Printed Pages :   **EAG-401**

(Following Paper ID and Roll No. to be filled in your Answer Books)

PAPER ID :   **Roll No**.

B.TECH.

Theory Examination (Semester-IV) 2015-16

ELECTRICAL CIRCUITS & MACHINES

Time : 3 Hours   *Max. Marks : 100*

Note : Attempt all sections.

SECTION - A

1. Answer all parts with brief explanation.

   (a) Distinguish the difference between the following with their symbols :

      (i)   Ideal voltage source & Real voltage source

      (ii)   Ideal current source & Real current source

   (b)   State and explain the maximum power transfer theorem.

   (c)   Draw the power triangle and define these three powers.

   (d)   Draw the load characteristic of d.c. shunt motor.

   (e)   If the value of slip (s) is one, what will be the speed of 30 induction motor.

   (f)   Determine current in 3 ohm resistance in the following figure using Norton's Theorem.
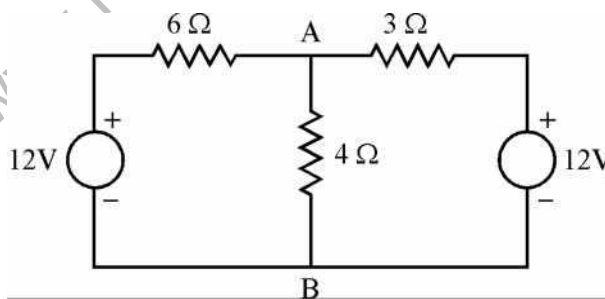
   (g)   Under which situation during the measurement of 3 phase power by two wattmeter method, one wattmeter start giving reading in negative direction.

   (h)   Why the current of primary side increases when we increase the load on secondary side of a 1 phase transformer.
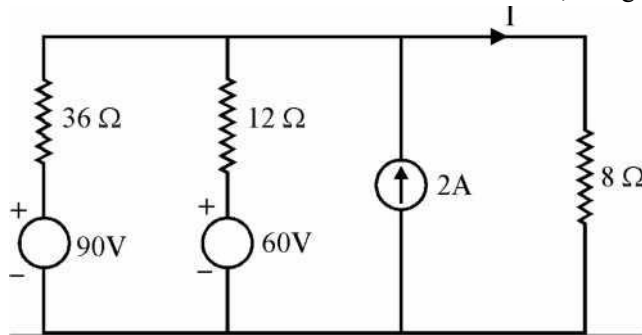
2

(i)   Why carbon brushes are being used in d.c. machine ?

(j)   What do you mean by composite filters ?

SECTION - B

2.   Answer any five parts of the following :   5 x 10 = 50

(b)   Find the current 'I' in resistor of the network shown below, using superposition theorem

(c)   Explain with suitable diagram the "series magnetic circuit" and "parallel magnetic circuit". An iron ring made up of three parts has $l_1 = 10$ cm, $A_1 = 5$ cm^2; $l_2 = 8$ cm, $A_2 = 3$ cm^2; $l_3 = 6$ cm, $A_3 = 2.5$ cm^2. It is wound with a coil of 250 turns. Calculate the current required to produce a flux of 0.4 mwb in the ring. Given $p = 2670$, $p_2 = 1050$ and $p_3 = 650$.

(d)   Find the equation for the instantaneous value of current, when a voltage represented by $v = 141.4 \sin 314\, t$ is applied to a circuit consisting of R = 50Q and L= 0.2 H. Calculate the value of the capacitance to be connected in series with this circuit to obtain minimum impedance of the circuit. Calculate the power drawn by the circuit under the condition.

(e)   Draw the phasor diagram of a $1\emptyset$ transformer with lagging load power factor. Also discuss the open circuit and short circuit test.

(f)   What is armature reaction ? Describe the effects of armature reaction on the operation of dc machines.

(g)   The efficiency of a 1000 kVA, 110/220 V, 50 Hz, single phase transformer is 98.5% at half load and full load at 0.8 p.f. leading and 98.8% at full load unity p.f. Determine (i) iron loss (ii) full load copper loss (iii) maximum efficiency at upf (iv) load kVA at maximum efficiency.

(h)   Why starter is required ? Explain the construction and working of a three point starter.

(i)   The efficiency of a 1000 kVA, 110/220 V, 50 Hz, single phase transformer is 98.5% at half load and full load at 0.8 p.f. leading and 98.8% at full load unity p.f. Determine (i)
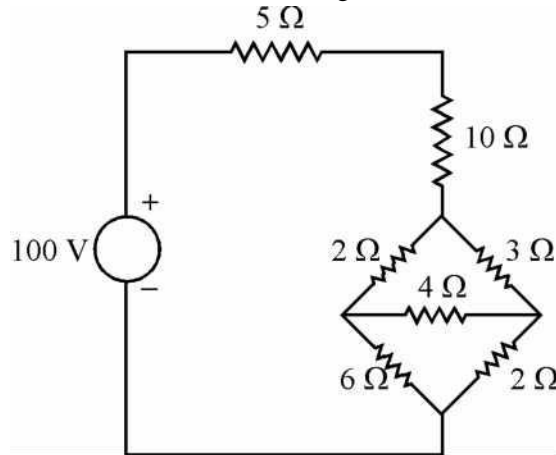
3

iron loss (ii) full load copper loss (iii) maximum efficiency at upf (iv) load kVA at maximum efficiency.

SECTION - C

2 x 15 = 30

3.   Attempt any two questions in this section :

   (a)   Find the current drawn from the source using star/delta transformation.

   (b)   Find the flux per pole of a 50 kW d.c. generator having 4 poles and a lap-wound armature with 380 conductors. The machine is running at a speed of 800 rpm and generates 460 V. Resistance of the armature and shunt field are 0.5 ohm and 350 ohm respectively. Also find the current flowing in the armature at full load and the terminal voltage.

   (c)   Discuss why single phase induction motors do not have starting torque. Explain its principle of operation and list various methods of starting. Also discuss the speed-torque characteristic of any one of the 1phase induction motor.

4