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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2024 Semester End Main Examinations

Programme: B.E.   **Semester: I / II**
Branch: Common to all Branches   **Duration: 3 hrs.**
Course Code: 21EE1ESBEE / 21EE2ESBEE   **Max Marks: 100**
Course: BASIC ELECTRICAL ENGINEERING

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

MODULE-1

1 a) State and prove maximum power transfer theorem applied to dc series circuit **04**

b) The equation for an ac voltage is given as v=10 sin (377t+π/6) volts. Determine the frequency, instantaneous voltage when t=4.16ms. What is the time represented by a π/6 radian phase angle? **05**

c) Define and derive the expression for rms value of an sinusoidal alternating current in terms of its peak value. **04**

d) Resistances are arranged in a Wheatstone bridge (ABCD) in the following manner: R_{AB} =8Ω , R_{BC} =16Ω , R_{CD} =10Ω , R_{DA} =4Ω & R_{BD} =20Ω. A voltage of 6 volts is applied across A & C with A positive.
Compute (i) the current in each resistor. (ii) the total current supplied by 6 volts source (iii) the equivalent resistance across the source terminals. **07**

MODULE - II

2 a) Show that in a series RL circuit, the average power consumed is $P=V_{rms} I_{rms} Cos\emptyset$. **04**

b) When a resistor and coil in series are connected to a 240V AC supply. A current of 3A is flowing lagging 37^0 behind the supply voltage, while the voltage across the coil is 171V. Compute (i) the resistance of the resistor (ii) t he resistance and reactance of the coil (iii) power   factor of the coil (iv) overall power factor **06**

c) With the help of circuit diagram & phasor diagram, derive the relationship between the line & phase values of voltage & current in a three balanced phase star connection. **06**

d) List the four advantages of three phase system over single phase system. **04**

MODULE - III

3 a) Sketch and explain Ta versus Ia and N versus Ia characteristics of DC Series motor. **06**

b) A 440V, DC Shunt motor takes an armature current of 20A and runs at 500 rpm. The armature resistance is 0.6Ω .If the flux is reduced by 30% and the torque is increased by 40%, what are the new values of armature current and speed. **07**

c) Explain principle of operation of a single phase transformer and derive the emf equation. **07**

OR

4 a) With a neat diagram, compare constructional features of shell type and core type transformers. **06**

b) In a 25kVA , 2000V/200V,Single phase transformer, the core loss and copper loss at full load are 350W and 400W respectively. Compute its efficiency (i) at full load at 0.8 pf lag (ii) at half full load at upf and (iii) maximum efficiency at upf. (iv) copper loss for maximum efficiency. **07**

c) Draw the cross sectional view of a dc machine. Mention the function of each part. **07**

MODULE - IV

5 a) Discuss the important features of squirrel cage rotor and wound rotor construction of an induction motor. **07**

b) A three phase , 6 pole induction motor operates from 50 Hz supply. Compute (i) the speed of the revolving magnetic field produced by the stator (ii) compute the rotor speed, if the motor operates at 3% slip (iii) estimate the number of poles in order to get a synchronous speed of 1500 rpm. **06**

c) Derive the expression for phase emf & line emf of a three phase star connected alternator considering pitch factor & distribution factor. **07**

OR

6 a) With sketches distinguish between salient pole & non salient pole rotors. **07**

b) A three phase 50HZ,16 pole alternator with star connected armature winding has 144 slots with 10 conductors/slot.The flux /pole is 0.03 weber. Take winding factor of 0.96, Compute (i) Synchronous speed (ii) Phase EMF and (iii) Line EMF. **06**

c) With the help of relevant phasor diagrams, explain when the three phase symmetrical supply is given to the stator winding of a three phase induction motor a revolving magnetic field of constant magnitude is produced in the airgap. **07**

MODULE - V

7 a) What is earthing? Why earthing is needed? With a neat sketch , explain plate earthing method. **07**

b) With the help of block diagram, explain the working of Electric Vehicle. **06**

c) With the help of a neat circuit diagram, explain the working of Resiential current circuit breaker. **07**

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