



TEE-101

Printed Pages : 7

PAPER ID : 2018

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

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--

B. Tech.

(SEM. I) (ODD SEM.) (REG. & BACK) EXAMINATION, 2012-13

BASIC ELECTRICAL ENGG.

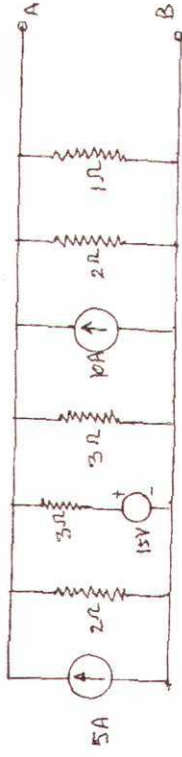
Time : 3 Hours

[Total Marks : 100]

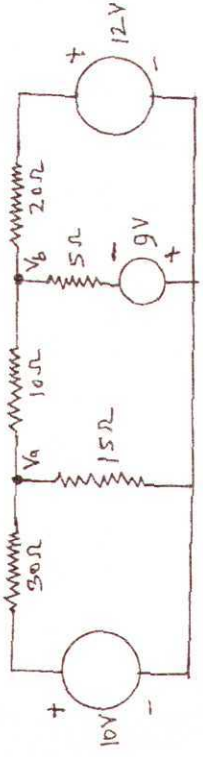
Note : Attempt all the questions. Each question carries equal marks.

1 Attempt any four parts of the following : 4×5=20

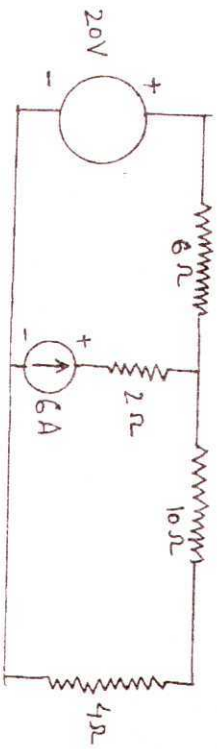
- (a) Combine the sources shown in following figure 5 into a single voltage source and current source.



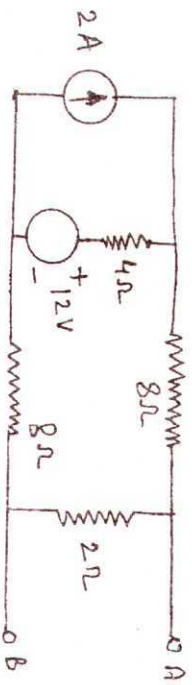
- (b) Using Nodal analysis, find the node voltage V_a and V_b in the figure shown below. 5



- (c) Calculate the value of the current in each branch of the circuit shown below using Mesh current analysis : 5



- (d) Draw Norton's equivalent circuit of following figure. Using duality theorem also draws equivalent Thevenin's circuit. 5



- (e) Prove that in a pure inductor, the applied sinusoidal voltage and the current are 90° out of phase with each other. Does the inductor absorb any power over one cycle of the applied voltage ? 5

- (iii) full load speed
 (iv) frequency of rotor current at stand still
 (v) frequency of rotor current at full load.

- (c) Write short technical note on any two of the following: 10
- (i) Slip-Torque characteristic of 3 ϕ Induction motor.
 - (ii) Stepper motor
 - (iii) Universal motor.

If the same coils are reconnected in delta across the same supply, what will be the power factor, total power absorbed and line current?

- (c) Describe the construction and working principle of operation of PMMC instrument. Derive the expression for its deflecting torque. **10**

A PMMC instrument has FSD current of 50 mA and $2\ \Omega$ resistance. How the instrument can be converted to

- (i) 0-5A range ammeter
- (ii) 0-100V range voltmeter.

3 Attempt any two of the followings : **2×10=20**

- (a) Explain how does the input current adjust to meet out the new conditions, when the load current in the transformer increase ? Also draw phasor diagram of a single phase transformer for lagging load p.f. **10**

2018]

4

[Contd...

(b) A single phase, 25 KVA, 1000/2000 V, 50 Hz transformer has maximum efficiency of 98% at full load, u.p.f. Determine its efficiency at :

- (i) 3/4 full load, u.p.f.
- (ii) 1/2 full load, 0.8 p.f.
- (iii) 1.25 full load, 0.9 p.f.

(c) A 5 KVA, 400/200V, 50 Hz transformer on test gives the following results with instruments connected on H.V. side. **10**

O.C. Test	400V	2A	120W
S.C. Test	20 V	20 A	80 W

Find out the percentage regulation at full load 0.8 lagging p.f. and efficiency.

4 Attempt any two of the following : **2×10=20**

- (a) Show the different significant parts of a D.C. Machine. Explain principle of operation of a DC generator. Derive the E.M.F. equation for DC generator. **10**

2018]

5

[Contd...

- (b) A 4-pole d.c. shunt generator with a shunt field resistance of 100Ω and armature resistance of 1Ω has 378 wave connected conductors in its armature. The flux per pole is 20 mWb . If a load resistance of 10Ω connected across the armature terminal and armature is driven at 1000 rpm calculate the voltage across the load resistance. **10**
- (c) Explain the method of starting of 3 phase synchronous motor. Also discuss its applications. **10**
- 5 Attempt any two of the following : **2×10=20**
- (a) Explain construction and working of 3 ϕ induction motor. Explain how does the rotor rotate ? Also discuss its applications. **10**
- (b) What do you mean by "slip speed" and "slip" ? **10**
- A three phase, 50 Hz, 6 pole induction motor has a slip of 2% at no load and 4% at full load. Determine
- (i) synchronous speed
- (ii) no load speed
- 2018] **6** [Contd...
- (f) A 20Ω resistor is connected in series with an inductor, a capacitor and an ammeter across 25 V variable frequency supply. When the frequency is 400 Hz, the current is at its maximum value of 0.5 A and potential drop across capacitor is 150 V . Calculate
- (i) capacitance
- (ii) resistance and inductance of the inductor. **5**
- Draw phase diagram representing voltage across each element and current.
- 2 Attempt any two of the followings : **2×10=20**
- (a) Derive the relationship between the phase and line voltage of 3 ϕ , Y-connected generator. What is the phase difference between line voltages and line currents ? **10**
- (b) Three similar coils each having a resistance of 20Ω and an inductance of 0.05 H are connected in star to a 3- ϕ , 50 Hz supply with 400 V between the lines. Calculate power factor, total power absorbed and line current. **10**
- 2018] **3** [Contd...