PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2019 – 20 Examination

Semester: 3   Date:27/11/2019
Subject Code: 203106203   Time:02:00 pm to 04:30 pm
Subject Name: Electrical Machine-I   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 **Objective Type Questions** - (Fill in the blanks, one word answer, MCQ-not more than Five in case **(15)**
of MCQ) (All are compulsory) (Each of one mark)

1. For a D.C. generator when the number of poles and the number of armatureconductors is fixed,
    then _____ winding will give the higher e.m.f. ?
2. Eddy currents are induced in the pole shoes of a D.C. machine due to
    a) Oscillating Magnetic field
    b) Pulsating Magnetic Flux
    c) Relative rotation Between Field & armature
    d) All above
3. The no load current drawn by transformer is usually what percent of the full load current?
    a) 0.2 to 0.5 percent
    b) 2 to 5 percent
    c) 12 to 15 percent
    d) 20 to 30 percent
4. The direction of rotation of a D.C. series motor can be changed by
    a) Interchanging supply terminals.
    b) None of the options.
    c) Interchanging field terminals
    d) both (A) and (C)
5. For low reluctance path for the flux in armature, the permeability of the material should be
    a) Low
    b) High
6. In a transformer the energy is conveyed from primary to secondary by the _____.
7. The no load current in a transformer lags behind the applied voltage by an angle of about _____.
    a) 180^0
    b) 120^0
    c) 90^0
    d) 75^0
8. If R_2 is the resistance of secondary winding of the transformer and K is the transformation ratio
then the equivalent secondary resistance referred to primary _____.
9. The full load copper loss of a transformer is 1600 w. At half load the copper loss will be
_____w.
10. Write main advantage of an auto transformer over a two winding transformer.
11. What happens when two transformers of unequal percentage impedance are connected in
parallel?
12. A dc motor with armature resistance of 0.5 ohms connected directly to a 230 Volt supply. If the
armature is stationary then the electric current flowing through armature is _____.
13. The speed of a motor falls from 1100 r.p.m at no-load to 1050 r.p.m at rated load. The speed
regulation of motor is _____%.
14. When Dc shunt motor runs at no load its Back EMF is _____ than applied voltage.
15. Which method is suitable for the speed control, below and above the normal rated speed of d.c.
shunt motor?

Q.2 Answer the following questions. (Attempt any three)   **(15)**
A) Explain Ampere's law.
B) Explain Singly excited magnetic system
C) Show three phase supply conversion in two phase supply system

D) Explain circuit diagram and vector diagram for delta delta connection 0 degree phase shift of three phase transformer.

Q.3 A) Derive EMF equation of Transformer and give condition for maximum efficiency. **(07)**

B) A 220 V compound generator is supplying a load of 100 A at 220V. The resistances of its **(08)** armature, shunt and series windings are 0.1 ohm, 50 ohm and 0.06 ohm respectively. Find the induced emf and the armature current when the machine is connected (a) Short shunt (b) Long shunt. Neglect armature reaction and brush contact drop.

OR

B) A 500 V dc shunt motor takes a current of 5 A on no load. The resistances of the armature and **(08)** field circuit are 0.22 and 250 ohm respectively. Find (a) the efficiency when loaded and taking current of 50 A (b) the percentage change of speed.

Q.4 A) The equivalent circuit for a 200/400 V step up transformer has the following parameters referred **(07)** to the low voltage side.

Equivalent resistance=0.15 ohm and Equivalent reactance=0.37 ohm

Core-loss component resistance =600 ohm and Magnetizing reactance=300 ohm

When the transformer is supplying a load at 10 A at a power factor of 0.8 lag, calculate

(i) primary current(ii) secondary terminal voltage

OR

A) Discuss essential and desirable conditions to be satisfied for parallel operation of two single phase **(07)** transformers. Explain parallel operation of transformers having equal voltage ratio but different impedance triangle.

B) Explain Hopkinson's test with neat circuit diagram. **(08)**