BEI1304

# Electrical Circuits and Machines
## (New) (1040)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** from each units.
5. Use of non programmable calculators is allowed.
6. Assume suitable data if necessary.

### UNIT - I

1. a) Deduce the relationship between the phase and line currents of a three phase data connected system. Draw neat circuit and phasor diagram. **10**

   b) Obtain current through 2 ohm resistor in the circuit given below using loop analysis. **10**
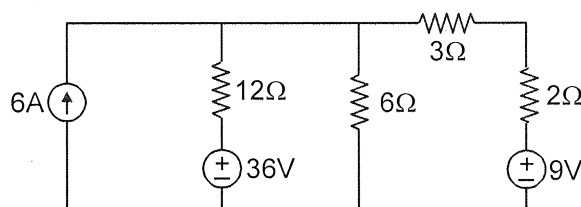


   c) Three impedances each (10+j24) ohm connected in data and three impedance each (6-j8) ohm connected no star are jointly fed by a balanced 3 phase 400 V supply find (a) phase current of delta load (b) phase current of star load (c) total active power drawn by delta load (d) total active power drawn by star load (e) Total active power drawn from the system (f) Total Var drawn from the system (g) total VA drawn from the system (h) overall power factor and total line current. **10**

### UNIT - II

2. a) Draw a neat labelled diagram of the cross section of a four pole d.c. shunt - connected generator. What are the essential functions of field coils, armature, commutator and brushes. **10**

   b) A d.c. shunt motor takes an armature current of 20A from a 230V. Supply. Resistance of the armature circuit is $0.5\,\Omega$. Calculate the resistance required in series with the armature to halve the speed if :
   i) The load torque is constant.
   ii) The load torque is propostional to the square of the speed. **10**

c) Derive the expressions for speed and torque in case of DC motors
and hence obtain the torque speed characteristics of the d.c. series motors.    **10**

## UNIT - III

3. a) Define efficiency of a transformer. How it is obtained experimentally ?
What is the condition for maximum efficiency of a transformer & derive it.    **10**

b) Explain with neat ckt and phasor diagram T-T connection to obtain
3 phase to 2 phase emfs.    **10**

c) O.C & S.C. Tests were conducted on a 50 KVA, 6360/240V 1 phase
transformer the results of the test being as O.C. pri voltage 6360V. Pri
current 1A, power input 2kW S.C. voltage across primary 180V, current in
sec 175A power input 2kW.
     Find the efficiency of a transformer when supplying full load at a p.f of
0-8 lagging. Draw a phasor diagram.    **10**

## UNIT - IV

4. a) Define voltage regulation in case of A.C. generator explain practical
method to obtain the voltage regulation of A.C. generator. Draw phasor
diagram and circuit diagrams.    **10**

b) A 2000V, 3 phase star connected synchronous motor has an effective
resistance and synchronous reactance of $0.2\Omega$ & $2.2\Omega$ respec.
The input is 800 kW at normal voltage and the induced emf is 2500V.
Calculate the line current and p.f.    **10**

c) Explain the effect of Increased load on a synchronous motor with
normal, under excitation and over excitation.    **10**

## UNIT - V

5. a) Obtain the relationship between rotor copper loss and rotor input in
case of 3 phase Induction motor.    **10**

b) A three phase 50Hz, six pole induction motor has a slip of 0.04 per unit when
the output is 20kW. The frictional loss is 250W calculate (i) The rotor speed
(ii) The rotor copper loss.    **10**

c) i) Write the differences between squirrel cage rotor and phase wound rotor.

ii) Write on shaded pole motor.    **10**

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