30

Total No of Questions: [12] **SEAT NO. :** [ ]

[Total No. of Pages : 3]

FE 2008 COURSE
BASIC ELECTRICAL ENGINEERING

Time: 3 Hours **Max. Marks : 100**

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Use of Calculator is allowed.*
5) *Assume Suitable data if necessary*

SECTION I

Q.1 (a) Define Resistance Temperature Coefficient (RTC). State its unit. With usual notations prove that 8M

$$\alpha_2 = \alpha_1 / [1 + \alpha_1 (t_2 - t_1)]$$

(b) An electric pump lifts 12 m^3 of water per minute to a height of 15 meters. If its overall efficiency is 60 %, find the input power. If the pump is used for 4 hours a day find the cost of energy for the month of April. 8M

OR

Q.2 (a) Define insulation resistance & Derive its expression for single core cable. 8M

(b) With neat sketch explain construction & working of Lead Acid Battery. 8M

Q.3 (a) State & Prove maximum power transfer theorem as applied to a d c resistive circuit. 8M

(b) Obtain the equations to convert delta connected resistive network into equivalent star connected network. 8M

OR

Q.4 (a) State & explain Kirchoff's laws as applied to a d c circuit. 8M

(b) State & explain Superposition Theorem as applied to a d c circuit. 8M

Q.5 (a) Compare Electric circuit with magnetic circuit stating clearly the similarities & dissimilarities. 8M

(b) Define self inductance of a coil. & hence state the factors that affect its value. 4M

(c) The length of an air cored solenoid is 1.7 m & area of cross section is 12 cm^2. The number of turns of the coil is 1000. Calculate- 6M

a) the self inductance b) the energy stored in the magnetic field when a current of 10 A flows through the coil.

OR

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OR

Q.6 (a) Define & state units of i) Reluctance ii) MMF 8M

iii) Magnetic flux density iv) permeance

(b) Compare statically induced emf & Dynamically induced emf 4M

(c) Define coefficient of coupling & Derive expression for it. 6M

SECTION II

Q.7 (a) Define Average value of sinusoidally varying quantity. Derive its expression in terms of its peak value. 8M

(b) Two capacitors of 8 μf & 2 μf are connected in series across 400 V supply. Calculate i) resultant capacitance ii) charge on each capacitor iii) voltage across each capacitor. 6M

(c) Define & state the units of - i) Electric flux density ii) Electric field intensity 4M

OR

Q.8 (a) Define RMS value of sinusoidally varying quantity. Derive its expression in terms of its peak value. 8M

(b) An alternating current is given by i= 14.14 sin 377t. Find i) RMS value of current 6M

Ii) Frequency iii) instantaneous value of current at t= 3 msec. Assume wave starts from origin & increasing positively.

(c) Define – i) Form factor ii) Peak factor 4M

Q.9 (a) A series R-L-C circuit has resistance of 50 ohms, inductance of 0.1 H & capacitance of 50 μf connected in series across single phase 230 V, 50 Hz supply. Calculate – i) current drawn by circuit ii) power factor of circuit iii) active and reactive power consumed by the circuit. 8M

(b) Define the terms – i) admittance ii) conductance iii) susceptance as related to a c circuit. State their units. Draw admittance triangle. 8M

OR

Q.10 (a) Two impedances (8+j6) Ω & (3-j4) Ω are connected in parallel. If the total current drawn by combination is 25 A at unity power factor, find the current and power taken by each impedance. 8M

(b) Sketch the waveform of voltage, current & power if $v= V_m \sin\omega t$ volts is applied across R-L series circuit. Derive the expression of current in this case. Also state the expression of power in this case. 8M

Q.11 (a) Write short notes on - i) Losses in transformer ii) Dimmerstat 8M

(b) Three identical coils each having resistance of 10 Ω & inductance of 0.03 H are connected in delta across a three phase 400 V, 50 Hz supply. Calculate – 8M

i) Phase current ii) line current iii) total power consumed by load.

OR

Q.12	(a)	With the help of neat circuit diagram describe the method of performing direct load test on a single phase transformer. Explain how efficiency & regulation can be calculated in this case.	8M
	(b)	Derive the emf equation of single phase transformer.	4M
	(c)	State the relationship between line value & phase value of voltage and current for 3 phase star connected load. Also state the expression for active power and reactive power.	4M

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