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Seat No : \_\_\_\_\_

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SARDAR PATEL UNIVERSITY  
Semester V, T.Y. B.Sc. Examination  
Date & Day: 20-11-2019 & Wednesday  
Time: 10:00 am to 01:00 pm  
Instrumentation, Course Code- US05CINS05  
Course title- Industrial Electronics- I

Maximum 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 another circuit.  
(a) electric power (b) electrical resistance (c) electrical capacitance (d) electrical inductance
- (2) The principal of working of transformer is-  
(a) Faraday's law (b) Lenz's law (c) mutual inductance (d) Self Inductance
- (3) 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
- (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) In the armature of a dc generator the induced voltage is \_\_\_\_  
(a) DC (b) AC (c) reversible (d) irreversible
- (6) In a simple loop dc generator the rectifying action is performed by \_\_\_\_  
(a) end rings (b) slip rings (c) split rings (d) wound rings
- (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) For a shunt dc motor  
(a)  $\Phi \propto R_a$  (b)  $\Phi \propto I_a$  (c)  $\Phi \propto E_b$  (d)  $\Phi = \text{constant}$
- (9) Which one of the following is NOT the classification of induction motors with respect to their speed?  
(a) constant speed (b) variable speed (c) single phase (d) adjustable speed
- (10) An induction motor is also called as a rotating \_\_\_\_.  
(a) transformer (b) transistor (c) capacitor (d) inductor

Q-2 Answer the following questions in brief. (Answer any ten questions)

[20]

- (1) Explain the working component of a transformer in detail.
- (2) Discuss the theory of an ideal transformer in brief.
- (3) Write a short note on voltage-transformation ratio.
- (4) Discuss the general principle of operation of a dc motor.
- (5) Write a short note on copper losses.
- (6) Write a note on significance of back emf.
- (7) Write a short note on speed regulation.
- (8) Enlist the various characteristics curves of dc motors.
- (9) Enlist the applications of cumulatively compound dc motors.
- (10) Provide the classification of ac motors with regards to their principle of operation
- (11) Provide the classification of ac motors with regards to the type of current supplied and with regards to their speeds.
- (12) Explain how does the rotor of an induction motor rotate?

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- Q-3 (a) Discuss the theory of an ideal transformer and derive the emf equations for it. [6]  
(b) Derive the formula for the equivalent resistance of a transformer. [4]

OR

- Q-3 (a) Discuss the step-by-step procedure for obtaining the single-line equivalent circuit of a transformer. [10]

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- Q-4 (a) Give a detailed account of the total losses in a dc generator. [6]  
(b) Write a note on the voltage equation of a dc motor. [4]
- OR
- Q-4 (a) Describe the construction and working of a simple-loop dc generator in detail. [6]  
(b) Write a detailed note on armature torque of a dc motor. [4]
- Q-5 (a) Discuss the different types of characteristics of a shunt dc motor in detail. [6]  
(b) Derive the expression for the speed of a dc motor. [4]
- OR
- Q-5 (a) Discuss the different types of characteristics of shunt and series dc motor in detail. [10]
- Q-6 (a) In case of a two-phase induction motor, explain how the rotating magnetic field is generated by its stator windings. [6]  
(b) Explain the construction and working of a squirrel-cage induction motor in detail. [4]
- OR
- Q-6 (a) With the help of necessary equations and figures discuss the relationship between torque and slip in an induction motor. [6]  
(b) Discuss the torque-speed curves of induction motor in detail. [4]

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