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Question Paper Code : 51393

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Third Semester

Electronics and Communication Engineering

EC 2201/EC 32/EE 1204/080290008/10144 EC 302 — ELECTRICAL
ENGINEERING

(Regulation 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the necessary conditions to be satisfied for the self excited DC generator to build up emf.
2. Give the reason for high starting current in a DC motor.
3. List out any four general application of Transformers.
4. Define voltage regulation of a Transformer.
5. Distinguish between squirrel cage and slip-ring induction motor.
6. Name any four types of single phase induction motors based on method of starting.
7. Find the speed at which a 6-pole Alternator is to be driven to obtain the Frequency of emf induced to be 50 Hz.
8. On what factors does the back emf induced on windings of Brushless DC motor depends?
9. State the advantages and limitation of high transmission voltage.
10. Write the desirable properties of transmission line insulators.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Briefly explain the load characteristics of different types of compound generators. (8)
- (ii) Explain of speed control of DC series motor applying flux control technique. (8)

Or

- (b) (i) Derive from the first principle an expression for the torque developed in a motor. (8)
- (ii) A 400 V DC shunt motor takes 5 A on no-load at its rated speed. The armature resistance including that of brushes is 0.2 Ω and the normal field current is 2 A. Determine the efficiency of the machine as generator delivering load current of 30 A. (8)

12. (a) (i) Deriving emf equation of the transformer and show that the voltage induced in a Transformer per turn is the same whether it is primary or secondary. (8)
- (ii) Develop equivalent circuit of 1-phase two winding transformer and hence obtain the total equivalent parameters referred to primary. (8)

Or

- (b) A 220/440 V single-phase transformer has the following test results:

OC test: 220 V, 1A, 70 W on LV side

SC test : 20 V, 12 A, 100 W on HV side.

Obtain and draw the equivalent circuit parameters of the Transformer referred to LV side.

13. (a) (i) Describe briefly with necessary diagrams the constructional details of 3-phase squirrel cage induction motor. (8)
- (ii) State the different methods of speed control of 3-phase induction motor and discuss any one method in brief. (8)

Or

- (b) (i) Explain the step by step procedure for estimating the efficiency of 3-phase induction motor using equivalent circuit when the speed of operation is specified. (10)
- (ii) Explain briefly why the plain single phase induction motor is not self starting. (6)

14. (a) A 3.3 kV alternator gave the following test results:

Field current (A)	16	25	37.5	50	70
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OC voltage (kV)	1.55	2.45	3.3	3.75	4.15
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A field current of 18 A is found to cause the full-load current to flow through the winding during short-circuit test. Predetermine the full-load voltage regulation at 0.8 power factor lagging by MMF method. Neglect winding resistance.

Or

- (b) With neat sketches, explain the Full-step operation of variable reluctance stepper motors.
15. (a) (i) Draw a single line diagram of a typical ac power supply scheme. Mark the various components and state their significance. (10)
- (ii) Discuss the advantages and disadvantages of dc transmission over ac transmission. (6)

Or

- (b) (i) Describe the various parts of a high voltage single-core cable with a neat diagram. (6)
- (ii) Draw the typical layout of 33 kV/11 kv substation showing all the protective devices. Assume there are 2 incoming feeders and 4 out going feeders (10)