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Question Paper Code : 90067

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Second Semester

Electronics and Communication Engineering

BE8254 – BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING

(Common to Computer and Communication Engineering/Electronics and Telecommunication Engineering)

(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. The power in a 3-phase circuit is measured by two wattmeters. If the total power is 100 kW and power factor is 0.66 leading, what will be the reading of each wattmeter ? For what power factor will one of the wattmeter read zero ?
2. A consumer has the following connected load : 10 lamps of 60 W each and two heaters of 1000 W each. His maximum demand is 1500 W. On the average, he uses 8 lamps for 5 hours a day and each heater for 3 hours a day. Find his total load, monthly energy consumption and load factor.
3. Draw the equivalent circuit of a transformer at no load.
4. Why is efficiency of a transformer high as compared to other electrical machines ?
5. What are the factors that affect the speed of a dc motor ?
6. **Calculate the emf generated in a wave wound dc generator having 6 poles, running at 1500 rpm with 430 conductors. Let the flux per pole is 0.4 mWb.**
7. What is slip in an induction motor ?
8. Why the synchronous motor is not self-starting ?
9. Mention the uses of capacitive transducer.
10. List any four static characteristics of a measuring system.

PART – B **(5×13=65 Marks)**

11. a) Explain three phase power measurement by 2-wattmeter method for star and delta connected load and determine the power equation and draw the phasor diagram.

(OR)

b) A star-connected alternator supplies a delta connected load. The impedance of the load branch is (8 + j6) ohm/phase. The line voltage is 230 V. Determine i) power consumed by the load ii) power factor of load.

12. a) i) The primary and secondary of a 25 kVA transformer has 500 and 400 turns respectively. If the primary is connected to 3000 V, 50 Hz mains, calculate primary and secondary currents at full load, the secondary emf and the maximum flux in the core. (4)

ii) Explain voltage regulation in a transformer with the relevant expressions. (9)

(OR)

b) i) Derive the EMF equation of a single-phase transformer with respect to its primary and secondary windings. (8)

ii) Compare the core type and shell type transformers. (5)

13. a) The armature and field resistance of a 230 V dc series motor is 0.15 ohm and 0.1 ohm respectively. It runs at a speed of 800 rpm when connected to rated voltage drawing a current of 100 A. What will be its speed when it draws 25 A from the supply considering that its flux is only 45% at this current as compared to 100 A.

(OR)

b) Explain with a neat diagram, the working of a 3-point Starter.

14. a) With a neat diagram, explain the constructional features of salient pole alternator.

(OR)

b) Discuss briefly different methods of stator side control of speed of a 3 ϕ induction motor.

15. a) Explain the working principle of LVDT with a neat diagram.

(OR)

b) With a neat block diagram, briefly explain about the general purpose oscilloscope.

PART – C **(1×15=15 Marks)**

16. a) i) Describe why the three phase ac system is most popular. (5)

ii) A generating plant has a maximum capacity of 100 kW and costs Rs. 3,00,000. The fixed charges are 12% consisting of 5% interest, 5% depreciation and 2% taxes etc. Find the fixed charges per kWh generated if load factor is 100%. (10)

(OR)

b) i) Compare the advantages of brushless dc motor with a brushed dc motor. (5)

ii) A factory has an average annual demand of 50 kW and an annual load factor of 0.5. The power factor is 0.75 lagging. The tariff is Rs. 100 per kVA maximum demand per annum plus five paise per kWh. If loss-free capacitors costing Rs. 600 per kVAR are to be utilized, find the value of the power factor at which maximum saving will result. The interest and depreciation together amount to ten per cent. Also, determine the saving affected by improving the power factor to this value. (10)
