Sub: Electrical Engineering (EEE 101/201)

Section A

1- Choose/fill in the blanks/match followings   (20)

I- A 4 pole dc generator is running at 1500 rpm. The frequency of current in the armature is
(a) 25 Hz   (b) 50 Hz (c) Zero Hz (d) 100 Hz   (1)

II -In series R L C circuit the power factor is   (1)

   (a) 0.8 lagging(b) zero (c) unity (d) 0.8 leading

III- Distributed winding in three phase alternator is preferred over concentrated winding as it   (1)

   (a) reduces noise (b) reduces machine size (c) reduces amount of copper required (d) reduces the harmonics in the generated e.m.f

IV- The efficiency of electrical machines is maximum
            (1)

   (a) constant losses =variable losses (b) constant losses =x(variable losses) (c) constant losses =1/x(variable losses) (d) constant losses = 2 variable losses

V- Thevinin's theorem is ------------------------- of Norton's Theorem.   (1)

VI- In three phase induction motor, mechanical power developed in terms of air-gap power Pg is
   (1)

   (a) (s-1)Pg (b) (s-1)/Pg (c)Pg /(s-1) (d) (1-s)Pg

VII- The stator of a three phase 4 pole slip ring induction motor is fed from 50 Hz source and its rotor from 30 Hz source. The motor will run at   (1)

   (a) 1500 rpm (b) 900 rpm (c)zero rpm (d) 2400 rpm

VIII- PMMC instruments are used for---.   (1)

IX- Single phase induction requires starting winding because it has no   (1)

      (a) starting current (b) current is high (c) starting torque (d) maximum torque

X- Match following   (5)

   (a) Single phase induction motors   (a) welding

(b) DC Series motors   (b) Paper Industry

(c) Three phase induction motor   (c) Constant speed drive

(d) Differentially compounded   (d) Electric Trains

     Generator

(e) Synchronous motor   (e) Electric Fans

XI. Which of the elements in the following is not bilateral?   (1)

(a) Resistor   (b) inductor   (c) capacitor   (d) transistor

XII. Three resistances of 3 ohm each are connected in delta. The value of the resistances in the equivalent star is   (1)

(a) 27 ohm   (b) 9 ohm   (c) 1.5 ohm   (d) 1 ohm

XIII. In the magnetic circuit   (1)

(a) Flux is analogous to current   (b) reluctance is analogous to resistance

(c) magneto motive force is analogous to potential difference

(d) all of these

XIV. Which of the following apply to power in a purely reactive circuit?   (1)

(a) P=0 and Q=0   (b) P is maximum and Q=0

(c) P=0 and Q is maximum   (d) P and Q are both maximum

XV. Which of the following constitute the basic components of a single phase transformer?   (1)

(a) tank   (b) windings   (c) Magnetic core   (d) all of these

XVI. At which of the following voltage level ranges is the power generated in a power station (1)

(a) 1.1-6.6 kV   (b) 11-30 kV   (c) 33-66 kV   (d) none of those

SECTION B

Attempt any three of the following

2- A 6 pole DC machine has 400 conductors and each conductor is capable of carrying 80 A. Flux / pole is 0.020 Wb and the machine is driven at 1800 rpm. Calculate: Total current (ii) emf (iii) power developed in armature if wave connected and lap connected for wave connected

3- Three similar coils each of resistance 30 ohm and inductance 0.07 H are connected in delta to a 3 phase 400 V 50 cycle supply. Calculate (a) phase current (b) Line current (c) power factor of the circuit (d) power absorbed

4- A moving coil instrument gives a full scale deflection of 20 mA when a potential difference of 50 mV is applied. Calculate the series resistance to measure 500 V on full scale.

5- A series R-L-C circuit has R=10 ohm, L=0.1 H, and C= 8 microfarad Determine (i) resonant frequency (ii) Q- factor of the circuit at resonance (iii) The half power frequencies

6- A 1100/ 110 V, 22 KVA single phase transformer has primary resistance and reactance 2 ohm and 5 ohm respectively. The secondary resistance and reactance are 0.02 ohm and 0.045 ohm respectively. Calculate (a) Equivalent resistance and reactance of secondary referred to primary (b) Total resistance and reactance referred to primary (c) equivalent resistance and reactance of primary referred to secondary (d) Total resistance and reactance referred to secondary (e) total copper losses

7- An iron ring 10 cm mean dia is made of round iron rod 1.5 cm in dia of relative permeability 900 and has an air gap of 5 mm in length. It has a winding of 400 turns. If the current through winding is 3.4 amp. Determine (a) MMF (B) Total reluctance of the circuit (c) flux in the ring (d) flux density in the ring

SECTION C
Attemt all   (10*5=50)
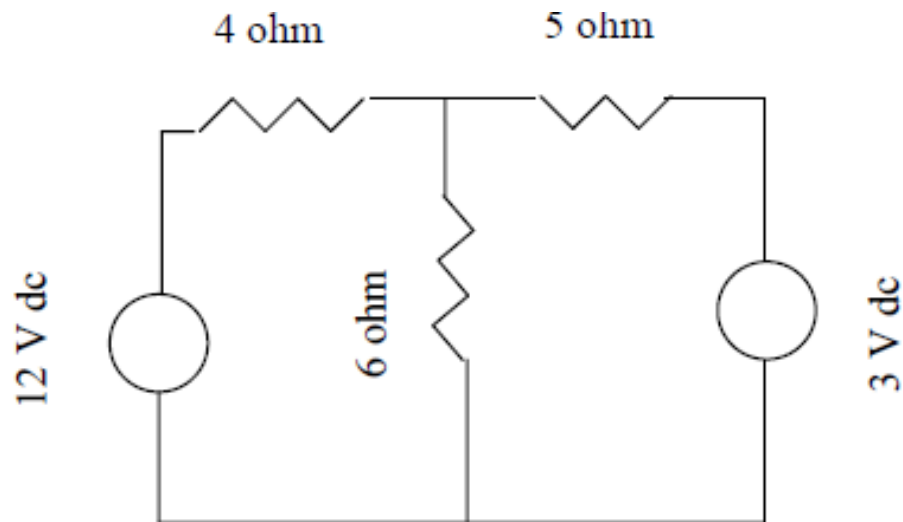
8- Attempt any one of the following

a) Determine average value, effective value and form factor of a sinusoidally varying alternating current whose half wave is rectified in each cycle.

b) A non inductive resistance of 10 ohm is connected in series with an inductive coil across 200 V, 50 Hz ac supply. The current drawn by the series combination is 10 Amp. The resistance of coil is 2 ohms. Determine: (i) Inductance of the coil (ii) Power factor (iii) Voltage across the coil

9- Attempt any one of the following

a) By taking an example explain Thevinin's theorem. How Norton's equivalent can be achieved with thevinin's equivalent.

b) Use Norton s theorem to find the current in 6 ohm resistor in circuit given below.

10- Attempt any one of the following

a) Derive the relationship between line and phase voltage/current in Star/delta connected system. Compare Star and Delta connection.

b) Explain the principle operation and application of different types of Instruments used for measurement. Give the use of shunt and series multipliers

11- Attempt any one of the following

a) Explain equivalent circuit of single phase transformer. How parameters of this is determined? Define efficiency and when it will be maximum? Explain working of Auto transformer.

b) What are the different losses occur in single phase transformer. On what factors they depends.

12- Attempt any one of the following

a) Derive the expression of EMF in DC generator. What are the different types of DC machines? Give the applications of DC generators.

b) Explain the working principle of three phase induction motors. Define slip. Draw torque slip characteristics of three phase induction machine and explain how the starting torque can be increased?