

PAPER ID : 2018



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

Roll No.

B. Tech.

(SEM. I) (ODD SEM.) EXAMINATION, 2011-12

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 : $4 \times 5 = 20$
 - (a) The Norton's and Thevenin's theorem. Also discuss about the duality of Norton's and Thevenin's Theorem.
 - (b) Use Nodal Analysis to find out the current in $4\ \Omega$ Resistor of Fig.1

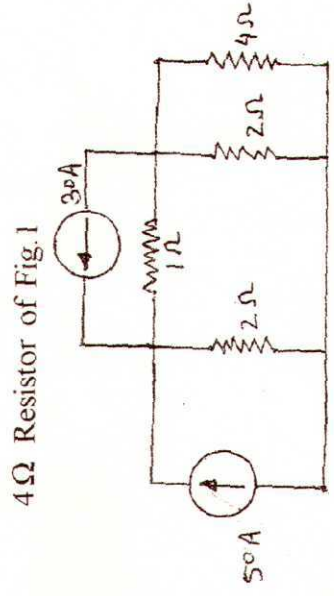


Fig.1

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(c) Apply Norton's theorem to calculate current following through $10\ \Omega$ resistor of Fig.2

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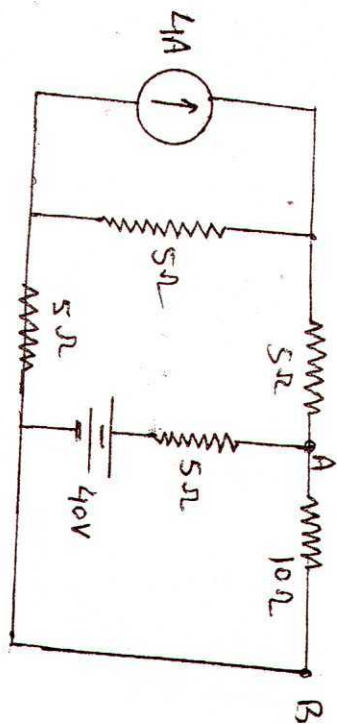


Fig.2

(d) Using Delta - Star Transformation Theorem calculate current from the supply voltage 130V shown in Fig.3

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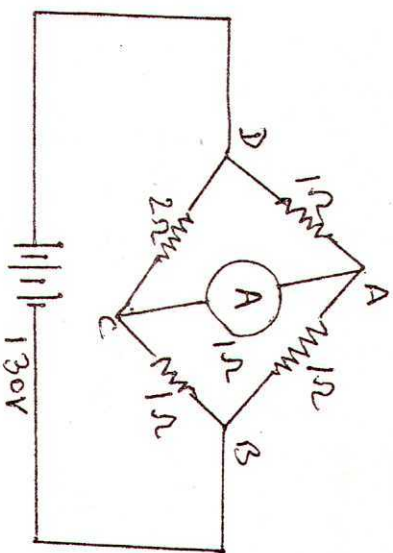


Fig.3

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- (c) Write short technical note on any **two** of the following : 10
- (iii) full load speed
 - (iv) frequency of rotor current at stand still.
 - (v) frequency of rotor current at full load.

- (i) Slip-Torque characteristics of 3 phase induction motor
- (ii) Construction and working of single phase capacitor start induction motor.
- (iii) Basic elements of power system with help of single line diagram.

- (c) A capacitor of 25 mF is connected in series with a variable resistor. The circuit is connected across 50 Hz mains. Find the value of the resistor for a particular condition when the voltage across the capacitor is half the supply voltage.
- (d) Explain relative permeability. Calculate the mmf required to produce a flux of 0.015Wb across an air gap 2.5 mm long an effective area of 200 cm².
- (e) An alternating current of peak value 45 A has the following wave forms in turn :
- (i) Sinusoidal
 - (ii) Full wave rectified sinusoidal
 - (iii) Rectangular and
 - (iv) Triangular
- Show the above wave forms and calculate average and rms value.
- (f) An iron ring of mean circumference 1.2 m is uniformly wound with 400 turns of wire. When a current of 1.5 Amp is passed through the coil, a flux density of 1.25Wb/m² is produced in the iron. Find the relative permeability of iron under these conditions.

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Attempt any **two** of the following :

2×10=20

- (a) Explain the following :
- (i) Defecting Torque
 - (ii) Controlling Torque
 - (iii) Damping Torque
- Discuss the principle of operation and construction of PMMC type measuring instrument.
- (b) A single phase energy meter hours a constant of 1200 rev/kWh, when a load of 200W is connected the disc rotate at 4.2 rev/min. if the load is on for 10 hours, how many units are recorded as an error ? Also find percentage error.
- (c) Explain how does the input current adjust to meet out the new conditions, when the load current in the transformer increase ?
- Calculate the efficiencies at half and full a 100 KVA transformer for p.f. of (a) unity
- (b) 0.8 The copper loss is 1000W at full load and iron loss is 1000W.

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

- (a) Three impedances each having a resistance of **10** 20Ω and an inductive reactance of 18Ω are connected in star across a $400V$, three phase supply. Calculate (i) the line current (ii) the power factor (iii) total power in kW.

(b) Explain principle of operation of a DC **10** generator. Also derive the E.M.F. equation for DC generator.

- (c) A shunt generator has a full load current of **10** $196A$ at $220V$. The stray losses are $720W$ and the shunt field resistance is 55Ω . If it has a full load efficiency of 88% , find the armature resistance. Also, find the load current corresponding to maximum efficiency.

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

- (a) Explain the method of starting of 3 phase **10** synchronous motor. Also discuss its applications.
- (b) What do you mean by "slip" ? A three phase, **10** $50Hz$, 6 pole induction motor has a slip of 2% at on load and 4% at full load. determine

- (i) synchronous speed
(ii) no load speed

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(e) Distinguish the difference between following : **5**

- (i) Active and Passive elements.
(ii) Ideal voltage and Current source
(f) State and prove the maximum power transfer **5** theorem.

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

- (a) Calculate the r.m.s. value, the form factor and the peak factor of a periodic voltage having following values for the equal time intervals changing suddenly from one value to the next :
 $0, 5, 10, 20, 50, 60, 50, 20, 10, 5, 0, -5, -10V$ etc.

What would be the r.m.s. value of sine wave having same peak value ?

- (b) Explain the nature of power factor in two wattmeter method of three phase power when :

- (i) the two readings are equal and positive
(ii) the two readings are equal but opposite in sign and

- (iii) one of the wattmeter reads zero.

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