

Date: 23/12/2016. Student Exam No:- _____

GANPAT UNIVERSITY
B.TECH SEM-I & II (CBCS NEW)
REGULAR/REMEDIAL EXAMINATION NOV-DEC-2016
2EE101:-ELEMENTS OF ELECTRICAL ENGINEERING

Time: 3 Hours

Total Marks:-60

- Instructions:** (1) This question paper has two sections. Attempt each section in separate answer book.
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.
(4) Make suitable assumptions wherever necessary

SECTION-I

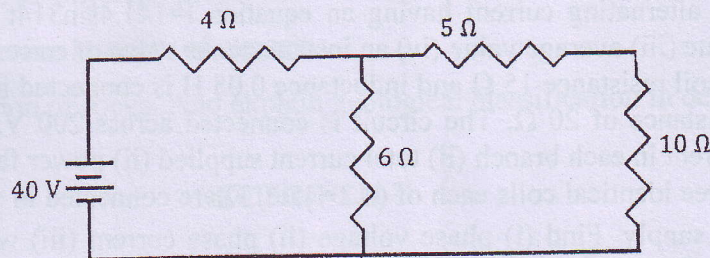
- Que-1** (A) Derive equivalent resistances for delta to star transformation. [04]
(B) Define resistivity and conductivity of the material. State their units. [03]
(C) Derive the expression of energy stored in a capacitor. [03]

OR

- Que-1** (A) State and explain superposition theorem with circuit diagram. [04]
(B) Explain charging of a capacitor C through a resistor R with neat sketch and derive the equation $v_c = V(1 - e^{-t/RC})$. Assume that the R-C series circuit is connected across a d.c voltage V. [04]
(C) Discuss (i) Electric field intensity (ii) Electric potential (iii) Electric flux density [02]
Que- 2 (A) Discuss self and mutual inductance. Derive the expressions of self and mutual inductance. [04]
(B) Prove that the total inductance for magnetically coupled coil connected in series is $L = L_1 + L_2 \pm 2M$ [03]
(C) Give similarities and dissimilarities between electrical and magnetic circuit. [03]

OR

- Que- 2** (A) Discuss leakage flux and leakage co efficient. [02]
(B) Discuss dynamically and statically induced emf. [04]
(C) State maximum power transfer theorem and prove it. [04]
Que-3 Attempt the following questions.
(A) Using Norton's theorem find the current in $10\ \Omega$ resistor in the circuit shown in fig. [03]



- (B) Determine the capacitance of a parallel plate air capacitor with 11 plates. The surface area of each plate is $12\text{ cm} \times 12\text{ cm}$ and the separation distance between the plates is 2.5 mm. What will be the capacitance if air is replaced by dielectric medium with dielectric constant of 3. If the voltage applied is 250V. Find the electric flux density and electric field intensity in the second case. [04]
(C) An iron ring of 40 cm diameter and 7 cm^2 cross section has an air gap of 2 mm. It is uniformly wound with 750 turns of wire and carries a current of 3 A. The iron takes 60% of total m.m.f. Neglect magnetic leakage. Find the total m.m.f, magnetic flux, reluctance and flux density in the ring. [03]

SECTION-II

- Que-4 (A) Obtain the r.m.s. value, average value, form factor and peak factor for Half-wave rectified waveform. [04]
- (B) Discuss different types of lighting scheme. [03]
- (C) Define following terms with respect to a.c. waveform (i) frequency (ii) amplitude (v) phase difference (vi) instantaneous value. (vii) time period [03]

OR

- Que-4 (A) Prove that average power consumption in pure inductor is zero when a.c. voltage is applied. [04]
- (B) Draw and explain a circuit diagram, wave diagram and phasor diagram of a R-L and R-C series circuit. [04]
- (C) An electric motor pump take 3000 W power. Calculate energy consumption in KWh and cost of energy for december month. An electric motor pump operate 2 hours per day. Take Rs 5 per KWh. [02]

- Que- 5 (A) Derive relation between line voltage & phase voltage and line current & phase current relation in 3-phase star connection. Draw phasor diagram. [04]
- (B) Discuss resonance in parallel circuit and derive the equation of resonance frequency. [04]
- (C) Explain the significance of active, reactive and apparent power. [03]

OR

- Que- 5 (A) What do you mean by tariff?. Discuss important types of tariff. [04]
- (B) Explain two wattmeter method for 3-phase power measurement. [03]
- (C) Discuss the phasor method to solve the parallel circuit. [02]

Que-6 Attempt the following questions.

- (A) An alternating current having an equation $i=141.4\sin 314t$. Find: (i) frequency (ii) r.m.s value (iii) average value (iv) an instantaneous value of current when 't' is 2 ms. [03]
- (B) A coil resistance $15\ \Omega$ and inductance $0.05\ \text{H}$ is connected in parallel with a non-inductive resistance of $20\ \Omega$. The circuit is connected across 200 V, 50 Hz supply. Determine (i) current in each branch (ii) total current supplied (ii) power factor of the combination. [04]
- (C) Three identical coils each of $(4.2 + j5.6)\ \Omega$ are connected in star across 415 V, 3- phase, 50 Hz supply. Find (i) phase voltage (ii) phase current (iii) wattmeter readings W_1 and W_2 when used for power measurement. [03]

END OF PAPER