CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **21ELE13**

First Semester B.E./B.Tech. Degree Examination, Feb./Mar. 2022
Basic Electrical Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. State Kirchoff's law for DC circuits. Illustrate with an example. **(08 Marks)**
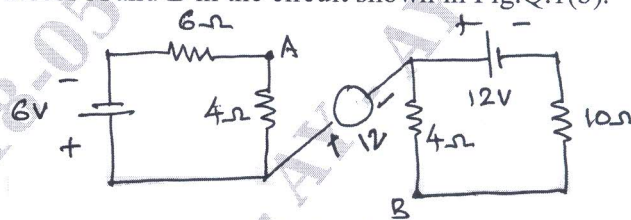   b. What is the voltage across A and B in the circuit shown in Fig.Q.1(b). **(06 Marks)**

Fig.Q.1(b)

   c. Define the following terms:
      i) Average value
      ii) RMS value
      iii) Form factor. **(06 Marks)**

OR

2 a. Prove that the maximum power will be transferred to the load when load resistance is equal to the source resistance. **(06 Marks)**
   b. A pure inductor excited by sinusoidal varying AC voltage, show that the average power consumed by inductor is zero. **(08 Marks)**
   c. A 318μF capacitor is connected across a 230V, 50Hz system. Determine: i) Capacitive reactance   ii) RMS value of current   iii) Extrusions for instantaneous voltage and current v(t) and i(t). **(06 Marks)**

Module-2

3 a. Define: i) Real power   ii) Reactive power   iii) Power factor. **(06 Marks)**
   b. A series circuit with R = 10Ω, L = 50mH and C = 100μF is supplied with 200V, 50Hz. Find:
      i) The impedance   ii) Current   iii) Power   iv) Power factor. **(08 Marks)**
   c. Deduce the relationship between the phase and the line voltages of a three phase star connected system. **(06 Marks)**

OR

4 a. Deduce the relationship between the phase and the line current of a three phase delta connected system. **(06 Marks)**
   b. A balanced star connected load of (8 + j6)Ω per phase is connected to a three phase 230V supply. Find the current, power factor, power, reactive volt ampere and total voltampere. **(05 Marks)**
   c. Three phase power consumed by the balanced load is given by $P = \sqrt{3} \ V_L \ I_L \cos\phi$ watts, then show that two wattmeter is sufficient to measure three phase power P. **(09 Marks)**

1 of 2

Module-3

5 a. With neat sketch, explain the different parts of a DC generators. (06 Marks)
  b. Give the classification of DC generator. Obtain the expression for EMf equation of a DC generator. (08 Marks)
  c. Give broad classification of transformers. Explain the construction of transformer. (06 Marks)

OR

6 a. Derive the expression for emf induced in the primary or secondary side of a transformer. (06 Marks)
  b. Derive an expression for the torque developed by a DC motor. (06 Marks)
  c. A 250KVA, 11000/415V, 50Hz single phase transformer has 80 turns on the secondary, calculate:
  i) Rated primary and secondary currents.
  ii) Number of primary turns.
  iii) Maximum value of core flux.
  iv) Voltage induced per turn. (08 Marks)

Module-4

7 a. Explain the concept of rotating magnetic field in case of stator field a 3-phase induction machine with a neat diagram. (08 Marks)
  b. Define slip of an induction motor and derive expression for the frequency of rotor currents. (06 Marks)
  c. Describe the main parts of synchronous generator with neat sketches. (06 Marks)

OR

8 a. A 3 phase induction motor with 4 poles is supplied from an alternator having 6 poles and running at 1000rpm. Calculate synchronous speed of the induction motor, its speed when slip is 0.04 and frequency of the rotor emf when speed is 600rpm. (08 Marks)
  b. Derive the emf equation of a synchronous generator. (06 Marks)
  c. A 24 pole turbo alternator has a star connected armature winding with 144 slots and 10 conductors per slot. It is driven by a low speed Kaplan turbine at a speed of 250rpm. The winding has full pitched coils with a distribution factor of 0.966. The flux per pole is 67.3mWb. Determine: i) Frequency and magnitude of the line voltage   ii) Output KVA of the machine if the total current in each phase is 50A. (06 Marks)

Module-5

9 a. What is electric power supply system? Draw a single line diagram of a typical a.c supply scheme. (06 Marks)
  b. What is the necessity of earthing? Explain plate earthing. (08 Marks)
  c. Explain the working principle of fuse and MCB. (06 Marks)

OR

10 a. Explain components of low voltage distribution system with neat sketches. (06 Marks)
   b. A consumer uses a 10kW geezer, a 6kW electric furnace and five 100W bulbs for 8 hours. How many units of electrical energy have been used? Define an electrical energy unit. (06 Marks)
   c. What do you mean by electric shock? Write a short note on precautions against an electric shock. (08 Marks)

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