



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 0.2Ω the machine has 6-poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate
- the speed and
 - 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 be 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 :
- the cross – sectional area of dia core
 - no-load secondary voltage
 - the no-load current drawn by the primary
 - 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. (7)
- (OR)
- b) Derive the equation for unknown resistance using wheatstone bridge.