BE Semester- III (Instrumentation and Control) Question Bank

(IC 303 ELECTRICAL ENGINEERING)

All questions carry equal marks (10 marks)

<table>
<tr><td>Q.1</td><td>Explain various equipments used in transformer substations</td></tr>
<tr><td>Q.2</td><td>A separately excited DC generator gave the following data for open circuit characteristic at 1000 rpm.
<table>
<tr><td>Field current A</td><td>0</td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td></tr>
<tr><td>Eg V</td><td>5</td><td>50</td><td>100</td><td>140</td><td>170</td><td>190</td><td>200</td><td>205</td></tr>
</table>
The armature resistance is 0.5 ohms. If the generator is now shunt connected and is driven at 1100 rpm, for a total shunt field resistance of 180 ohms, calculate
(1) No load emf.
(2) The out put current and shunt field current for a terminal voltage of 190V.
(3) The maximum output current and corresponding terminal voltage.
(4) Steady state short circuit current:</td></tr>
<tr><td>Q.3</td><td>A 10kW, 250V DC shunt motor has an armature resistance of 0.5 ohms and field resistance of 200 ohms. At no load and rated voltage the speed is 1200 r.p.m and the armature current is 3A. At full load and rated voltage the line current is 47A and because of armature reaction the flux is 4% less than its no load value.
(a) What is the full load speed?
(b) What is the torque at full load?</td></tr>
<tr><td>Q.4</td><td>A 60 kW, 250V DC shunt motor takes 16A when running light at 1440 r.p.m. The resistance of the armature and field are 0.2 and 125 ohms respectively when hot.
(a) Estimate the efficiency of motor when taking 152 A.
(b) Also estimate efficiency if working as a generator and delivering a load current of 152A at 250V.</td></tr>
<tr><td>Q.5</td><td>A 230 V DC series motor is taking 50A. Resistance of armature and series field winding is 0.2 ohms and 0.1 ohms respectively. Calculate (a) brush voltage (b) back emf (c) power wasted in armature (d) mechanical power developed.</td></tr>
<tr><td>Q.6</td><td>Discuss DC series motor characteristic in details.</td></tr>
<tr><td>Q.7</td><td>Classify DC generators and derive an expression for induced emf with usual notations.</td></tr>
<tr><td>Q.8</td><td>State and explain various types of losses in case of DC generators.</td></tr>
<tr><td>Q.9</td><td>Explain commutation process in details for DC generator.</td></tr>
<tr><td>Q.10</td><td>Discuss working of three – point starter for DC shunt motor.</td></tr>
<tr><td>Q.11</td><td>Describe different methods of speed control for DC series motor.</td></tr>
<tr><td>Q.12</td><td>Compare lap winding and wave winding in details.</td></tr>
<tr><td>Q.13</td><td>Explain armature reaction in DC generators.</td></tr>
<tr><td>Q.14</td><td>Explain back emf and derive torque equation for DC motor.</td></tr>
<tr><td>Q.15</td><td>Discuss working principle and construction of transformer in details.</td></tr>
<tr><td>Q.16</td><td>Explain open circuit and short circuit tests of transformer.</td></tr>
<tr><td>Q.17</td><td>Draw and explain phasor diagrams for transformer under (i) no-load condition (ii) R-L load condition.</td></tr>
<tr><td>Q.18</td><td>Describe voltage regulation of single phase transformer and derive condition for maximum efficiency for the same.</td></tr>
<tr><td>Q.19</td><td>Discuss working of autotransformer in details.</td></tr>
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Q.20	Explain parallel operation of two single phase transformers with necessary conditions and diagrams.
Q.21	Discuss applications of three-phase star-star, delta-delta, star-delta & delta-star transformers.
Q.22	A 15 kVA, 2300/230V, 50Hz, single phase transformer gave following test results: OC test Vo = 2300V, Io = 0.21A, Wo = 50W SC test Vsc = 47V, Isc = 6A Wsc = 160W. (i) Find equivalent circuit referred to high voltage side. (ii) Calculate full load voltage regulation at 0.8 p.f. lagging when the load voltage is lead at 220V. (iii) What is the efficiency at half the rated load at UPF? (iv) Find maximum efficiency and corresponding output power.
Q.23	In a 25 kVA, 2000/200V transformer, the iron & copper losses are 350 & 400 W respectively. Calculate: (a) Efficiency on UPF at (i) full load (ii) Half load (b) Determine load for maximum efficiency and the iron and copper loss at this stage.
Q.24	20 kVA , 2000/200 V, single phase transformer has following parameters.: HV winding r1 = 3 ohms, x1 = 5.3 ohms LV winding r2 = 0.05 ohms, x2 = 0.05 ohms Find the voltage regulation at (i) 0.8 p.f lagging (ii) UPF (iii) 0.707 p.f leading
Q.25	Explain construction and working principle of three-phase induction motor.
Q.26	Briefly discriminate between starting torque of slip-ring and squirrel cage induction motor. Derive condition for maximum starting torque and maximum running torque with usual notations.
Q.27	State various starting methods of three-phase induction motor. Explain
Q.28	Explain methods of measurement of slip in three-phase induction.
Q.29	Explain torque-slip characteristic of three-phase induction motor.
Q.30	Describe three-phase induction motor as generalized transformer.
Q.31	A 3000 V , 24 pole , 50Hz, Three phase star connected induction motor has slip ring rotor of resistance 0.016 ohms and standstill reactance 0.265 ohms per phase full load torque is obtained at speed of 247 rpm. Calculate (a) the ratio of maximum full load torque (b) the speed at maximum torque. Neglect stator impedance.
Q.32	A 746 kW, Three phase, 50Hz, 16 pole Induction motor has rotor impedance of (0.02 + j 0.15) ohms at standstill. Full load torque is obtained at 360 rpm. Calculate (a) Speed at maximum torque (b) the ratio of maximum to full load torque (c) the external resistance per phase to be inserted in rotor circuit to get maximum torque at starting.
Q.33	Describe working of capacitor start and run induction motor.
Q.34	Discuss working of shaded pole single phase induction motor.
Q.35	Explain working of universal motor.
Q.36	State different causes of low power factor and discuss disadvantages of low power factor in power system.
Q.37	Explain schematic arrangement of thermal power station.
Q.38	Explain schematic arrangement of hydro power station.
Q.39	Explain choice of site for steam power station.
Q.40	Describe wind mill power generation.