea about ECL and CMOS logic families Gate properties fan-in, fan-out, propagation delay and power-delay product.

## **Combinational logic circuit design:**

Combinational logic circuits and building blocks. Binary adders and subtractors. Encoders, decoders, multiplexers, demultiplexers, comparators, parity generators etc. Realization of logic functions through decoders and multiplexers.

## **Introduction to sequential circuits:**

Flip-flops - truth table and state table. The S-R, J-K, T and D flip-flop. Race condition. Sequential circuits, clock, counters and registers. Ripple counter, synchronous counters, up/down counters, modulo-N counter. Design of counters - state diagram.

## **Some functional devices:**

SSI, MSI LSI and V LSI devices. RAM and ROM - their uses. Some commonly used digital ICs.

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**EE 543 Control System I**  
**Theory: 100 marks**  
**Sessional: 50 marks**  
**Practical: 50 marks**  
**Time: 3 hours**

### **Elementary concepts**

Open loop and closed loop systems. Examples of modern control systems. Definition of Linear, Nonlinear, Time Invariant and Time Variant, Continuous and discrete control systems

### **Models of Physical Systems**

Formulation of differential equations for a dynamic system. Mechanical and electrical systems. Transfer functions of a linear system. Block diagrams and reduction technique, signal flow graphs. Mason's formula. Standard test signal's \_step, ramp, parabolic and impulse. impulse response.

### **Introduction to control system components**

Error detectors, servo motors, techogenerators and servo amplifiers. Determination of transfer functions.

### **Time domain analysis**

Poles, zeros and characteristics equations, relation between S plane root locations and transient response. Performance specifications in time domain such as overshoot, rise time, setting and steady state error. Transient response of second order systems. Derivative and integral control and their effect on the performance of the second order systems. System types and error constants. Generalized error coefficients. Transient response of higher order systems(outline only). Routh's satiability criterion, scopes and limitations of Routh's criterion.

### **The root locus technique**

Introduction. Rule for contruction. System analysis and design(outline only) using root locus.

### **Frequency domain analysis**

Logarithmic plots, polar plots, Log magnitude vs phase plots.

Nyquist stability criterion, stability analysis, Relative stability. Closed loop frequency response. Experimental determination of transfer functions. M and N circle.

### **Textbooks and references**

1. Automatic Control System- Kuo.
2. Modern Control Engg.- Ogata.
3. Control system Engg.- Nagrath & Gopal.

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## **ET 564 Instrumentation & Electronic Measurements**

**Theory: 100 marks**

**Sessional: 50 marks**

**Practical: 50 marks**

**Time: 3 hours**

### **Review**

Quick review of electromagnetic indicating instruments and potentiometers. Limitations of such instruments.

### **Bridges**

The principles of bridges. The basic Wheatstone bridge, Kelvin's bridge, Anderson's bridge and the Hey's bridge.

### **Operational Amplifiers**

Basic circuits. Enhancing the performance of traditional measuring instruments with the help of Op- Amps. Increasing input resistance, range and accuracy. High frequency instruments build around precision rectifiers. Measurements of important electrical parameters. Four quadrant multipliers and the measurement of power.

### **DA/AD Converter**

Effect of resolution and non-linear behaviour on accuracy of measurement. Working of R-2R ladder DA converter. AD conversion - successive approximation type, dual slope integrating type and flash converter.

### **Analog Multiplexing**

Analog switches, sample and hold circuit. Multiplexing of multiple signals.

### **The Oscilloscope**

The principle and the important components of an analogue scope. Time base and deflection fundamentals. Delayed time base. Multiple channels and the various mode of display. Concepts of digital scopes. The use of the oscilloscope for: measuring voltage and current waveforms, frequency and phase measurements, displaying electrical and magnetic characteristics of materials.

### **Use of Microcomputers**

Use of microcomputers for transient measurements. RMS calculation, linearization of thermocouple signals. The IEEE-488 standard.

### **Measurement and error**

Statistical analysis, probability of errors. System of units and standards of measurement.

**Text Books/references:**

1. William David Cooper- Electrical Instrumentation and Measurement Techniques. Prentice Hall of India Private Limited.
2. Golding and Widdis- Electrical Measuring Instrument and Measurement. ELBS.
3. E.O. Doebelin – Measurement Systems.
4. Ralph Morison – Instrumentation Fundamentals and Applications, John Wiley & Sons.
5. D. Patronobis – Sensors and Transducers, Wheeler Publications.

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**ET 565 Analog Communication**

**Theory: 100 marks**

**Sessional: 50 marks**

**Practical: 50 marks**

**Time: 3 hours**

**Spectra and Noise**

Review of Fourier series and transform; energy/power-type signals, auto-/cross-correlation functions, spectral density; thermal noise, time average noise statistics, band-limited white noise.

**Amplitude Modulation**

Need for modulation. Types of analog CW modulation. Linear CW modulation schemes. Double Sideband Large Carrier (DSB-LC), Double Sideband Suppressed Carrier (DSB-SC), Single-Sideband (SSB), Vestigial Sideband (VSB). Generation and detection. AM broadcasting.

**Angle Modulation**

Phase Modulation (PM), Frequency Modulation (FM), Bessel functions and FM spectral analysis, Narrowband FM and Wideband FM, frequency division multiplexing (FDM). Generation and detection of PM and FM. Stereophonic FM broadcasting.

**Radio Receivers**

TRF receivers. Superheterodyne receivers. Image frequency. Image rejection ratio. Receiver sensitivity and selectivity. Phase locked loops. Synchronous detection.

**Noise**

Sources and characteristics of different noise. Concept of white Gaussian noise. Noise calculations: noise temperature, noise bandwidth and noise figure. Effect of noise on amplitude modulation systems, effect of noise on angle modulation, comparison of different analog communication systems. Envelope detection and threshold effect. Performance of exponential modulation schemes in presence of noise. Output S/N ratio. Threshold effect in FM. Pre-emphasis/de-emphasis filtering. Comparison of CW modulation systems.

**Pulse Modulation**

Review of sampling theorem and practical sampling of PAM, PWM and PPM signals. Generation and detection.

**Text Books/references:**

1. S. Haykin, *Communication Systems*, 4th ed., John Wiley & Sons, 2001 (2 copies on reserve, K5101.H37 2001).
2. J.G. Proakis and M. Salehi, *Communication System Engineering*, 2nd ed., Prentice Hall, 2002 (2 copies on reserve, TK5101.P75 2002).
3. B. Sklar, *Digital Communications: Fundamentals and Applications*, 2nd Ed., Upper Saddle River, N.J., Prentice-Hall PTR, 2001 (1 copy on reserve, TK5103.7 .S55 2001).

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**ET 566 Power Electronics**

**Theory: 100 marks**

**Sessional: 50 marks**

**Time: 3 hours**

**SCRs**

Basic theory of operation. Characteristics. Ratings. Protection- Series and parallel operation. Methods of firing and commutation. Firing circuits.

**Triacs and Diacs**

Basic theory of operation. Characteristics. Ratings. Protection. A.C. load control using Triacs and Diacs.

**Line Commutated Controlled Converter**

2 pulse, 3 pulse and 6 pulse configurations. A. C. phase control.

**Choppers**

Principles Class; fications and basic chopper circuits.

**Inverters**

Series, parallel and bridge inverters. Voltage control of inverters.

**Control of Electric Motors**

Phase control of D.C. shunt and series motors. Speed control of induction motors using SCRs. Slip power recovery scheme.

**High Frequency Heating**

Principles of Operation and application of induction and dielectric heating. High frequency sources.

**Text Books/references:**

1. G. M. Chute and R. D. Chute -Electronics in Industry, McGraw-Hill.
2. M. Ramamoorthy - An Introduction to Thyristors and their Applications, East-West Press.
3. P. C. Sen - Power Electronics, Tata McGraw-Hill