

Roll No. ....

## EX-501(N)

B. E. (Fifth Semester) EXAMINATION, June, 2011

(Electrical & Electronics Engg. Branch)

UTILISATION OF ELECTRICAL ENERGY

[EX-501(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any five questions choosing one from each Unit.

### Unit-I

1. (a) Explain the following terms : 10
- (i) Illumination
  - (ii) Brightness
  - (iii) Glare
  - (iv) MSCP
  - (v) MHCP
- (b) Two lamp posts are 16 m apart and are fitted with a 100 CP lamp each at a height of 6 m above ground. Calculate the illumination on the ground : 10
- (i) Under each lamp
  - (ii) Midway between the lamps

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Or

2. (a) Explain with neat sketch, the construction and working of an incandescent lamp. 10
- (b) Explain how flood lighting is provided and also explain the design consideration involved. 10

### Unit-II

3. (a) State the various advantages of induction heating. Explain with the help of neat sketch the working of an induction furnace. What is its field of application ? 10
- (b) A 30 kW, 3-phase, 400 V resistance oven is to employ nickel-chrome strip 0.025 cm thick for the 3-phase star-connected heating element. If the wire temperature is to be 1100°C and that of charge is to be 700°C, estimate a suitable width for the strip. Assume radiating efficiency as 0.6 and emissivity as 0.9. The specific resistance of the nichrome alloy is  $1.03 \times 10^{-6} \Omega\text{-m}$ . State any assumption made. 10

Or

4. (a) Discuss the principle of arc welding and differentiate carbon and metallic arc welding. 10
- (b) What is electroplating and what for is it done ? Describe the various operations involved in electroplating. 10

### Unit-III

5. (a) Explain the following : 10
- (i) Speed-time curve
  - (ii) Mechanism of train movement
- (b) A sub-urban electric train has a maximum speed of 70 km/hour. The schedule speed including a station

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stop of 30 second is 45 km/hour. If the acceleration is 1.5 km/h/s, find the value of retardation when the average distance between stops is 4 km. 10

Or

6. (a) What is the coefficient of adhesion ? How does it affect slipping of driving wheels of traction unit ? 10
- (b) A 250 tonne EMU is started with a uniform acceleration and reaches a speed of 42 km/h in 25 seconds, on a level track. Assuming trapezoidal speed-time curve, find the specific energy consumption, if rotational inertia is 10%, retardation is 2.8 km/h/s, distance between stops is 3.2 km, motor efficiency is 88% and train resistance is 45 N/t. 10

## Unit-IV

7. (a) Discuss and distinguish between rheostatic and regenerative braking applied in electric traction. 10
- (b) A train weighting 400 tones is going down a gradient of 20 in 1000. It is desired to maintain train speed at 40 km/h by regenerative braking. If the traction resistance is 40 N/tones, rotational inertia 10% and efficiency of conversion of 75%, calculate the power fed into the line. 10

Or

8. (a) Discuss the criteria for selection of motors for various industrial drives. 10
- (b) What do you understand by refrigeration and air conditioning ? Draw and explain the electric circuit used in air-conditioning. 10

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## Unit-V

9. (a) Derive an expression for tractive effort for propulsion of a train on up and down gradient. 10
- (b) The current-torque curve of a series traction motor is given by : 10

Current (A)	Torque (N-m)
10	54
20	142
30	250
40	365
50	480
60	620
70	810

Deduce the speed-current of the motor at an operating voltage of 500 volts. Take the resistance of armature circuit as 0.6 ohm.

Or

10. (a) Discuss the factors that affect the specific energy consumption. 10
- (b) Explain the method of series-parallel starting of traction motors. Mention its advantages. 10

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