

Electrical Machines

Duration: 40 Minutes**Maximum marks: 30****Q.1 - Q.10 Carry One Mark each.**

1. If transformer A has a core where flux density is higher than the core used in transformer B, and both are connected to same bus bar then
(A) Weight of transformer –A is more than B
(B) Weight of transformer –B is more than A
(C) Both of them have same weight
(D) Flux density has no relation with weight of transformer
2. For a salient pole alternator excitation voltage is 1.2 p.u $x_d = 1$, $x_q = 0.6$ p.u. The maximum power developed at rated voltage when the excitation fails
(A) 1 p.u
(B) 0.5 p.u
(C) 0.33 p.u
(D) 1.2 p.u
3. The number of slots per pole per phase of a 3-phase synchronous machine with a double layer winding and phase spread of 60° is 3. Its distribution factor is _____
4. At 1500 RPM, the slope of the linear part of the open-circuit characteristic of a DC machine is 250Ω . Its field circuit resistance is 100Ω . When operating as a shunt generator, its critical speed is _____
5. An auto-transformer having 1250 turns is connected across a 250V supply. What secondary voltage will be obtained if a tap is taken at 800th turn
(A) 80 V
(B) 100 V
(C) 140V
(D) 160V

Q.6 - Q.10 Carry Two Mark each.

6. A 250 watt, 230 V, 50 Hz single-phase capacitor start induction motor has the following constants for the main and auxiliary windings. Main winding $Z_m = (4.5 + j 3.7)\Omega$, auxiliary winding $Z_a = (9.5 + j 3.5) \Omega$. ___ μ F is the value of the starting capacitor that will place the main and auxiliary winding currents in quadrature at starting.
7. A 3- ϕ induction motor at rated voltage and frequency has a starting torque of 150 percent and a maximum torque of 200% of full load torque. Neglecting stator resistance and rotational losses, calculate the slip at maximum torque.
(A) 0.12,0.12
(B) 0.22,1.72
(C) 0.35,0.45
(D) 0.45,0.12

8. A 50 kVA, 440 V, 3-phase, 50 Hz inductor motor is provided with a 3-phase step down auto-transformer starter, which steps down the voltage to 60% of the input. The starting current of motor on rated voltage is 6 time of the rated full-load current. The current drawn by the auto-transformer from the mains at starting is ____A.
9. A 6 pole, 50 Hz, 3- ϕ induction motor running on full load develops a useful torque of 150 Nm at a rotor frequency of 1.5 Hz. The shaft power output is ____kW.
10. A 25 h.p., 6-pole, 50-Hz, 3-phase slip-ring induction motor runs at 960 revolutions per minute on full load with a rotor current per phase of 35 A. Allowing 250 W for the copper loss in the short-circuiting gear, and 1000 W for mechanical losses, find the resistance per phase of the three-phase rotor winding.
- (A) 0.154 Ω (C) 0.354 Ω
(B) 0.254 Ω (D) 0.333 Ω