

[4]

**Unit - V**

5. a) What are the major components of electrical vehicle?  
b) Enumerate major requirements of electrical vehicle motor drive.  
c) Describe with the help of block diagram the operation of hybrid vehicle.  
d) Explain how will you evaluate the performance of an electrical vehicle.

OR

Explain in detail with the help of block diagram the operation of an electrical vehicle.

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**EX - 501**

**B.E. V Semester**

Examination, December 2015

**Utilization of Electrical Energy**

*Time: Three hours*

*Maximum Marks : 70*

- Note:* i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.  
ii) All parts of each question are to be attempted at one place.  
iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.  
iv) Except numericals, Derivation, Design and Drawing etc.

**Unit - I**

1. a) What is a solid angle?  
b) What are the requirements of good lighting?  
c) What is flood lighting and where it is used?  
d) With the help of circuit diagrams explain the working of following light sources -  
i) Fluorescent lamp  
ii) Incandescent lamp

[2]

OR

The front of a building  $45\text{m} \times 20\text{m}$  is illuminated by twenty 1000W lamps arranged so that uniform illumination on the surface is obtained. Assuming a luminous efficiency of 18 lumen/Watt, coefficient of utilization 0.4, waste light factor 1.2 and depreciation factor 1.3, determine the illumination on the surface.

### Unit - II

2. a) What are the advantages of electric heating?
- b) Enumerate the various welding processes.
- c) What are electrolytic processes?
- d) What is resistance welding? What are its limitations?

OR

What is dielectric heating? Explain the factors on which the dielectric loss in a dielectric material depends.

### Unit - III

3. a) Draw the speed time curves for urban and main line service.
- b) Discuss the factors which affect the schedule speed of a train.
- c) What is tractive effort of a train and what are its functions?
- d) A 250 tonne EMU is started with a uniform acceleration and reaches a speed of 42 km/hour in 25 seconds, on a level track. Assuming trapezoidal speed-time curve, find specific energy consumption if rotational inertia is 10%, retardation is 28 km/hour/sec, distance between stops is 3.2 km, motor efficiency is 88% and train resistance is 45 N/t.

[3]

OR

A train is required to run between two stations 2 km apart at a schedule speed of 36 km/hour, the duration of stops being 20 seconds. The braking retardation is 2.7 kmphps. Assuming a trapezoidal speed-time curve, calculate the acceleration if the ratio of maximum speed to average speed is 1.2.

### Unit - IV

4. a) What is an electrical drive?
- b) What do you mean by load equalization?
- c) Describe the main features of -
  - i) Plugging and
  - ii) Regenerative braking
- d) An induction motor has a final steady temperature rise of  $40^\circ\text{C}$  when running at its rated output. Calculate its half-hour rating for the same temperature rise if the copper losses at the rated output are 1.25 times its constant losses. The heating time constant is 90 minutes.

OR

In an air conditioning plant it is required to raise the temperature of  $2000\text{m}^3$  of air per hour from  $0.0^\circ\text{C}$ . It is further necessary to evaporate 0.5 kg of moisture per  $100\text{m}^3$  of air per hour to control the humidity. The density of air may be taken as  $\text{kg/m}^3$ , its specific heat 0.25 and latent heat of evaporation as 500 calories per gram. Estimate the power required.