Printed Pages—5 **TEE101/201**

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

PAPER ID : 2018 **Roll No.** | | | | | | | | | | |

B.Tech.

(SEM. I) THEORY EXAMINATION 2010-11

ELECTRICAL ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note : Attempt **all** questions.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) Two alternating currents represented by the equations $i_1 = 7 \sin \omega t$ and $i_2 = 10 \sin\left(\omega t + \frac{\pi}{3}\right)$ are fed into a common conductor. Find the equation for the resultant current and its rms value.

(b) A coil in parallel with a 200 μF capacitor is connected across a 200 V, 50 Hz Supply. The coil takes a current of 8 A and loss in the coil is 960 W. Calculate the following :

(i) Resistance of the coil

(ii) Inductance of coil

(iii) Power factor of entire circuit.

(c) Derive the expression of resonant frequency for a series R-L-C. circuit. Why series resonant circuit is called as an accepter circuit ? Explain bandwidth and quality factor of series resonant circuit.

(d) Draw a magnetisation curve and define the hysteresis and eddy current losses. On what factors these losses depends ?

(e) An iron ring has a mean circumferential length of 60 cm with an airgap of 1 mm and a uniform winding of 300 turns. When a current of 1 A flows through the coil, find the fluxdensity. The relative permeability of iron is 300. Assume $\mu = 4\pi \times 10^{-7}$ H/m.

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

(a) Three resistances r, 2r and 3r are connected in delta, then calculate the equivalent values of these resistances in star connection. Prove formula used.

(b) Find Norton equivalent circuit for the network shown Fig. 1.

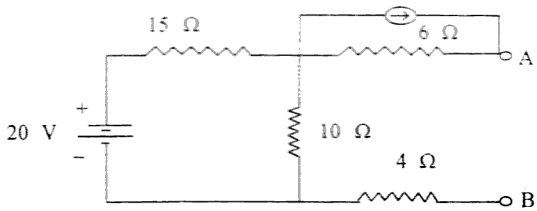

Fig. 1

(c) State and explain super position theorem. Determine current through 6 Ω resistor. Fig. 2

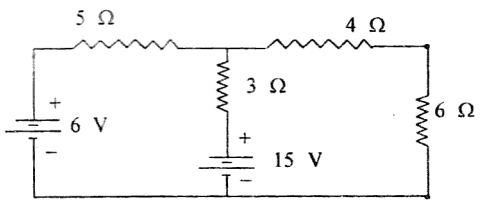

Fig. 2

(d) Explain the difference between moving coil and moving iron instruments.

A moving coil ammeter has a resistance of 0.01 Ω and full scale deflection current of 0.25 A. How this meter can be made to read :

(i) Voltage upto 250 V

(ii) Current upto 20 A ?

(e) Explain the working principle of an induction type wattmeter with the help of a diagram.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) Compare 3 phase star and delta connected systems. Show that total power in these connection remains same. A balanced 3 phase star connected load takes a power of 5 kW at 0.8 pf lagging when connected to a 400 V, 3 phase supply. Calculate the line current and impedance per phase of the load.

(b) Explain the principle of operation of a single phase transformer.

A 230/460 V transformer has a primary resistance of 0.2 Ω and a reactance of 0.5 Ω and the corresponding values for the secondary are 0.75 Ω and 1.8 Ω respectively. Find the secondary terminal voltage when supplying

(i) 10 A at 0.8 p.f. lagging

(ii) 10 A at p.f. 0.8 leading.

(c) Following results were obtained on a 100 kVA, 11,000/220 V single phase transformer :

(i) OC test 220 V, 45 A, 2 kW

(ii) SC test 500 V, 9.09 A, 3 kW.

Determine equivalent circuit parameters of the transformer referred to low-voltage side.

4. Attempt any **three** parts of the following : $(6\frac{2}{3} \times 3 = 20)$

(a) Explain working of different parts of D.C. machine. Derive emf equation across the armature terminals of D.C. generator.

(b) Explain load characteristics of D.C. generators. Why terminal voltage falls by increasing the load ?

(c) Describe the voltage build up process in D.C. Shunt generator. Write conditions of voltage build up failure.

(d) A 200 V dc series motor runs at 500 rpm when taking a current of 25 A. The resistance of the armature is 0.5 Ω and that of field is 0.3 Ω. If the current remains constant, calculate the resistance necessary to reduce the speed to 250 rpm.

5. **Attempt any four** parts of the following : **(5×4=20)**

(a) Draw torque slip characteristics of 3 phase induction **machine**. Draw it for different rotor resistances.

(b) Explain starting of 3 phase step ring induction motor.

(c) Why single phase induction motor is not self starting ? Explain various starting methods.

(d) A 12 pole, 3 phase alternator driven at a speed of 500 rpm supplies power to an 8 pole, 3 phase induction motor. If the slip of the motor is 0.03 pu, calculate the speed of the motor.

(e) Give the applications of the following :

(i) Single phase Induction motor

(ii) Synchronous motor

(iii) Three phase Induction motor

(iv) D.C. series motor

(v) D.C. shunt motor.