Seat No:-_____

GANPAT UNIVERSITY
B.TECH SEM.1st (ME/MC/Civil/EE)
REGULAR EXAMINATION NOV-DEC 2012
EE101: ELEMENTS OF ELECTRICAL ENGINEERING

TIME:-3 HOURS   TOTAL MARKS-70

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

Section-I

Que-1 (a) Derive the conditions for maximum power transfer when load consists of a variable   (04)
            resistance for D.C
       (b) Derive an expression for the capacitance of a parallel plate with composite medium.   (04)
       (c) Derive expressions of equivalent inductance when two magnetically coupled coils   (04)
            are connected in parallel in two different ways.

OR

Que-1 (a) Explain the method of transforming a star network of resistances into delta network.   (04)
       (b) Derive equation for charging of capacitor in RC circuit. Also define time constant of   (04)
            circuit.
       (c) Using thevenin's theorem, find the current in 5Ω resister in the circuit as shown in   (04)
            below figure.
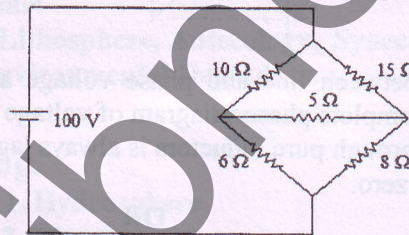
Que-2 (a) Explain Joule's law of electric heating.   (03)
       (b) Derive the equation of co – efficient of coupling.   (04)
       (c) A coil is wound uniformly with 300 turns over a steel ring of relative permeability   (04)
            900 having a mean diameter of 20 cm. The steel ring is made of a bar having cross
            section of diameter 2cm. If the coil has resistance of 50 Ω and is connect to 250 V
            DC supply. Calculate the (i) mmf (ii) field intensity of the ring (iii)reluctance
            (iv)total flux (v) permeance

OR

Que-2 (a) Explain lead-acid Battery.   (03)
       (b) Explain self inductance and derive the methods for finding self inductance.   (04)
       (c) A capacitor is charged to a d.c source a resistor of 1M Ω. If in 1 second, the   (04)
            potential difference across the capacitor reaches 80 % of the final value, calculate
            the capacitance of the capacitor.

Que-3   **Attempt Any Three**   (12)
       (a) Define (i) Leakage co-efficient (ii) Reluctance (iii) Magnetic fringing.
       (b) Explain the laws of illumination.
       (c) Bring out the analogy between electric and magnetic circuit.
   (d) Explain multi plate capacitor.

Que-4 (a) Explain following terms: (i) Frequency (ii) Crest factor (iii) Average Value (iv) Phase difference **(04)**

(b) Obtain RMS value for sinusoidal alternating current and half wave rectified output waveform. **(04)**

(c) Find the circuit constants of a two element series circuit which consumes 700 W with a power of 0.707 leading. The applied voltage is $V=141.4\sin 314t$. **(04)**

OR

Que-4 (a) State the condition for series R-L-C resonance circuit. Derive the equation for resonant frequency and Q-factor. **(04)**

(b) What do you mean by admittance of a circuit? And draw admittance triangle of RL and RC series circuit. **(04)**

(c) The Circuit having Two Impedances of $Z_1=8+j15\ \Omega$ and $Z_2=6-j8\ \Omega$ in Parallel, is Connected to A Single Phase Ac Supply And The Current Drawn is 10A. Find Each Branch Current, Both in Magnitude and Phase, and also the Supply Voltage **(04)**

Que-5 (a) Calculate the r.m.s. value of the voltage waveform shown in below Fig. **(03)**
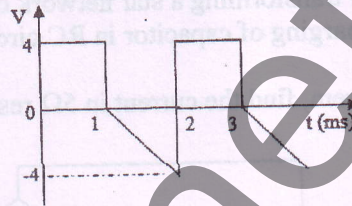
(b) Establish relation between line and phase voltage and current in balanced delta connection. Draw complete phasor diagram of voltage and currents. **(04)**

(c) Prove that current through pure inductors is always lagging by 90° to its voltage and power consumed is zero. **(04)**

OR

Que-5 (a) A balanced 3-phase star connected load of 120 KW takes a leading current of 100 A when connected across 3-phase, 3.3 KV, 50 Hz supply. Determine the impedance, resistance, and power factor of the load. **(03)**

(b) Explain Two Wattmeter method for measurement of 3-Ø power. **(04)**

(c) Define following terms: (i) Load Curve, (ii) Load Factor, (iii) Demand Factor, (iv) Connected Load **(04)**

Que-6 **Attempt Any Three** **(12)**

(a) Discuss Tariff and its types.

(b) Discuss construction and application of ELCB

(c) Write a short note on PMMC.

(d) Explain parallel resonance.

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