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**Question Paper Code : 60019**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Second Semester

Electronics and Communication Engineering

BE 3254 – ELECTRICAL AND INSTRUMENTATION ENGINEERING

(Common to Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the characteristics of ideal transformer.
2. What are the applications of auto transformer?
3. State the emf and torque equation of a DC machine.
4. What are the salient features of brushless DC motor?
5. Define 'Revolving magnetic field'.
6. How a synchronous machine start rotating?
7. What are the torques produced in a PMMC?
8. Mention the components presents in the Data acquisition system.
9. Which are all called as the transmission losses?
10. Distinguish between the fuse and circuit breaker.

PART B — (5 × 13 = 65 marks)

11. (a) (i) With the neat sketch explain the working principle of a single phase transformer. (6)

(ii) Draw and explain the phasor diagram of a transformer under resistive load condition. (7)

Or

(b) (i) Explain the construction details of a three phase transformer with different types of connection in windings. (6)

(ii) A 20 KVA, 2000/200 V single phase transformer has r1 = 3 ohms, x1 = 5.3 ohms (HV side) and r2 = 0.05 ohms and x2 = 0.05 ohms (LV side). Find the voltage regulation at 0.8 pf lagging, UPF and 0.707 pf leading. (7)

12. (a) (i) Explain the working of Commutation in a DC machine with respect to generator mode. (6)

(ii) What are the needs of a starter in a dc motor? Compare the 3 point starter and 4 point starter and draw its connection diagram. (7)

Or

(b) (i) Briefly explain the theory of operation of a stepper motor. (6)

(ii) How the speed of a DC motor can be controlled? Explain any one method in detail. (7)

13. (a) Define Slip and Derive the equivalent circuit of an induction motor. (13)

Or

(b) A 750 Kw, 11 kv, 3 phase star connected synchronous motor has a synchronous reactance of 35 ohms per phase and negligible resistance. Determine the excitation emf per phase when the motor is operating on full load at 0.8 pf leading. Its efficiency under this condition is 93%. (13)

14. (a) How the moving Iron instrument working explain the same by deriving the expression for driving torque? (13)

Or

(b) Prove that the power measured by 2 wattmeter methods is equal to the power delivered in all the three phase of the input supply also derive the expression for the power factor in terms of two watt meter reading. (13)

15. (a) (i) Why earthling is important? Explain any two methods of measuring earth resistance. (6)

(ii) What are the transmission losses? Explain them in detail. (7)

Or

(b) (i) Explain the principle of SF6 circuit breakers and mention its advantages and disadvantages. (6)

(ii) Write short notes on Electrical safety and first aids. (7)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the principle of operation of alternator with its emf equation.

Or

(b) With the help of neat diagram explain the functional blocks in the digital storage oscilloscope.

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