

# CBCS SCHEME

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18ELE13/23

## First/Second Semester B.E. Degree Examination, July/August 2021 Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1 a. State and explain: i) Ohm's law    ii) Kirchoff's voltage law. (06 Marks)
- b. Define: i) frequency    ii) time period    iii) form factor. (06 Marks)
- c. Determine: (08 Marks)
  - i) Current flowing through  $12\Omega$  and  $8\Omega$  resistances
  - ii) Total power dissipated
  - iii) Power dissipated in all resistors.

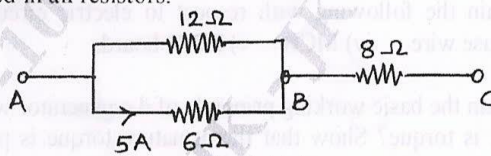


Fig.Q.1(c)

- 2 a. Define the RMS value of an alternating current and show that its value is proportional to maximum value. (06 Marks)
- b. Apply Kirchoff's laws to calculate the current in  $2\Omega$  resistor in Fig.Q.2(b). (06 Marks)

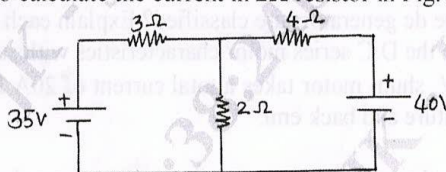


Fig.Q.2(b)

- c. An alternating current 'i' is given by  $i = 141.4 \sin 314t$ , find: i) maximum value  
ii) frequency    iii) time period    iv) instantaneous value when  $t = 3\text{ms}$ . (08 Marks)
- 3 a. Show that current lags the applied voltage  $v = v_m \sin \omega t$  by  $90^\circ$  in a pure inductive A-C circuit and also power consumed is zero. (08 Marks)
- b. List the advantages of 3 phase A.C system over 1 phase A.C system. (06 Marks)
- c. A  $318\mu\text{F}$  capacitor is connected across a 230volts, 50Hz, AC supply. Determine: (06 Marks)
  - i) Capacitive reactance    ii) RMS value of current    iii) Voltage and current expressions.
- 4 a. Show that the power in a 3 phase balanced star connected load can be measured by two wattmeters with suitable circuit diagram and vector diagrams. (08 Marks)
- b. Explain the following with respect to single phase A.C system: (06 Marks)
  - i) Power factor
  - ii) True power
  - iii) Reactive power
  - iv) Apparent power
- c. Three  $50\Omega$  resistors are connected in star across 400V, 3 phase, 50Hz, AC supply. Find phase current, line current and power taken from the mains. (06 Marks)

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.

- 5 a. Explain the basic working principle of transformer and identify the applications of transformers (any two). (06 Marks)
- b. Explain the two way control of lamp with suitable diagram and working table. (06 Marks)
- c. A single phase, 50Hz, transformer has 30 primary turns and 350 secondary turns. The net cross sectional area of the core is  $250\text{cm}^2$ . If the primary winding is connected to a 230V, 50Hz, AC supply. Calculate:
- Peak value of flux density in the core
  - Voltage induced in the secondary winding
  - Primary current when the secondary current is 100A (Neglecting losses). (08 Marks)
- 6 a. Explain the concealed conduit wiring with a neat diagram and mention its advantages. (08 Marks)
- b. A 10KVA transformer has iron loss of 450W and full load copper loss of 650W. If the power factor of the load is 0.8 lagging. Calculate: i) Full load efficiency ii) Load at maximum  $\eta$  iii) Maximum efficiency at unity power factor. (06 Marks)
- c. Explain the following with respect to electric circuit i) Earthing ii) Electric shock iii) Fuse wire iv) MCB v) meter board. (06 Marks)
- 7 a. Explain the basic working principle of d.c generator with suitable diagrams. (06 Marks)
- b. What is torque? Show that the armature torque is proportional to armature current in d.c motor. (06 Marks)
- c. An 8 pole lap connected armature has 960 conductors, a flux of 40mwb per pole and a speed of 400RPM. Calculate the emf generated. If the armature were wave connected, at what speed it must be driven to generate 400V? (08 Marks)
- 8 a. How the dc generators are classified? Explain each one in brief. (06 Marks)
- b. Explain the D.C series motor characteristics with suitable plots. (06 Marks)
- c. A 250V, shunt motor takes a total current of 20A  $R_{sh} = 200\Omega$ ,  $R_a = 0.3\Omega$ . Find the current in armature and back emf. (08 Marks)
- 9 a. Explain the constructional details of 3 phase synchronous generator. (06 Marks)
- b. A 3 ph, induction motor is wound for 4 poles and is supplied from 50Hz system. Calculate: i) Synchronous speed ii) Speed of motor when slip is 4% iii) rotor current frequency when motor runs at 600rpm. (08 Marks)
- c. Derive an expression to calculate the frequency of generated emf. (06 Marks)
- 10 a. Explain the basic working principle of 3 phase induction motor with suitable diagrams. (06 Marks)
- b. A 6 pole, 3 phase, 50Hz, alternator has 12 slots per pole and 4 conductors per slot. A flux of 25mWb is sinusoidally distributed along the air gap. Determine the i) Phase EMF ii) Line EMF, is the alternator is star connected. Assume pitch factor = 1 winding factor = 0.96. (06 Marks)
- c. Why the 3 phase induction motor stops at slip = 0, explain the working of star-delta starter with a neat diagram. (08 Marks)

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