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B.TECH

(SEM VII) THEORY EXAMINATION 2022-23

UTILIZATION OF ELECTRICAL ENERGY & ELECTRIC TRACTION

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

(a) What is D.C. Arc Heating?
(b) Which method of heating is not dependent on the frequency of supply?
(c) What is TIG and MIG welding?
(d) What is Faraday's First law of electrolysis?
(e) What is the basic nature of light? Explain.
(f) State the laws of illumination.
(g) Draw and explain speed-time curve for traction system.
(h) What is meant by the term adhesive weight?
(i) What various traction systems you know of?
(j) What are the advantages and disadvantages of diesel electric traction?

SECTION B

2. Attempt any *three* of the following: 10 x 3= 30

(a) Explain with the help of a neat sketch the working of Ajax Wyatt furnace. What is its field of application?
(b) Describe with neat sketches the various methods of electric resistance welding. Give its merits and demerits with respect to arc welding.
(c) A lamp with reflector is mounted 10 m above the centre of a circular area of 20 m diameter; if the combination of the lamp and reflector gives a uniform C.P. of 800 over the circular area, determine the maximum and minimum illumination produced on the area.
(d) Describe different systems of track electrification.
(e) Discuss the suitability of series motor for traction duties with the help of characteristic curve.

SECTION C

3. Attempt any *one* part of the following: 10 x 1= 10

(a) Explain different methods of induction heating. Give some application of induction heating.
(b) Calculate the efficiency of a high frequency induction furnace which takes 10 minutes to melt 1.8 kg of aluminium. The input to the furnace being 4.8 kW and initial temperature 15^0 C. Specific heat of aluminium = 0.88 kJ/ kg^0 C; melting point of aluminium = 660^0C; latent heat of fusion of aluminium = 32 kJ/ kg; 1 kJ = 2.78 x 10^{-4} kWh.

4. Attempt any *one* part of the following: 10 x 1= 10

(a) Discuss the principle of arc welding and the difference between carbon and metallic arc welding and their relative merits. Compare the AC and DC systems of metallic arc welding.

(b) What is electro-deposition? Explain in detail various factors which have effect on the appearance and quality of the deposited surface.

5. Attempt any *one* part of the following: 10 x 1= 10

(a) Explain the working of fluorescent tube with the help of circuit diagram giving the function of various parts.

(b) Define air conditioning. On what factor does the air conditioning depends? Explain in Detail.

6. Attempt any *one* part of the following: 10 x 1= 10

(a) What are different types of functions performed by the tractive effort developed by a traction unit?

(b) A train has schedule speed of 30 Kmph over a level track, distance between stations being 1 Km. Station stopping time is 20 seconds. Assuming braking retardation of 3 Kmphps and maximum speed 25 % greater than average speed, calculate acceleration required to run the service.

7. Attempt any *one* part of the following: 10 x 1= 10

(a) Explain the working principle of metadyne control of traction motor. What are merits and demerits of this control?

(b) How direction of rotation of a traction motor is reversed? What are the advantages and disadvantages of thyristor control of traction motors?