MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
Model questions ELECTRICAL MACHINES-I

Time: 3hours Max Marks: 60M

PART-A

1.Q.
A. List the main parts of a d.c Machine (generators)?
B. Compare lap and wave winding?
C. Write a brief on different type of d.c. armature winding
D. Define front and back pitch factors?
E. What is critical field resistance?
F. How do you classify the compound generators?
G. Write equation for generator induced e.m.f.
H. Write equation for motor back e.m.f.?
I. How do you classify the d.c motor?
J. Write voltage regulation equation?
K. What is stater?
L.What are the factors affecting the speed of d.c motors.
M.State the various losses in d.c machine.
N.Write condition for maximum efficiency?
O.Name the various methods of testing a d.c machine.
P.Definition of the Transformer and name type of testing method of transformer.
Q.Define type of losses in transformer.
R.Write the regulation of the transformer.
S.Draw the equivalent circuit of transformer.
T.Derivation of the equivalent resistance and reactance of transformer?

Section-I

2.With neat diagram give the constructional features of d.c machines?
3.Give the materials and functions of the following parts of a d.c machines

i)Field poles ii) Yoke iii) Commutator iv) armature

4.Derive the expression for the induced e.m.f.in a d.c. generator.

5.A 4 pole, lap wound d.c. generator has a useful flux of 0.07 Wb per pole. Calculate the generated e.m.f. When it is rotated at a speed of 900 r.p.m With the help of prime mover. Armature consists of 440 numbers of conductors. Also calculate the generated e.m.f.

6.Short discussion on armature reaction.

7.what are the different type of d.c. generators.

9.Explain the basic principle of operation of a D.C. generator

10.Describe the constructional details of the armature of a D.C. machine giving suitable diagrams.

11.Draw the schematic diagram of separately excited D.C. generator. Also write the current and voltage equations.

12.Draw the schematic diagram of D.C. series generator. Also write the current and voltage equation.

13.In a 110 V D.C. compound generator, the resistance of the armature, shunt field and series field are 0.06 Ω, 25 Ω and 0.04 Ω respectively. The load consists of 200 lamps each rated at 55 W, 110V. Find the total emf. generated and the armature current when the machine is connected in, (a) Long shunt and (b) Short shunt.

14.Draw the external and internal characteristics of a separately excited D.C. generator.

15.What is critical speed? Explain the significance of critical speed

16.In a 110 V compound generator, the resistance of the armature, shunt and series windings is 0.06, 25 and 0.04 Ω respectively. The load consists of 200 lamps each rated at 55 W, 110 V. Find the emf. generated and armature current when the machine is connected, (a) Long shunt, (b) Short shunt and (c) How will the ampere-turns of series winding be changed if in, (i) A diverter of resistance Ω be connected in parallel with the series winding? Ignore armature reaction and brush contact drop the armature of a 6-pole generator has a wave winding containing 664 conductors. Calculate the generated emf. When flux per pole is 60 m wb and the speed is 250 r.p.m. Find the speed at which the armature must be driven to generate an emf. of 550 V if the flux per pole is reduced to 58 m wb.

17.Derive the expression for calculating the demagnetizing and cross magnetizing ampere turns per pole in a D.C. generator with usual notation.

18.An 8-pole D.C. generator has per pole flux of 40 m wb and winding is connected in lap with 960 conductors. Calculate the generated emf. on open circuit when it runs at 400 r.p.m. If the armature if wave wound at what speed must the machine be driven to generate the same voltage.

Section-II

1.Write the principle of working of D.C. motor

2.Mention various types of windings used in d.c. machines and briefly discuss their relative merits.

3.Explain the in detailed about Significance Of Back E.M.F.

4.Derive the torque equation of a d.c motor.

5.A 250 V D.C. motor takes 41 amps at full load. Its armature and shunt field resistance are 0.1 Ω and 250 Ω. Find back emf. On full load.

6.What are the different methods of speed control of a d.c motor? Explain.

7.Explain the necessity of a stater? Write short notes on 3-point stater.

8. Draw the schematic diagram of D.C. series motor. Also write the back emf. Current and voltage equations.

9.A D.C. series motor working on 200 V supply draws a current of 50 A, its armature and series field resistance are 0.03 Ω and 0.02 Ω respectively. Calculate back emf.

10.A 4-pole, 500 V, shunt motor has a total of 720 armature conductors which are wave wound. The full-load armature current is 60 A, and the flux per pole is 0.03 m wb. The armature

resistance is Ω. The voltage drop across a brush is 1 volt. Calculate the full-load speed of the motor.

11.Describe a method of determining the efficiency of D.C. shunt motor at various loads, without actually putting the load on the motor. State the assumptions made in the method described

12.Explain with neat diagram, how can you find efficiency of small D.C. motor with brake test.

15.In a 4-pole lap wound D.C. compound motor develops back emf. of 200 V. The field produces a flux of 0.025 wb and the armature contains 400 conductors. Calculate the speed developed.

Section-III

1.Explain with neat diagram how fields test can be conducted on pair of identical series machines

2.Swinburne's test? List the advantages and the disadvantages of Swinburne's test Conducted on D.C. motor. [7M]

3.Write about Hopkinson's test and give its limitations. What are the advantages of Hopkinson's test?

4.In a Hopkinson's test on 220 V, 100 kW generators the circulating current is equal to the full load current and in addition, 90 A are taken from the supply. Obtain the efficiency of each machine.

Section-IV

1.Draw the single phase transformer and discuss about constructional details of transformer.

2. Derive the E.M.F. Equitation of the single phase transformer

3.The maximum flux density in the core of a 250/3000V, 50 Hz, single phase transformer is 1.2 wb/m^2. If the EMF/Turn is 8V calculate i) Primary and secondary turns ii) Area of core.

4.Discuss about transformer on load and no load condition.

Section-V

1.Find the efficiency and regulation of transformer.

2. Explain the concept of sumpners test.

3. Explain the parallel operation of transformer with equal and unequal voltage rations.

4.Define auto transformer? And explain working principle and equivalent circuit.

5. Explain the scott connection of transformer.