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**First/Second Semester B.E. Degree Examination, Aug./Sept. 2020**  
**Basic Electrical Engineering**

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, choosing at least two from each part.**

**PART - A**

- 1 a. Choose the correct answers for the following : (04 Marks)
- i) The resistance of 200w, 250v Lamp \_\_\_\_\_.
  - A) 625Ω                      B) 1250Ω                      C) 312.5Ω                      D) 31.25Ω
  - ii) The practical unit of electrical energy is \_\_\_\_\_.
  - A) kw-hr                      B) watt-hr                      C) watt-sec                      D) joule-second.
  - iii) The emf induced in a 1 phase transformer is \_\_\_\_\_.
  - A) Statically induced emf                      B) Dynamically induced emf
  - C) Zero induced emf                      D) Non of the above.
  - iv) The equivalent inductance of the two coils connected differentially given by \_\_\_\_\_.
  - A)  $L_1 + L_2 + 2M$                       B)  $L_1 + L_2 - 2M$                       C)  $L_1 + 2L_2 + M$                       D)  $2L_1 + 2L_2 - M$
- b. State and explain Kirchoff's voltage Law (05 Marks)
- c. State and explain statically induced emf, and Dynamically induced emf. (05 Marks)
- d. Derive the expression for inductance connected cumulatively. (06 Marks)

- 2 a. Choose the correct answers for the following : (04 Marks)
- i) An alternating voltage is given by  $e = 20\sin 314t$  then its Max value is 20V, and its frequency is \_\_\_\_\_.
  - A) 60Hz                      B) 50Hz                      C) 49Hz                      D) 62Hz.
  - ii) An alternating current has an effective value of 200A, its frequency if 25Hz, what is its average value \_\_\_\_\_.
  - A)  $\frac{\text{RMS value}}{1.11}$                       B)  $\frac{\text{Max value}}{1.11}$                       C)  $\sqrt{2} \times \text{RMS value}$                       D) None of above.
  - iii) Power consumed in a pure inductive circuit is \_\_\_\_\_.
  - A) Double the power applied                      B) Zero
  - C) Same as power applied                      D) None of above.
  - iv) The impedance of a series connected resistor, inductor and a capacitor is \_\_\_\_\_.
  - A)  $Z = \sqrt{R^2 + (X_L + X_C)^2}$                       B)  $Z = \sqrt{R^2 + (X_C - X_L)^2}$
  - C)  $Z = \sqrt{R^2 + X^2}$                       D) None of above.
- b. Show that series RLC circuit resonates and acting like a pure resistive circuit. Draw the phasor diagram. (08 Marks)
- c. Find the total current, power and power factor of the circuit below shown in Fig Q2(c).

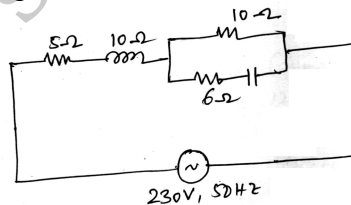


Fig Q2(c)

(08 Marks)

- 3 a. Choose the correct answers for the following : (04 Marks)
- i) In a 3φ balanced star connected load, the neutral current is equal to
  - A) Zero                      B)  $I_{\text{Phase}}$                       C)  $I_{\text{Line}}$                       D) Unpredictable.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.



- ii) In a  $3\phi$  systems, the emf's are  
A)  $30^\circ$  apart      B)  $60^\circ$  apart      C)  $90^\circ$  apart      D)  $120^\circ$  apart.
- iii) If  $V$  is the line voltage,  $I$  is the Line current and  $\phi$  is the angle between them, then 'P' is the power measured in a  $3\phi$  load is equal to \_\_\_\_\_.  
A)  $3VI \cos\phi$       B)  $3VI \sin\phi$       C) \_\_\_\_\_      D) \_\_\_\_\_
- iv) If two wattmeter readings are +Ve and equal then the pf of circuit is \_\_\_\_ and angle \_\_\_\_\_.  
A) 1 &  $\phi = 0^\circ$       B) 0.8 &  $\phi = 1$       C) 0.6 &  $\phi = 0$       D) 0.58 &  $\phi = 1$ .
- b. Show that in a star connected system, the line current is equal to phase current, and line voltage =  $\sqrt{3}$  phase voltage. (08 Marks)
- c. Two Watt meter are connected to measure the input to a  $3\phi$ , 12HP, 50Hz, induction motor, which works at a full load, efficiency of 85% and a power factor of 0.8. Find the reading of the two watt meters. (08 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- i) An electro-dynamometer type instrument can be employed for measurement of  
A) D.C voltages      B) A.C voltages  
C) DC as well as AC voltages      D) None of the above.
- ii) In a dynamometer wattmeter the moving coil is  
A) Current coil      B) Potential coil      C) Current or potential coil      D) None.
- iii) Megger is used to measure \_\_\_\_\_ resistance.  
A) Very low      B) Very high      C) Medium      D) Low.
- iv) In a  $1\phi$  energy meter moving system consists of a \_\_\_\_\_ disc.  
A) Copper      B) Aluminium      C) Bronze      D) Iron.
- b. Explain the working of a Megger with a neat diagram. (08 Marks)
- c. Explain, what is earthing? Why it is required explain plate earthing with a diagram. (08 Marks)

**PART - B**

- 5 a. Choose the correct answers for the following : (04 Marks)
- i) The function of a starter in d.c motor is to  
A) Control its speed      B) Increase its starting torque  
C) Limit the starting current to a safer value      D) Reduce armature reaction effect.
- ii) For a 'P' pole lap wound armature DC machine, the number of parallel paths are equal to \_\_\_\_\_.  
A) 2      B) 2P      C) P      D) P/2.
- iii) Commutator is made up of \_\_\_\_\_.  
A) Iron laminations      B) Copper segments      C) Both Iron and Copper      D) None.
- iv) The back emf of a motor at the moment of starting is \_\_\_\_\_.  
A) Zero      B) Maximum      C) Low      D) Optimum.
- b. What is the necessity of a starter for a DC motor? Explain the operation of three point starter with a neat diagram. (06 Marks)
- c. Derive the Torque equation of a d.c motor. (10 Marks)
- 6 a. Choose the correct answers for the following : (04 Marks)
- i) The flux in a transformer core  
A) Increases with load      B) Decreases with load  
C) Remains constant irrespective of load      D) None.
- ii) The Regulation of Transformer is defined as  
A) Rise in terminal voltage when loaded      B) Fall in terminal voltage when loaded  
C) Change in secondary terminal voltage from no load to full load as a percentage of secondary no load terminal voltage  
D) Change in flux from no-load to full load.
- iii) Losses which do not occur in a transformer are  
A) Copper loss      B) Magnetic losses      C) Friction loss      D) None.

- iv) The losses which vary with load in a power transformer are \_\_\_\_\_.
- A) Friction and windage losses                      B) Copper losses  
C) Eddy current losses                                  D) Hysteresis losses.
- b. A single phase transformer working at 0.8 p.f has an efficiency of 94% at both three-fourth, full load and full load of 600kW. Determine the efficiency at half full load. **(10 Marks)**
- c. Find the number of turns on the Primary and Secondary side of a 440/230V, 50Hz, single phase transformer, if the net area of cross section of the core is 30cm<sup>2</sup>, and flux density is 1wb/m<sup>2</sup>. **(06 Marks)**
- 7** a. Choose the correct answers for the following : **(04 Marks)**
- i) An emf induced in generator is \_\_\_\_\_.
- A) DC only                      B) AC only                      C) Both AC and DC                      D) None.
- ii) The frequency of emf generated by an alternator depends upon the alternator speed N(rpm) and number of poles on the alternator, P and is given by
- A)  $\frac{PN}{60}$                       B)  $\frac{60N}{P}$                       C)  $\frac{PN}{120}$                       D)  $\frac{120N}{P}$
- iii) The Generalized expression for EMF equation of an Alternator is  $E_{ph} =$  \_\_\_\_\_.
- A)  $4.44 f \phi T_{ph}$                       B)  $4.00 f \phi T_{ph}$                       C)  $\frac{\phi ZNP}{60A}$                       D) None.
- iv) Voltage Regulation of an alternator \_\_\_\_\_.
- A)  $\frac{\text{No load induced emf} - \text{Rated terminal voltage}}{\text{Rated terminal voltage}}$   
B)  $\frac{\text{No load induced current} - \text{Rated current}}{\text{Rated current}}$   
C)  $\frac{\text{Full load induced emf} - \frac{1}{2} \text{ load induced emf}}{\frac{1}{2} \text{ Rated terminal emf}}$   
D) None.
- b. A 3 phase, 16 pole, Y connected alternator has 144 slots o the armature periphery, each slot contains 10 conductors, It is driven at 375 rmp. The line value of emf available across the terminals is observed to be 2.657kV. Find the frequency of the induced emf and flex per pole. **(08 Marks)**
- c. Derive the expression for the emf generated in the Alternator. **(08 Marks)**
- 8** a. Choose the correct answers for the following : **(04 Marks)**
- i) A, 3 $\phi$ , 440V, 50Hz, Induction motor has 4% ship the frequency of rotor emf is \_\_\_\_\_.
- A) 200Hz                      B) 50Hz                      C) 2Hz                      D) 0.2Hz.
- ii) Speed of IM is \_\_\_\_\_ that of N<sub>s</sub>.
- A) greater than                      B) less than                      C) same as                      D) None.
- iii) When a 3 $\phi$  supply is given to the stator of 3 $\phi$  IM, a \_\_\_\_\_ magnetic field is produced.
- A) Stationary                      B) Alternating                      C) Rotating                      D) None.
- iv) A supply of 50Hz is given to a 3 $\phi$  IM having 4 pole, If IM runs at 1440 rpm the slip is \_\_\_\_\_.
- A) 3%                      B) 4%                      C) 5%                      D) 3.33%.
- b. Explain the working principle of an IM (3 $\phi$ ). **(06 Marks)**
- c. What is slip of an induction motor? Explain why slip is never zero in an induction motor. **(04 Marks)**
- d. Discuss the important feature of squirrel case and phase wound rotor construction in an IM. **(06 Marks)**