

Reg. No. :

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

**Question Paper Code: 51332**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Electrical and Electronics Engineering

15UEE302 - DC MACHINES AND TRANSFORMERS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The principle of dynamically induced emf is utilized in
  - transformer
  - choke
  - generator
  - thermocouple
- Permanent magnets are normally made of
  - alnico alloys
  - aluminum
  - cast iron
  - wrought iron
- The main purpose of performing open-circuit test on a transformer is to measure its
  - copper loss
  - core loss
  - total loss
  - insulation resistance
- A transformer transforms
  - voltage
  - current
  - voltage and current
  - frequency
- The emf induced in a conductor rotating in a bipolar field is
  - DC
  - AC
  - both AC and DC
  - none of these

6. The property of a material which opposes the creation of magnetic flux in it is known as
- (a) reluctance (b) magnetomotive force  
(c) permeance (d) reluctance
7. In DC generators, the residual magnetism is of the order of
- (a) 2.5% (b) 10% (c) 15% (d) 25%
8. The sparking at the brushes, in a dc machine is due to
- (a) armature reaction (b) reactance voltage  
(c) presence of commutator (d) high resistance of carbon brushes
9. Laminated yoke in dc motor can reduce
- (a) speed regulation (b) iron loss  
(c) temperature rise (d) sparking on load
10. The most inefficient method for speed control of a DC motor is
- (a) voltage control (b) field control  
(c) armature control (d) none of these

PART - B (5 x 2 = 10 Marks)

11. How leakage flux is produced in a magnetic circuit?
12. State the properties of an ideal transformer.
13. Draw the energy flow diagram in electromechanical energy conversion device as a generator.
14. Differentiate lap and wave winding of DC generator.
15. Why DC series motor is never started in No-load?

PART - C (5 x 16 = 80 Marks)

16. (a) Discuss the properties of magnetic materials and explain the B-H relationship using a typical B-H curve and hysteresis loops. (16)

Or

(b) Develop the equivalent circuit of two winding transformer with secondary parameters referred to primary, by representing the transformer as a magnetically coupled circuit. (16)

17. (a) (i) Discuss the construction and working of an auto transformer with a neat sketch. (8)

(ii) Explain the phasor diagram of a practical transformer at no-load condition. (8)

Or

(b) Determine the efficiency and regulation of two similar single phase transformers by Sumpner's test. (16)

18. (a) Derive an expression for magnetic field energy stored in a singly excited magnetic system. (16)

Or

(b) Derive an expression for co-energy in multiple excited magnetic system. (16)

19. (a) (i) Derive the EMF equation of DC generator. (8)

(ii) A 4 pole, lap wound DC generator has a useful flux of  $0.07\text{Wb}$  per pole. Calculate the generated emf when it is rotated at a speed of  $900\text{rpm}$  with the help of prime mover. Armature consists of 440 numbers of conductors. (8)

Or

(b) With neat diagrams, describe the phenomenon of armature reaction in a DC machine. Discuss its effects. (16)

20. (a) Discuss any three methods implemented to control the speed of DC shunt motor. (16)

Or

(b) With the help of a neat circuit diagram, explain the procedure for finding the efficiency of DC motor at different loads using Swinburne's test. (16)

