



Name :

Roll No. :

Invigilator's Signature :

**CS/B.Tech(EE-OLD)/SEM-7/EE-702-A/2009-10
2009**

UTILISATION OF ELECTRIC POWER

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

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

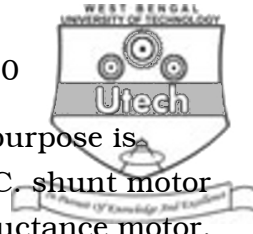
GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) Luminous efficiency of a fluorescent tube is
 - a) 10 lumens/watt b) 20 lumens/watt
 - c) 30 lumens/watt d) 40 lumens/watt.
- ii) The filament of a GLS is made of
 - a) Tungsten b) Copper
 - c) Carbon d) Aluminium.
- iii) In induction heating, depth of penetration is inversely proportional to
 - a) square root of frequency
 - b) square of frequency
 - c) cube of frequency
 - d) frequency.



- iv) The most suitable motor for traction purpose is.
 - a) synchronous motor
 - b) D.C. shunt motor
 - c) D.C. series motor
 - d) reluctance motor.
- v) In suburban services as compared with urban services
 - a) the coasting period is longer
 - b) the coasting period is smaller but free running period is longer
 - c) the coasting period and free running period are smaller
 - d) none of these.
- vi) Quadrilateral speed-time curve is a better approximation to the actual conditions for
 - a) sub-urban service
 - b) urban service
 - c) main line service
 - d) urban and sub-urban service.
- vii) Filament lamp at starting will take current
 - a) equal to its full running current
 - b) more than its full running current
 - c) less than its full running current
 - d) none of these.
- viii) Aluminium is difficult to weld because
 - a) it has an oxide coating
 - b) it conducts away heat very rapidly
 - c) of (a) & (b)
 - d) none of these.
- ix) Stroboscopic effect is related to
 - a) fluorescent lamp
 - b) incandescent lamp
 - c) night lamp
 - d) none of these.
- x) Steel rails are welded by
 - a) Argon arc welding
 - b) Thermit welding
 - c) Gas welding
 - d) Resistance welding.



- xi) During plugging the dissipated energy comes from
- the supply
 - the rotating (moving) mass
 - both (a) & (b)
 - none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- Describe the different ways of supply system for electric traction with their merits and demerits.
- What is anodizing ? Explain in brief.
 - What is meant by "Throwing power" of an electrolyte ? Explain in brief. $3 + 2$
- What do you understand by the specific energy consumption ? What are the factors that affect the specific energy consumption of a train ? $2 + 3$
- Prove that in a filament lamp the diameter of filament is directly proportional to $I^{2/3}$, where I is current flowing in the filament.
- Discuss the advantages of series parallel control of starting as compared to the rheostatic starting for a pair of d.c. traction motors.
 - What is the difference between dead weight and accelerating weight ? $3 + 2$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- What do you understand by speed-time curve ? Explain speed-time curve of a train running on main line. What difference does exist in speed-time curve in case of urban and sub-urban services ? 7
 - Define average speed and schedule speed. 2



- c) A train is required to run between two stations 1.6 km apart at an average speed of 43 kmph. The run is to be made to a simplified quadrilateral speed-time curve. If the maximum speed is limited to 64 kmph, acceleration to 2 kmphs and coasting and braking retardation to 0.16 kmphs and 32 kmphs respectively, determine the duration of acceleration, coasting and braking periods. 6
8. a) State and explain the laws of illumination. 5
- b) What is the relation between the plane angle and solid angle ? 5
- c) A 110 volt lamp develops 60 c.p. and a lamp of same material working at the same efficiency develops 25 c.p. on 220 volt. Compare the diameter and length of the filament. 5
9. a) What are the processes and types of electric heating ? What is resistance welding ? 5
- b) A 27 kW, 3-phase, 400 volt resistance oven is to employ nickel-chrome strip 0.25 mm thick for the three star-connected heating elements. If the temperature of the strip is to be 100°C and that of the charge be 600°C, estimate a suitable width for the strip. Assume emissivity = 0.9 and radiating efficiency to be 0.5 and receptivity of the strip material is 101.6×10^{-8} cm. 10
10. a) Describe briefly various sources of generating high frequency energy for induction heating. 8
- b) Describe the various types of Electric Arc welding processes. 7
11. Write short notes on any *three* of the following : 3 × 5
- Sodium vapour lamp
 - Ultrasonic welding
 - Laser welding
 - Dielectric heating
 - Electro-extraction.