SPECIAL SUPPLE B.TECH/EE/7TH SEM/ELEC 4101/2018

ELECTRIC DRIVES AND POWER UTILIZATION
(ELEC 4101)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

   (i)   The heating time constant of an electrical machine gives an indication of
   (a) cooling   (b) rating
   (c) overload capacity   (d) short time rating.

   (ii)   Which braking is not possible in series motor?
   (a) Regenerative Braking   (b) Dynamic Braking
   (c) Counter Current Braking   (d) Rheostat Braking.

   (iii) Which type of electrical drive is used in cranes?
   (a) Multimotor   (b) Group
   (c) Individual   (d) Both (a) and (c).

   (iv) Polarity of supply voltage is reversed in which type of braking?
   (a) Regenerative braking   (b) Dynamic Braking
   (c) Plugging   (d) Rheostatic Braking.

   (v)   The consideration involved in the selection of the type of electric drive for a particular application depends on
   (a) speed control range and its nature
   (b) starting torque
   (c) environmental conditions
   (d) all of the above.

   (vi) Crest speed of a vehicle is
   (a) maximum speed of the vehicle
   (b) average speed of the vehicle
   (c) schedule speed of the vehicle
   (d) speed at the time of coasting.

   (vii) Eddy current heating is involved in
       (a) resistance heating   (b) dielectric heating
       (c) induction heating   (d) arc heating.

   (viii) Kando system is basically
       (a) single phase AC system
       (b) three phase AC to single phase AC system
       (c) single phase AC to three phase AC system
       (d) DC system.

   (ix) The electrodes used for projection welding are
       (a) flat and smaller in diameter
       (b) flat and larger in diameter
       (c) round and smaller in diameter
       (d) round and larger in diameter.

   (x)   The area under the speed - time curve represents the
       (a) acceleration of the train   (b) time taken by the train
       (c) distance travelled by the train   (d) crest speed.

Group – B

2. (a)   What is electric drive? Describe the main components of electric drive.

    (b)   What is meant by load equalization? Define steady state stability.

(2 + 6) + (2 + 2) = 12

3. (a)   Explain four quadrant operation of a motor driving a hoist load with necessary diagram.

    (b)   Explain various classes of motor duty with examples.

7 + 5 = 12

Group – C

4. (a)   What is braking? Explain the process of plugging in a dc motor.

    (b)   How dynamic braking is brought about by a chopper.

(2 + 5) + 5 = 12

5. (a)   Explain Static Scherbius drive in detail.

    (b)   What are the various methods of speed control in an induction motor?

7 + 5 = 12

Group – D

6. (a) What is the advantage of using Electric drive in traction system? Define dead weight and accelerating weight.

    (b) A train service consists of the following:
    Uniform acceleration of 5km/hr/sec for 30 seconds followed by free running for 10 minutes, then uniform braking at 5km/hr/sec to stop followed by a stop of 5 minutes.
    Draw the speed vs. time curve and calculate:
    (i)   Distance between stations
    (ii) Average speed
    (iii) Scheduled speed.

    (3 + 2) + 7 = 12

7. (a) Write short notes of any one: (i) Conductor rail system (ii) Current collectors for overhead system.

    (b) A train weighting 120 tonnes is to be driven up an incline of 2 percent at a speed of 36kmph. If the train resistance at this speed is 2kg/tonne, find the current required at 1500 V dc if the efficiency of the motors and gearing is 88 percent. If the current were cut off how long would the train take to come to rest.

    5 + 7 = 12

Group – E

8. (a) Why electric heating is preferred over other forms of heating.

    (b) Briefly explain induction heating.

    (c) Describe arc welding in detail.

    3 + 5 + 4 = 12

9. Define the following terms used in illumination: **(6 × 2) = 12**
    (i)   Luminous Flux
    (ii) Luminous Intensity
    (iii) Lux
    (iv) Maintenance Factor
    (v)   Lumen
    (vi) Utilization Factor.