

GANPAT UNIVERSITY
B.Tech SEM I (ME/MC/CIVIL/EE)
REGULAR EXAMINATION DEC.-2011
EE101: ELEMENTS OF ELECTRICAL ENGINEERING

SEAT NO. G.P. B

Time: 3 Hours

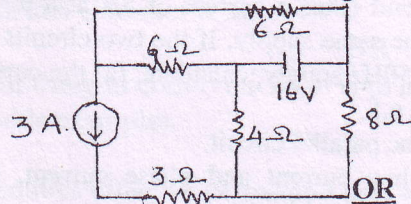
Total Marks: 70

Instructions:

- (1) All Questions are compulsory.
- (2) Figures to the right indicate full marks.
- (3) Answer to two sections must be written in separate answer books.
- (4) Assume suitable data if necessary.

SECTION: I

- Q-1 (a) Derive the equation of transforming a star connected network in a delta network. (04)
- (b) Discuss time constant of a capacitor in detail. (04)
- (c) Use Thevenin's Theorem to find the current flowing through the 8Ω resistor of the network shown in fig. (04)



- OR
- Q-1 (a) Discuss Ohm's law of magnetic circuit. Define mmf, reluctance, permeability. (04)
- (b) State and explain Maximum power transfer Theorem. (04)
- (c) A $2\mu\text{F}$ capacitor and a resistor R are connected in series across a 150V dc supply. A neon lamp which strikes at 90V is connected across the capacitor. (a) what should be the value of R so that the lamp may strike 5 seconds after the switch is closed? (b) If $R=1\text{M}\Omega$, how much time will the lamp take to strike? (04)

- Q-2 (a) Discuss statically induced emf. (03)
- (b) What is co-efficient of coupling? Derive an expression for the same. (04)
- (c) An iron ring of mean diameter 19.1 cm and having a cross-sectional area of 4cm^2 is required produce a flux of 0.44mWb . Find the ampere turns to be provided on the coil wound on the ring. If a saw cut of 1mm wide is made in the above ring how many extra ampere turns are required? The points on $B-\mu_r$ curve are given below. (04)
- | | | | | |
|-----------|------|------|------|------|
| $B(T)$: | 0.8 | 1.0 | 1.2 | 1.4 |
| μ_r : | 2300 | 2000 | 1600 | 1100 |

OR

- Q-2 (a) Discuss Magnetic Hysteresis. (04)
- (b) Compare magnetic circuit with electric circuit. (03)
- (c) Two coils with co-efficient of coupling of 0.5 between them are connected in series so as to magnetise (a) in the same direction (b) in the opposite direction. The corresponding values of total inductances are (a) 1.9H and for (b) 0.7H. Find the self inductances of the two coils and the mutual inductance between them. (04)

- Q-3 Attempt any three: (12)

- (a) Discuss types of lighting schemes and requirement of good lighting.
- (b) Explain Types of Cells.
- (c) The cost of boiling 2kg water in an electric kettle is 12 paise. The kettle takes 6 minutes to boil water from an ambient temperature of 20°C . Calculate (i) the efficiency of the kettle (ii) wattage of the kettle if the cost of 1 unit is 40 paise.
- (d) When a dc supply of V volts is connected to an inductive circuit having a resistance R and an inductance L through a switch, prove that the current in the circuit at any time from the instant of closing the switch is given by

$$i = I_m(1 - e^{-Rt/L})$$

SECTION: II

- Q-4 (a) Define Average value of ac and prove that for sinusoidal ac $I_{ave.} = 2I_m / \pi$ (04)
(b) Explain how impedance triangle is obtained from the phasor diagram of R-L series circuit. What is its significance in ac circuit? (04)
(c) An alternating current of 50Hz following the sine law has an RMS value of 50A. Write down the equation for the instantaneous value of current. Calculate the instantaneous value of current at (i) 0.0025s and (ii) 0.0125s after passing through positive maximum value. At what time measured from positive maximum value, will the instantaneous current be 35.35A? (04)

OR

- Q-4 (a) Derive the expression of impedance, current and power factor for R-L-C series circuit. Draw phasor diagram. (04)
(b) Prove that average power in pure inductive circuit is zero and define frequency, cycle, and RMS value. (04)
(c) A circuit takes a current of 3A at a p.f. of 0.6 lagging when connected to a 115V, 50Hz supply. Another circuit takes a current of 5A at a p.f. of 0.707 leading when connected to the same supply. If the two circuits are connected in series across a 230V, 50Hz supply, calculate: (a) the current (b) the power consumed and (c) the p.f. (04)
- Q-5 (a) Explain phasor method for solving ac parallel circuit. (04)
(b) Derive the relationship between line current and phase current, line voltage and phase voltage for star connected load. (03)
(c) An impedance of $(7+j5)\Omega$ is connected in parallel with another circuit having an impedance of $(10-j8)\Omega$. The supply voltage is 230V, 50Hz. Calculate (i) the admittance, conductance and susceptance of the circuit. (ii) the total current and (iii) power factor. (04)

OR

- Q-5 (a) Explain Two Wattmeter method for measurement of 3-phase power and prove that $W_1 + W_2 = \sqrt{3} V_L I_L \sin \phi$. (04)
(b) Discuss dynamic impedance, admittance, active and reactive power. (03)
(c) A 3-phase, 400V, 50Hz induction motor has a full load output of 14.9kW at which the efficiency and power factor are 0.88 and 0.8 respectively. Find the readings on the two wattmeters connected to measure the power input to the motor. What is the full load line current? (04)
- Q-6 Attempt any three: (12)

- (a) Discuss significance of the Load curve and types of tariff.
(b) Write short note on PMMC and also explain the use of Megger.
(c) Discuss safety rules and explain first aid for electric shock. Compare MCB with ELCB.
(d) Explain the effect of damping system on instrument deflection. Define Maximum Demand, Diversity factor and Plant use factor.

END OF PAPER
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