Student Enrollment No. _____

GANPAT UNIVERSITY
B.TECH SEM. II (CE/IT/EC/BM&I/MR/ME$_{INT}$/CI$_{INT}$)
REGULAR EXAMINATION APRIL-JUNE 2015
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.

Section-I

Que-1 (a) Deduce an equation for equivalent inductance when two inductors are connected in series with aiding connection. (04)

(b) An Iron ring of 0.15m diameter and 0.001 m^2 in cross-section with saw cut 2mm wide is wound with 300 turns of wire. The gap flux density is 1 T. The relative permeability of iron is 500. Determine exciting current and inductance. Ignore Leakage and fringing. (04)

(c) What do you understand by Magnetic Hysteresis? (02)

OR

Que-1 (a) Discuss the analogy between electric and magnetic circuit. State the difference between these two types of circuit. (04)

(b) Two identical magnetically coupled coils when connected in series has inductance of 100 mH. When the connection of one of the coils are reversed the resultant series combination has inductance of 40 mH. Calculate their co-efficient of coupling. (04)

(c) What is leakage coefficient? How does it affect the magnetic circuit? (02)

Que-2 (a) Explain Norton's Theorem used to solve electric network. (04)

(b) Two capacitor having 12 μF and 6μF are connected in series and charged from a constant voltage of 230 V supply. Calculate (a) Voltage across each capacitor (b) Charge on each capacitor. (04)

(c) What is time constant for R-C circuit? (02)

OR

Que-2 (a) Discuss parallel plate capacitor and deduce an equation of capacitance for it (04)

(b) State Maximum Power transfer theorem. (02)

(c) Use Thevenin's theorem to find the current flowing through the 6Ω resister of the network shown in below figure. All resistances are in ohms. (04)
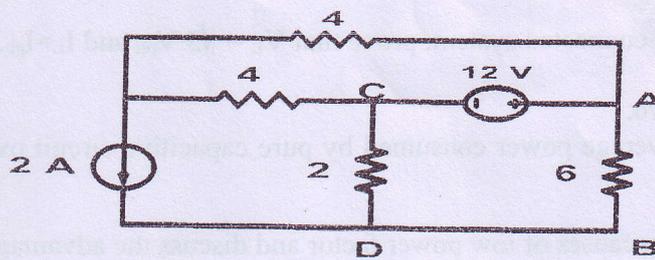
Que-3 A. **Attempt any Two.** (08)
(i) State and explain Joule's law of electric heating also define Thermal efficiency.
(ii) Discuss charging phenomena of capacitor and derive an equation for charging voltage of capacitor.
(iii) Describe in brief the requirements of good lighting. Enumerate the factors to be considered while designing an indoor lighting scheme.

B. Define: (i) Luminous intensity (ii) Magnetic fringing. (02)

Que-4 **(a)** A metal-filament lamp, rated at 750W, 100V is to be connected across a 230V, 50Hz supply (04) What value of (i) a resistor (ii) a capacitance should be connected alternately in series with lamp so it can ignite properly?

(b) Obtain the relationship between average value and peak value of sinusoidal alternating voltage. (04)

(c) Draw impedance triangle for (i) Series R-L circuit (ii) Series R-C circuit (02)

OR

Que-4 **(a)** Obtain an equation of resonance frequency of series RLC circuit. (03)

(b) A rectangular coil of 20 cm length and 10 cm breadth having 100 turns is rotated at a speed of (04) 1000 rpm about its axis perpendicular to that of a uniform magnetic field of strength 0.3 wb/m². Determine (i) Equation for instantaneous emf induced (ii) Peak induced emf (iii) Instantaneous values of the induced emf when plane of the coil is parallel to the field.

(c) Compare series RLC resonance with parallel RLC resonance. (0?)

Que-5 **(a)** Prove that "Two wattmeter method can be used for three phase power measurement." (04)

(b) Find the values of branch current and total current of circuit having two impedances Z_1 and Z_2 (03) connected in parallel across 240 V, 50 Hz supply. $Z_1=3-j6$ ohm and $Z_2=8+j6$ ohm. Also find the power factor of circuit.

(c) List out main types of tariff and explain flat rate tariff and block rate tariff. (03)

OR

Que-5 **(a)** Write the methods to solve the parallel circuit and explain any one of them. (03)

(b) A 3 phase, 400V, 50 Hz supply is connected to balanced star connected load of (10- j20) Ω per (04) phase. Find the Line Current, Power Factor and Power consumed by load.

(c) For 3-phase star connected system, prove that $V_L = \sqrt{3}\ V_{ph}$ and $I_L=I_{ph}$. (03)

Que-6 **A.** **Attempt any two.** (08)
(i) Prove that an average power consumed by pure capacitive circuit over the full cycle of supply voltage is zero.

(ii) Explain the main causes of low power factor and discuss the advantages of high power factor.

(iii) Define (i)Power factor (ii) Inductive reactance (iii) Tariff (iv)Dynamic impedance

B. Three currents having values $i_1=3+j4, i_2=4-j5$ and $i_3=10e^{j30}$ than calculate resultant current (02)
$$i_r = (i_1+i_2)/i_3$$

End of paper