

S.No. : 508

BEE 3201

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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 33302

Roll
No.

1 2 2 0 4 3 2 3 0 9

B. Tech. Examination 2022-23

(Even Semester)

BASIC ELECTRICAL ENGINEERING

Time : Three Hours]

[Maximum Marks : 60]

Note :- Attempt all questions.

SECTION-A

1. Attempt all parts of the following : $8 \times 1 = 8$
 - (a) Distinguish between linear and non-linear networks.
 - (b) What is the utility of Thevenin theorem?
 - (c) What do you understand by power factor of a circuit?
 - (d) Draw the no load phasor diagram of a transformer.

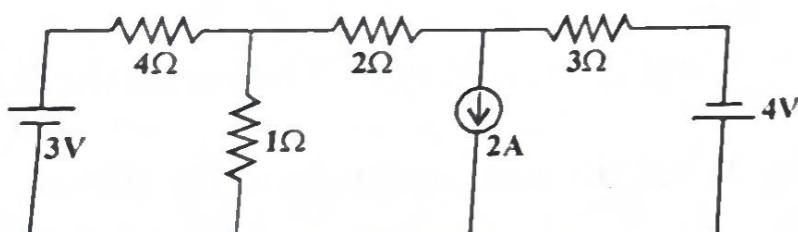
[P. T. O.]

- (e) Why is transformer rating done in volt amperes (VA)?
- (f) Why is the starting torque of capacitor start induction motor high?
- (g) Write difference between EMF and potential difference.
- (h) Define slip and rotor frequency.

SECTION-B

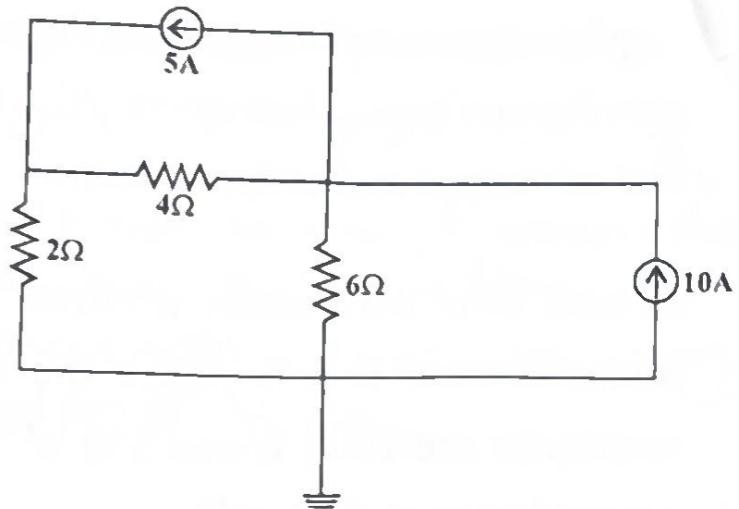
2. Attempt any two parts of the following: $2 \times 6 = 12$

- (a) What is criterion for star-delta transformation? Develop the relationship for delta-to-star transformation.
- (b) Find the value of current flowing through 4Ω resistance in the given circuit using Thevenin theorem.



- (c) Find the expression for RMS and average value of half wave rectified alternating voltage. Also calculate form factor and peak factor.

- (d) Using super position theorem determine the currents in various resistors.



SECTION-C

Note :- Attempt all questions. Attempt any two parts from each question. $5 \times 8 = 40$

- 3. (a) Define the term resonance for an AC circuit consisting of R, L and C. Derive the condition for resonance frequency in case of R-L-C series circuit.
- (b) What is the basic function of transformer. A transformer is rated at 100 kVA, at full load its copper loss 1400 W and iron loss 940 W Calculate:
 - (i) The efficiency at full load, unity power factor.

(ii) The efficiency at half load, the same power factor.

(c) Explain construction and working principle of moving iron type of instrument. Also write down and advantage and its applications.

4. (a) In the two wattmeter method of power measurement in a 3 phase the reading of wattmeter are 1000 W and 550 W. What is the power factor of the load?

(b) How B-H curve of a ferromagnetic materials differ from that of a non-magnetic materials? Name all the salient regions of B-H curve of a magnetic materials.

(c) Explain the slip torque characteristics of a three-phase induction motor. The voltage applied to the stator of three phase, 4 pole induction motor has frequency of 50 Hz and the frequency of emf induced in rotor is 15.5 Hz. Determine the slip and speed at which motor is running.

(a) Draw and explain the construction of single phase induction motor with neat sketch.

(b) Write short notes on the following :

- Faraday's laws
- Lenz' law
- Mutual induction

(c) A 4 pole generator with 400 armature conductors has a useful flux of 0.04 Wb per pole. What is the emf produced if the machine is wave wound and runs at 1200 rpm.

6. (a) (i) Drive the emf equation of a transformer.
(ii) Drive the condition for maximum efficiency in single phase transformer.

(b) With neat sketch describe the construction and principle of operation of synchronous motor.

(c) Drive the expression for back emf and torque equation of DC motor. A dc shunt motor runs at 600 rpm taking 60A from a 230 V supply. Armature resistance is 0.2 ohm and field resistance is 115 ohms. Find the speed when the current through armature is 30 A.

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