

GANPAT UNIVERSITY
B.TECH SEM-I (EE/ME/MC/Civil)
REGULAR EXAMINATION DEC-2013

2EE 101:-ELEMENTS OF ELECTRICAL ENGINEERING

Time: 3 Hours

Total Marks:-70

- Instructions:** - 1. Attempt all questions.
 2. Make suitable assumptions wherever necessary.
 3. Figures to the right indicate full marks.

SECTION-I

- Que-1 (A)** Discuss the time constant of a circuit that includes a resistor and a capacitor connected in series across DC supply. [04]
(B) Compare magnetic circuit with electrical circuit. [04]
(C) State Maximum Power Transfer theorem and prove it. [04]

OR

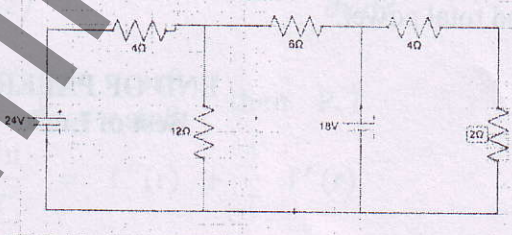
- Que-1 (A)** Derive expressions for total inductance when two coils are connected in series. [04]
(B) Define illumination, lumen, candela and explain requirements of good lighting. [04]
(C) Explain voltage and current divider rules. [04]

- Que- 2 (A)** Discuss self inductance and explain statically induced emf. [04]
(B) Define capacitor and derive the expression of capacitance for parallel plate capacitor. [04]
(C) Explain magnetic hysteresis. [03]

OR

- Que- 2 (A)** Explain Ohm's Law for magnetic circuit. [04]
(B) Derive the equations for delta to star transformation. [04]
(C) Explain types of cells. [03]

- Que-3** **Attempt any three:** [12]
(A) Using Superposition theorem solve the following circuit.



- (B)** An iron ring is made a rod of 2 cm diameter and has mean diameter of 30 cm. It is wound with 250 turns of wire. The relative permeability of iron is 800. A 1 mm air gap is cut in the ring. Find the current required to produce a useful flux of 20000×10^{-8} Wb taking leakage factor 1.12.
- (C)** Two air cored coils are placed close to each other so that 80% of the flux of one coil links with the sssother. Each coil has mean diameter of 2 cm and a mean length of 50 cm. If there are 1800 turns of wire on one coil calculate the no. of turns on the other coil to give a mutual inductance of 15mH.
- (D)** For following loads calculate the energy consumption in kWh for 30 days and cost of energy at a rate of 5 Rs./kWh.
 Lighting load: 20 kW, Average use 4 hours per day.
 Heating load: 30 kW, Average use 6 hours per day.
 Motors load: Total 25 kW with average efficiency of 80%, average use 3 hours per day.

SECTION-II

- Que-4 (A)** Define RMS value and Average value. Derive the expression for the RMS value of the half wave rectified sinusoidal waveform. [04]
- (B)** Explain the series resonance with necessary phasor and vector diagram. [04]
- (C)** Define Tariff and explain types of tariff. [04]

OR

- Que-4 (A)** Prove that for purely inductive circuit the value of average power is zero. [04]
- (B)** Define active, reactive and apparent power and explain any one method to solve parallel AC circuit. [04]
- (C)** Explain PMMC instruments. [04]

- Que- 5 (A)** Derive the relation between line voltage and phase voltage, line current and phase current for Star connected load. [06]
- (B)** Explain methods of power factor improvement. [05]

OR

- Que- 5 (A)** Explain Two Wattmeter Method for Three phase power measurement. [06]
- (B)** Discuss MCB, ELCB, Relay and safety rules in brief. [05]

Que-6 **Attempt the following:** [12]

- (A)** A circuit takes a current of 3A at a power factor of 0.6 lagging when connected to 115V, 50 Hz 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 230V, 50Hz supply. Calculate the current, power consumed and power factor.
- (B)** An inductive circuit of resistance 2Ω and inductance $0.01H$ is connected to a 250V, 50Hz supply. What capacitance placed in parallel will produce resonance?
- (C)** Three coils are connected in delta to a 3 phase, 3 wire, 415V, 50Hz supply and take a line current of 5A at 0.8 lagging p.f. Calculate the parameters of the coil. If the coils are now connected in star to the same supply, calculate the line current and total power.

END OF PAPER

Best of Luck