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SARDAR PATEL UNIVERSITY
T.Y.B.Sc. Examination, Fifth Semester
Friday, 22nd November 2013
Time : 10.30 am To 01.30 pm
Instrumentation Course Code : USO5CINS05
Course Title : Industrial Electronics – I

Total Marks : 70

Q-1 Write answers to the following multiple choice questions in your answer book by selecting the proper option. **[10]**

(1) The transformer is a static device which transforms the _____of one circuit into the another circuit.
(a) electric power **(b)** electrical resistance
(c) electrical capacitance **(d)** electrical inductance

(2) The steel used in the core of transformer is of high silicon content to reduce
(a) hysteresis loss **(b)** eddy current loss
(c) stray loss **(d)** capacitive loss

(3) The principal of working of transformer is
(a) Faraday's law **(b)** Lenz's law
(c) mutual inductance **(d)** self inductance

(4) In a simple loop dc generator the function of split-ring is analogous to that of
(a) capacitor **(b)** inductor **(c)** rectifier **(d)** inverter

(5) The machine which converts mechanical power to electrical power is called
(a) generator **(b)** motor **(c)** converter **(d)** inverter

(6) For a shunt dc motor
(a) $\Phi \propto R_a$ **(b)** $\Phi \propto I_a$ **(c)** $\Phi \propto E_b$ **(d)** Φ = constant

(7) The speed of a dc motor is given by the equation
(a) $N = KE_b/\Phi$ **(b)** $N = KE_b\Phi$ **(c)** $N = K/E_b\Phi$ **(d)** $N = K\Phi/E_b$

(8) An induction motor is also called as a rotating _____.
(a) transformer **(b)** transistor **(c)** capacitor **(d)** inductor

(9) In a two phase induction motor the resultant revolving magnetic flux produced by the stator windings has a constant value ____ .
(a) $2\Phi_m$ **(b)** Φ_m **(c)** $\Phi_m/2$ **(d)** $3\Phi_m/2$

(10) The synchronous speed is given by N_s = ____ .
(a) 120p/f **(b)** 120p·f **(c)** 120f/p **(d)** 120(f-p)

Q-2 Answer the following questions in brief. (Answer any Ten Questions) **[20]**

(1) Write a short note on spira-core transformer.
(2) Write a short note on classification of transformer on the basis of the cooling methods employed.
(3) Write a short note on voltage-transformation ratio.
(4) Write a short note on copper losses.
(5) Write a note on significance of back emf.
(6) Explain the motor action using the principle of working of a dc motor.

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(7) Enlist the applications of shunt dc motors.
(8) Enlist the applications of cumulatively compound dc motors.
(9) Write a short note on speed regulation.
(10) Discuss the general principle of induction motors.
(11) State the advantages of induction motors.
(12) Provide the classification of ac motors with regards to the type of current supplied and with regards to their speeds.

Q-3 **(a)** Explain the construction of Core type and Shell type transformer in detail. **[7]**

(b) Write a note on emf equations of a transformer. **[3]**

OR

Q-3 **(a)** Discuss the step-by-step procedure for obtaining the single-line equivalent circuit of a transformer. **[7]**

(b) Write a note on transformer with winding resistance but no magnetic leakage. **[3]**

Q-4 Describe the construction and working of a simple-loop dc generator in detail. Also discuss the rectifying action of split-ring. **[10]**

OR

Q-4 **(a)** With the help of necessary diagrams compare the generator and motor actions in detail. **[6]**

(b) Write a note on the voltage equation of a dc motor. **[4]**

Q-5 **(a)** What are compound dc motors? With the help of necessary figures explain the construction and working of cumulatively and differentially compound dc motors in detail. **[6]**

(b) Discuss the performance curves of shunt and series dc motors in detail. **[4]**

OR

Q-5 **(a)** Discuss the different types of characteristics of shunt and series dc motor in detail. **[7]**

(b) Derive the expression for the speed of a dc motor. **[3]**

Q-6 **(a)** In case of a two-phase induction motor, explain how the rotating magnetic field is generated by its stator windings. **[7]**

(b) Enlist the merits and demerits of induction motors. **[3]**

OR

Q-6 **(a)** In case of a three-phase induction motor, explain how the rotating magnetic field is generated by its stator windings. **[7]**

(b) Explain the concept of slip in induction motor and write its equation. **[3]**

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