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SEAT No. \_\_\_\_\_

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SARDAR PATEL UNIVERSITY  
B.Sc. (III<sup>rd</sup> SEM.) INSTRUMENTATION (V)

20<sup>th</sup> NOVEMBER-2018 EXAMINATION, *Tuesday*

SUBJECT- ELECTRICAL INSTRUMENT AND POWER ELECTRONICS-I  
SUB.CODE-US03CINV01

TIME: 2:00 pm to 5:00 pm

MARKS-70

Q-1 Choose correct answer.

[10]

1. A shunt connected motor armature torque ( $T_a$ ) is directly proportional to \_\_\_\_.  
(A)  $I_a$  (B)  $I_a^2$  (C)  $I_a^3$  (D) None of above
2. The difference between the synchronous speed and actual speed of an induction motor is known as \_\_\_\_.  
(A) split (B) slip (C) shaft torque (D) None of above
3. \_\_\_\_\_ carries the magnetic flux produced by poles.  
(A) Yoke (B) Commutator (C) Armature (D) None of above
4. \_\_\_\_\_ Winding is used for high voltage and low current in machine  
(A) Wave (B) Lap (C) pole coil (D) None of above
5. \_\_\_\_\_ is a machine which converts mechanical energy in to electrical energy.  
(A) Power supply (B) Motor (C) Generator (D) None of above
6. \_\_\_\_\_ Connection is most economical for large, low voltage transformer.  
(A) Star/ Star (B) Delta/Delta (C) Why/Delta (D) None of above
7. Motor efficiency is given by the ratio of \_\_\_\_\_ developed by the armature to its input.  
(A) Current (B) Voltage (C) Power (D) None of above
8. An induction motor works on \_\_\_\_\_.  
(A) DC only (B) AC only (C) both (A) and (B) (D) None of above
9. \_\_\_\_\_ Core coil mainly used in Transformer.  
(A) Iron (B) Air (C) Ferrite (D) None of above
10. Area of hysteresis loop represents the energy spends in taking the iron bar through \_\_\_\_\_ cycle of magnetisation.  
(A) one (B) two (C) three (D) None of above

Q-2 Short answer type question. (Any Ten)

[20]

1. Write a short note on three phase transformer.
2. Briefly explain total losses in D.C generator.
3. List advantage of AC induction motor.
4. List magnetic hysteresis application.
5. Briefly explain: Why split ring is used in dc generator in place of slip ring?
6. Briefly explain general principle of induction motor.
7. Briefly explain wave winding.
8. List different methods of speed control induction motor.
9. Draw pole shoes and pole core figure and list its function in generator.
10. Write a short note on significant of back emf.
11. Derive an expression of voltage transformation ratio of a transformer.
12. Derive an expression voltage equation of a DC Motor.

(1)

(P.T.O)

- Q.3(A) State faraday's laws of electromagnetic induction and explain it in detail. [06]  
 Q.3(B) A coil of resistance 100 ohm is placed in magnetic field of 1 mWb. The coil has 100 turns and a galvanometer of 400 ohm is connected in series with it. Find the average emf and the current if the coil is moved in  $1/10^{\text{th}}$  second from the given field to a field of 0.2 mWb. [04]

**OR**

- Q.3(A) Discuss core type transformer with necessary figure. [06]  
 Q.3(B) Explain magnetic hysteresis with necessary figure. [04]  
 Q.4 Explain practical loop generator parts; [10]  
 (a) Yoke (b) Armature core (c) Commutator (d) Brushes and Bearings

**OR**

- Q.4(A) Explain simple loop generator with necessary figure. [06]  
 Q.4(B) A four-pole generator having lap wound armature winding has 51 slots, each slot containing 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm assuming the flux per pole to be 7.0 mWb [04]  
 Q.5(A) Derive an expression for speed of series and shunt connected D.C Motor. [07]  
 Q.5(B) A dc motor takes an armature current of 110 A at 480 V. The armature circuit resistance is 0.2 ohm. The machine has 6 poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate speed (N). [03]

**OR**

- Q.5(A) Derive an equation for armature Torque, series and shunt connected motor. [07]  
 Q.5(B) Write a short note on shaft Torque. [03]  
 Q.6(A) Explain speed control of induction motor ; (a) Rotor rheostat control [06]  
 (b) Cascade operation  
 Q.6(B) The stator of 3-phase induction motor has 4 slots per pole per phase. If supply frequency is 50 Hz, calculate (a) Number of stator poles produced (b) Speed of rotating stator flux. [04]

**OR**

- Q.6(A) Draw two phase supply production of rotating field in AC induction motor and explain it. [06]  
 Q.6(B) Write a short note on stroboscopic method for finding the slip of an induction motor. [04]

