

**B.Tech. – VIEP – ELECTRICAL ENGINEERING
(BTELVI)**

Term-End Examination

June, 2017

00284

BIEEE-011 : ELECTRIC ENERGY UTILIZATION

Time : 3 hours

Maximum Marks : 70

Note : Attempt **seven** questions in all. Use of scientific calculator is allowed. Assume any suitable data, if missing.

1. (a) Compare DC and AC systems of Railway Electrification from the point of main line and suburban line railway services. 5
- (b) What are the advantages and disadvantages of electric traction over other types of traction systems ? 5
2. The following data relates to a 3-phase arc furnace :
Current drawn = 5000 A, Arc voltage = 60 V,
Resistance of transformer referred to secondary side = 0.0025 Ω , Reactance of transformer referred to secondary side = 0.0060 Ω .
 - (a) Calculate the power factor and kW drawn from the supply.

- (b) If the overall efficiency of the furnace is 80%, find the time required to melt 3.5 tons of steel

if Latent heat of steel = 372 kJ/kg,

Specific heat of steel = 0.5 kJ/kg K,

Melting point of steel = 1370°C and

Initial temperature of steel = 15°C.

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3. Discuss the advantages of electric heating over conventional methods. Derive the condition for maximum power output for electric arc furnace. Obtain the power factor for such condition.

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4. An illumination of 35 lux is to be produced on the floor of a room 12 m × 9 m. 18 lamps are required to produce this illumination in the room. If 50% of emitted light falls on the floor, what is the power of the lamp in candela ?

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5. What are the general principles that are visually employed in the design of street lighting ? Explain.

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6. Define the following :

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- (a) Illumination and Luminous intensity
- (b) Lamp efficiency and Specific consumption
- (c) Maintenance factor and Depreciation factor
- (d) Specular reflection and Diffusion reflection

7. Write short notes on the following : 10
- (a) Resistance Welding
 - (b) Arc Welding
 - (c) Atomic Hydrogen Welding
 - (d) Welding Transformer
8. Describe the function of a complete air-conditioning system in detail. 10
9. Discuss the various advancements in the electric and hybrid electric vehicle technology. 10
10. Draw a mainline speed – time curve and label its various parts. Derive an expression for maximum speed of a suburban pair in terms of total distance travelled, acceleration, retardation and average speed. Assume the speed – time curve to be trapezoidal. 10
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