

GANPAT UNIVERSITY
B.Tech 1st Sem (MC / ME / Civil)
Regular Examination Dec.2010
EE101 : ELEMENTS OF ELECTRICAL ENGINEERING

MAX TIME: 3HRS.

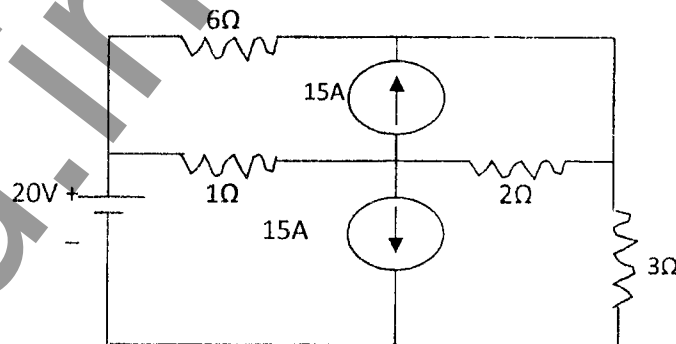
MAX MARKS: 70

Instruction:

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

SECTION-I

- Q.1 (a) Discuss current divider rule and Voltage divider rule. (03)
 (b) Define Capacitance. Derive an expression for the capacitance of a parallel plate capacitor. (04)
 (c) Explain Thevenin's theorem With necessary Diagram. (04)
- OR**
- Q.1 (a) Explain multi-plate capacitor. (03)
 (b) Derive the equation for delta to star transformation. (04)
 (c) Explain heating effect of electric current and Joule's law. (04)
- Q.2 (a) State and explain faraday's laws of electromagnetic induction. (04)
 (b) Explain Co efficient of Self Inductance. (04)
 (c) Explain Ohm's Law for Magnetic Circuit. (04)
- OR**
- Q.2 (a) Explain Series-aiding connection of coupled coils. (04)
 (b) Derive the expression for coefficient of coupling. (04)
 (c) Explain the types of lighting schemes. (04)
- Q.3 **Attempted any three.** (12)
 (a) A capacitor is charged through a resistance of $500\text{K}\Omega$ connected in series with it across a dc supply. The p.d. across the capacitor is 80% of its final value after 1 second during charging. Find the value of the capacitor.
 (b) An iron rod of 1 cm radius is bent into a ring of mean diameter 30 cm and wound with 250 turns of wire. An air gap of 0.1 cm is cut across the bent ring. Calculate the current required to produce a useful flux of 0.2 mWb in the air gap. Assume relative permeability of iron as 800 and leakage factor = 1.1
 (c) Solved the Circuit using superposition theorem as shown in figure.



- (d) Two heaters A and B are in parallel across a supply voltage of V volts. Heater A produces 500 Kcal in 20 minutes and B produces 1000 Kcal in 10 minutes. The heating coils resistance of A is 10Ω . Calculate resistance of B, if the two heaters are connected in series across the same voltage V. determine total heat produced in Kcal in 5 minutes.
- (e) The combined inductance of two coils when connected in series are 0.42 H and 0.096 H for series-aiding and series-opposing connection respectively. If one of the coils when isolated has an inductance 0.1 H calculate (i) the self inductance (ii) mutual inductance between the coils, (iii) the coefficient of coupling.

SECTION: II

- Q-4 (a) Define RMS value and obtain RMS value for sinusoidal alternating current. (04)
(b) When RLC series circuit having 50 ohm resistance, an inductive reactance of 25.12 ohm and an unknown capacitor, is connected across 200 V, 50 Hz supply, it draws current of 3.8 A leading. Then find out value of unknown capacitor and PF of circuit. Also calculate voltage drops across each element of circuit. (04)
(c) Draw and Explain Admittance triangle for R.L series circuit (03)
- OR**
- Q-4 (a) When ac voltage is applied to the combined circuit having a 40 W filament lamp in series with a choke coil of 0.2 lag. PF, the current of 0.25 A flows and power consumption is 45 W. Calculate overall p.f. of the circuit and the voltage applied to the circuit. (04)
(b) Discuss the different types of power for series RL series circuit. (03)
(c) Define bandwidth and obtain equation for bandwidth for series RLC circuit. (04)
- Q-5 (a) Discuss the effect of change in power factor on the readings of two wattmeter used for 3 phase power measurement. (04)
(b) Discuss the causes of low power factor and effects of low PF on power system. (04)
(c) Define phase current and line current and obtain the relationship between phase quantity and line quantity for 3 phase delta connected system. (04)
- OR**
- Q-5 (a) A balanced 3 phase star connected load of 100 kw takes a leading current of 80 A, when connected across a 3 phase, 1100 V, 50 Hz supply. Find the circuit constants of the load per phase. (04)
(b) Discuss Load curve and its importance in power system. (04)
(c) Explain measurement of power and power factor by two wattmeter method for 3-phase unbalanced load. (04)
- Q-6 **Attempt Any three.** (12)
(a) Define Tariff and discuss important types of Tariff.
(b) Explain operation, construction and application of Meggar.
(c) Prove that average power over the full cycle for pure inductive circuit is zero.
(d) Explain the effect of frequency on the values of R, X_L , X_C , Z and I of series R-L-C circuit

END OF PAPER

Wish You Best of Luck