

(3) Assume suitable additional data if necessary and state them clearly.

(4) Draw neat diagram and sketches.

1. Solve any four :-
  - (a) Explain multi range ohm meter with diagram 5
  - (b) Explain role of CT and PT in measurement with diagram 5
  - (c) Explain Rectifier type of Instruments 5
  - (d) Explain the 3 point starter 5
  - (e) Derive the balance equation of Wheatstone bridge for measurements of unknown resistant. 5
  
2. (a) A 250 V, shunt motor takes a rated current of 67 A. Armature winding and field winding resistance are 0.15 ohm and 166.67 ohm respectively. The motor takes 6.5 A when running without load and runs at 1280 r.p.m. Determine (i) full load speed of the motor (ii) speed regulation (iii) motor current is 50 A (iv) speed when motor current is 40 A (v) horsepower rating of the motor. Neglect effect of armature reaction. 12
  
- (b) A 6 pole, 500 V, wave connected shunt motor has 1200 armature conductor and useful flux per pole is 20 m Wb. Armature and field winding resistance are 0.5 ohm and 250 ohm. What are the speed and the torque developed when motor draws a current of 20 A? If magnetic and mechanical loss are 900 W. Determine useful torque and efficiency. 8
  
3. (a) A 6 pole, 3 phase, 50 Hz Induction motor runs at 940 r.p.m. on full load and takes a power of 40 kW. At this point of operation stator copper loss is  $\frac{1}{2}$  times the stator iron loss and mechanical loss is 50% of the no load loss. Calculate (i) h.p. rating of the motor (ii) torque developed and the shaft torque on full load. Efficiency of the motor is given as 86.33%. 10
  
- (b) A 20 hp 3 phase, 50 Hz, four pole induction motor has a full load slip of 4 percent the friction and winding losses are 500 watts. Calculate the rotor copper loss and rotor speed. 10
  
4. (a) Give the all types of AC and DC potentiometer and explain their application in AC and DC Voltmeter. 10
  
- (b) Explain 1 phase and 3 phase dynamometer type power factor meter. 10
  
5. (a) Explain Megger with construction diagram, working principle, application. 10
  
- (b) An a.c. bridge was arranged as follows, arm AB contains a coil. Arms BC and DE contain variable non-reactive resistance. Arms CD and DA contain non-reactive resistance of 200 ohm each. EC contain a loss force capacitor of 1 micro F. A supply of 50 Hz is connected to terminals A and C and the detector to terminals B and E. At balance, the resistance in arm BC is found to be 400 ohm and that in arm DE, 500 ohm. Find the parameters of coil and Q factor of the coil. 10
  
6. (a) Explain in brief the following: (i) Diamagnetism (ii) Para magnetism (iii) Ferromagnetism. 10
  
- (b) Explain the principle of PMMC meter with the help of neat sketch. How the different forces produced? Derive the torque equation. 10
  
7. Write short notes on any two :- 20
  - (a) Describe the construction and principle of operation of stepper motor, giving classification of various steppers motor.
  - (b) Explain and define static and dynamic Characteristic of stepper motor.
  - (c) Compare the DC Shunt and compound motor with diagram and Characteristic.
  - (d) Explain in brief the speed control of DC motor.