



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, B.E. – Electrical and Electronics Engineering

Semester End Examination;

Basic Electrical Engineering

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Define the following Terms: 6
 - i) Real power ii) Reactive power iii) Power Factor
- b. Derive an expression for the average power consumed in a series RL circuit. Draw the Related waveforms. 6
- c. A 0.5 p.f. load of 4KW is connected in parallel with a capacitance C. If the supply voltage is 230V, 50Hz and overall p.f. is 0.85, calculate the value of capacitance C. 8
- 2 a. Define RMS value and derive an expression for RMS value of a sinusoidal alternating Quantity. 6
- b. Show that the current series circuit inductance lags the voltage by 90°. 6
- c. A two elements series circuit is connected across an AC source of $e = 200\sqrt{2} \sin(\omega t + 20^\circ) V$. The current in the circuit then is found to be $i = 10\sqrt{2} \cos(314t - 25^\circ) A$. Determine the power factor, nature of the circuit and value of the circuit elements. 8

UNIT – II

- 3 a. Develop the relation between line and phase values for 3- ϕ balanced Delta connected system and hence derive expression for Power. 7
- b. With the help of a circuit diagram and switching table explain 2-Way and 3-Way control of lamps. 8
- c. List the advantages of 3 phase systems over single phase system. 5
- 4 a. What is the necessity of Earthing? With a neat sketch explain Pipe earthing. 6
- b. With a neat sketch, explain the construction and working of a single phase induction type energy meter. 8
- c. Three similar coils are connected in star takes power of 1.5 KW at a power factor of 0.2 lagging, from a three phase 400V-50Hz supply. Determine the circuit parameters. 6

UNIT - III

- 5 a. With a neat sketch, explain the construction of a DC machine and function of each part. 8
- b. With usual notation, derive the EMF equation of a synchronous generator. 6
- c. A 6 pole, 500 volt lap-wound series motor has 710 armature conductors and has a total resistance of 1 ohm. It gives 35kw when taking 90A. If the flux per pole is 0.07 Wb find 6
- (i) Total torque developed (ii) mechanical power developed
- 6 a. Derive an expression for the torque developed by a DC motor. 8
- b. What is Back Emf? Explain its significance. 6
- c. A 3 phase, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.003. Wb and the speed is 375 rpm. Evaluate frequency, the phase and line emfs assuming pitch factor $K_C=1$ and distribution factor $K_d=0.96$ 6

UNIT - IV

- 7 a. What is transformer? Write the working principle of a single phase transformer. 6
- b. Obtain an expression for emf of a transformer. 6
- c. Find the efficiency of a single phase 150k VA transformer at 8
- i) 25% full load ii) 100% full load at 0.8 p.f. lag, if copper loss is 1600W at full load and the iron loss is 1400w.
- 8 a. Explain the concept of rotating magnetic field in a three phase induction motor. 8
- b. Distinguish between Cage rotor and Wound rotors of three phase induction motor. 6
- c. A 6 pole, 50 Hz three induction motor which runs at 970rpm. What is the slip of the induction motor? 6

UNIT - V

- 9 a. Explain the construction, working and applications of BLDC motor. 10
- b. With a neat sketch and phasor diagram, explain the capacitor star and capacitor run single phase induction motor. Mention its applications. 10
- 10 a. With a neat sketch explain the working of DC servo motor. 6
- b. With a neat sketch explain the working of stepper motor. 8
- c. Mention the applications of stepper motors and Servo motors. 6

* * * *