Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50478

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Third Semester

Electronics and Communication Engineering

EE 6352 – ELECTRICAL ENGINEERING AND INSTRUMENTATION

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. How hysteresis and eddy current losses are minimized ?
2. What is back emf in d.c. motor ?
3. Why transformers are rated in kVA ?
4. Define all day efficiency of a transformer.
5. Why an induction motor never runs at its synchronous speed ?
6. Why MMF method of estimating voltage regulation is considered as optimistic method ?
7. Distinguish between static and dynamic characteristics.
8. State piezoelectric effect.
9. What is the principle of ramp type digital voltmeter ?
10. Name the two different types of storage oscilloscope.

PART – B (5×13=65 Marks)

11. a) i) Draw and explain the construction and principle of a operation of a DC generator. (6)

ii) A motor takes an armature current of 110 A at 480 V. The armature circuit resistance is 0.2 Ω the machine has 6-poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate
i) the speed and
ii) the gross torque developed by the armature. (7)

(OR)

b) i) Draw and explain the characteristic of a DC shunt motor and DC series motor. Compare the DC shunt and series motor characteristics and applications. (6)

ii) A four-pole generator, having wave-wound armature winding has 51 slots, each slot containing 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm assuming the flux per pole to the 7.0 mWb ? (7)

12. a) i) Draw an ideal single phase transformer and explain the principle of operation, the concept of step up and step down transformer. (7)

ii) Derive the EMF equation of a transformer. (6)

(OR)

b) i) A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50Hz supply. Find the full load primary and secondary currents, the secondary e.m.f. and the maximum flux in the core Neglect leakage drops and no-load primary current. (6)

ii) A single phase transformer has 500 turns on the primary and 40 turns on the secondary winding. The mean length of the magnetic path in the iron core is 150 cm and the joints are equivalent to an air-gap of 0.1 mm. When a potential difference of 3,000 V is applied to the primary, maximum flux density is 1.2 Wb/m^2. Calculate :

i) the cross – sectional area of dia core

ii) no-load secondary voltage

iii) the no-load current drawn by the primary

iv) Power factor on no-load. Given that AT/cm for a flux density of 1.2 Wb/m^2 in iron to be 5, the corresponding iron loss to be 2 watt/kg at 50 Hz and the density of iron as 7.8 $gram/cm^3$. (7)

13. a) Draw and explain the construction details and operating principle of an alternator. Also derive the emf equation and draw the vector diagram. (13)

(OR)

b) Draw and explain the construction and principle of operation of three phase slip ring induction motor. How is the construction different in squirrel cage induction motor ? (13)

14. a) i) Explain the static and dynamic characteristics of instruments and measurement systems. (7)

ii) Explain the construction and working of a strain gauge. (6)

(OR)

b) i) Explain the construction and working of LVDT. (7)

ii) Explain the working of a pieze electric transducer. (6)

15. a) i) Explain how an inductance value can be found using a Maxwell's inductance bridge. (7)

ii) Explain the working of a Q meter with neat circuit. (6)

(OR)

b) i) Explain the working principle of a digital Oscilloscope. (7)

ii) Explain the construction and working of Digital voltmeter with neat block diagram. (6)

PART – C (1×15=15 Marks)

16. a) Derive the torque equation and also the condition for maximum torque under starting and running condition.

(OR)

b) Derive the equation for unknown resistance using wheatstone bridge.

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