

B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Second Year)

MECHANICAL ENGINEERING

Paper - III : Electrical Technology

Time : 3 Hours

Maximum Marks : 75

Answer question No.1 compulsory

(15)

Answer ONE question from each unit

(4 × 15 = 60)

- 1) a) Explain the principle of operation of a dc generator and Flemings right rule with neat sketches.
- b) Explain the working principle of a dc motor and Flemings left hand rule.
- Enumerate the various losses in a transformer. how these losses can be minimized.
- c) Derive the expression for efficiency and voltage regulation of a transformer.
- d) Define the of an alternator and explain how will you find the regulation by synchronous impedance method.
- e) Explain the principle of operation of alternators.
- f) Explain the types of dc motors with neat sketches and derive the voltage, current, power generated and power dissipated.
- g) i) Derive the condition for maximum efficiency.
- ii) A 315KVA,50HZ single phase transformer has full load copper loss 1900w and iron loss 1800w.calculate the efficiency of the transformer at
- Full load and 0.8 lagging p.f.
- Half load and 0.8 lagging p.f

- h) Show that a rotating magnetic field is produced in the air gap, when a balanced three-phase supply is given to the stator of a 3-phase induction motor. Justify your claim with necessary mathematical equations?
- i) Why commutator is used in DC generator? Why the carbon or graphite brushes preferred over copper brushes for use in Dc machines?
- j) What is meant by KVL?
- k) Define average value'?
- l) Define RMS value?
- m) Define commutator?
- n) What are methods for excitation?
- o) What is a watt meter?

UNIT – I

- 2) a) Explain the following
 - i) Why is the yoke of a DC machine not laminated? Why the armature core is laminated?
 - ii) How can induced emf in the armature conductors of a dc generator be made uni directional?
 - iii) Why is commutator is used in DC generator?
 - iv) Why are the carbon or graphite brushes preferred over copper brushes for use in Dc machines'?
- b) Explain how torque is developed in a DC motor? What will happen when a DC series motor is started without a load connected to it?

OR

- 3) a) Give the materials and functions of the following parts of a DC machine :
 - i) Field pole
 - ii) Yoke
 - iii) Commutator
 - iv) Commutating poles
 - v) Armature

- b) The armature of a 6 pole generator has wave winding containing 664 conductors. Calculate the generated emf when flux per pole is 60mWb and the speed is 250rpm. Find the speed at which the armature must be driven to generate an emf of 550V if the flux per pole is reduced to 58mWb?

UNIT - II

- 4) a) Explain the working principle of operation of single-phase transformer. Explain why transformer rating will be given in KVA but not in KW.
- b) What is an ideal transformer? And draw the phasor diagram for this transformer under loading, when the load is an inductive, capacitive and resistive load?

OR

- 5) a) Draw and compare the load characteristics of shunt and series generators.
- b) Explain about braking in D C motor.

UNIT - III

- 6) a) Define the of an alternator and explain how will you find the regulation by synchronous impedance method.
- b) Derive the out put equation of an alternator?

OR

- 7) a) Explain the application of 3 phase induction motor.
- b) Explain the operating principle of alternator with constructional details.

UNIT - IV

- 8) a) Briefly explain about the measuring instruments.
- b) Explain the principle of resistance and induction heating.

OR

- 9) a) Explain about the moving-iron instruments and dynamometer type wattmeter.
- b) Explain about the principle of electrical traction and speed characteristics.

