Basic Electrical Engineering
First Semester B.E. Degree
Model Question Paper

Time: 3 hrs   Max. Marks:100

Note: 1. Answer any FIVE full question selecting atleast TWO questions from each Part
2. Answer all objective types questions only in first and second writing pages.
3. Objective types questions should not be repeated.

PART – A

1. a) i) The current in a circuit having constant resistance is doubled. The power consumed by resistance increases by _____ times.
   A) ¼   B) 4   C) ½   D) 2
   ii) A voltage drop of 10V develops across a 1KΩ resistor. The power consumed in the resistance is _____
   A) 1000W   B) 100W   C) 1W   D)0.1W
   iii) At/m is unit of _____.
   A) mmf   B) reluctance C) magnetizing force D) magnetic field intensity
   iv) Inductance opposes _____ in current in circuit
   A) increase   B) decrease   C) change   D) none of these   **(1m x 4)**

   b) A resistance of 5Ω is connected in series with a parallel combination of RΩ and 10Ω. The total power consumed by circuit is 1200W. The applied voltage is 100V. Find R. **(8 M)**
   c) State and explain Faraday's laws of electromagnetic induction.   **(4 M)**
   d) A coil of 300 turns wound on a non – magnetic material has an inductance of 10mh. Calculate, (i) Flux produced by a current of 5A (ii) The average value of emf induced when current is reversed in 8ms.   **(4 M)**

2. a) i) The ac voltage is V = 20sin 157t. The frequency is _____
      A) 50Hz   B) 75Hz   C) 25Hz   D) 100Hz
   ii) An ac voltage is V = 100 sin 314t. Average value of its half wave is_____
      A) 70.7V   B) 50V   C) 63.7V   D) 100V
   iii) In an ac circuit electrical energy is consumed in _____
      A) L   B) C   C) L&C   D) R
   iv) In RL- Series circuit R=10Ω, X_l=10Ω. The phase angle between V and I is_____.
      A) 45°   B) 30°   C) 60°   D) 36.8°   **(1m x 4)**
   b) Prove that power in 1ϕ circuit is VI cos ϕ for a RL series circuit energized by 1ϕ ac voltage.   **(8 M)**
   c) When a resistor and an inductor are series connected to a 240V, 50Hz supply a current of 3A flows lagging 37° behind the supply voltage, while the voltage across the inductor coil is 171V. Find resistance of resistor, resistance in inductor and reactance of inductor.
                        (8 M)

3. a) i) In, 3φ system power equation $\sqrt{3}$ VI cos φ, φ is the angle between _____
   A) line voltage and line current.   B) line voltage and phase current
   C) phase voltage and line current   D) phase voltage and phase current.

   ii) The algebraic sum of instantaneous phase voltages in a 3φ balanced system is
   A) O   B) line Voltage   C) phase voltage   D) none of these
   iii) A 3φ equipment has a size _____ that of a 1φ equipment for same power capacity.
   A) bigger than B) same as C) smaller than D) none of these
   iv) In 2 wattmeter method of power measurement the load is resistive. If the wattmeter's readings are W_1 & W_2 then,_____
   A) $W_1 > W_2$ B) $W_1 < W_2$ C) $W_1 = W_2$ D) $W_1 = 0$, $W_2 = 0$ **(1m x 4)**
 b) Prove that 2 wattmeters are sufficient to measure 3φ power. Draw relevant vector diagram.
                                                                                    (8 M)
 c) A star connected load has impedance of (6+j8)Ω per phase. A 3φ supply of 440V at 50Hz is applied to load. Two wattmeters are used to measure the power consumed. Find readings of 2 wattmeters.   **(4 M)**
4. a) i) A fuse is a _____
   A) protective device   B) current limiting device
   C) voltage limiting device   D) none of these
   ii) In a dynamometer wattmeter moving coil is _____
    A) current coil B) potential coil C) current coil or potential coil D) none of these
   iii) Creeping in an energy meter is reduced be _____
    A) brake magnet   B) a hole in disc   C) shunt magnet   D) series magnet
   iv) A good earthing should provide _____ resistance in earthing path
    A) low   B) high   C) medium   D) none of these   **(1m x 4)**
 b) Explain necessity of earthing. Explain plate earthing with neat diagram   **(8 M)**
 c) Explain with a neat diagram working of induction type energy meter.   **(8 M)**

PART – B

5. a) i) Armature of a DC machine is laminated to reduce _____
        A) eddy current loss   B) hysterisis loss   C) copper loss   D) friction loss
     ii) High voltage generators use _____ winding
        A) lap   B) wave   C) lap or wave   D) none of these
     iii) _____ motor should never be started on no load.
        A) Series   B) Shunt   C) Cumulatively compounded   D) Differentially compounded.
     iv) Motor draws a large current at starting due to _____
        A) high value of Ra   B) low back emf   C) flux low in shunt field   d) none of these
                                                                                    (1m x 4)
 b) Derive the expression for induced emf in a dc generator   **(6 M)**

 c) A 250V, DC shunt motor takes 6A line current on no load & runs at 1000rpm. The resistance of the field winding and armature are 250Ω, 0.2Ω respectively. If the full load line current is 26A, calculate the full load speed.   **(10 M)**

6) a) i) The primary and secondary of a transformer are _____ coupled
   A) electrically B) magnetically   C) electrically & magnetically D) none of these
   ii) The voltage per turn of primary of a transformer is _____ the voltage per turn of secondary
   A) greater than   B) less than   C) equal to   D) none of these.
   iii) When load on a transformer is reduced _____ decreases
   A) eddy current loss B) hysterisis loss   C) copper loss   D) friction loss
   iv) The no load ratio of 50Hz, 1ϕ transformer is 6000/250V. If the max flux in core = 0.00563 Weber, the number of turns N_1 on LV side is _____
   A) 450   B) 900   C) 350   D) 200   **(1m x 4)**
   b) Explain working principle of transformer. Derive expression for induced emf in Primary & Secondary.   **(8 M)**
   c) The max η of a 10KVA TFR is 98% at 75% full load 0.8pf lag. Find η at UPF   **(8 M)**

7) a) i) In a 3ϕ Induction motor, motor speed is _____ synchronous speed
   A) greater than   B) less than   C) equal to   D) none of these
   ii) 3ϕ wound rotor motors are also called as _____ motors
   A) synchronous   B) slipring   C) series   D) commutator
   iii) The Induction motor has lagging pf at _____
   A) starting only   B) operation only   C) starting & operation D) none of these
   iv) Rotor of an Induction motor revolves in _____ direction of stator flux
   A) same   B) opposite   C) non- determinable   D) none of these   **(1m x 4)**
   b) Explain with neat sketch the construction of 3ϕ Induction motors   **(8 M)**
   c) A 4 Pole Induction motor is supplied from a 50Hz source. The rotor emf makes 2 alternations per second. Find slip & speed of motor   **(4 M)**
   d) Explain necessity of starter for a 3ϕ Induction motor   **(4 M)**

8) a) i) The frequency of emf generated in an 8 pole alternator running at 900rpm is _____
   A) 50hz   B) 25hz   C) 60hz   D) 100hz
   ii) The armature winding of an alternator is generally_____
   A) star connected   B) delta connected C) star delta   D) none of these
   iii) A non salient pole field construction is used for alternator having _____ rotor.
   A) low speed   B) medium speed   C) large speed   D) none of these
   iv) Smooth cylindrical rotor have _____
   A) smaller diameter & long axial length
   B) larger diameter & long axial length
   C) larger diameter & smaller axial length
   D) same diameter & smaller axial length   **(1m x 4)**
   b) Obtain expression for emf induced in an alternator. What is effect of K_p and K_d **(6 M)**
   c) Explain construction of salient pole alternator   **(6 M)**
   d) A6 pole, 3ϕ star connected alternator has armature turns per phase = 120. The ϕ_m = 0.05wb, Kw = 0.97. Find E_L.   **(4 M)**