Subject Code: XXXXX

Roll No:

BTECH

(SEM-7) UTILIZATION OF ELECTRICAL ENERGY AND ELECTRIC TRACTION 2021-22

TIME:3 HOUR ***Total Marks: 100***

Instruction: Attempt the questions as per the given instructions. Assume missing data suitably.

SECTION - A

Attempt *All Parts* in Brief **2*10 = 20**

Q1	Questions	Marks
(a)	Explain conduction mode of heat transfer.	2
(b)	How is control of power affected in electric air arc furnaces ?	2
(c)	Define the term electric welding.	2
(d)	What are the various current collection systems ?	2
(e)	Why is tungsten selected as the filament material ?	2
(f)	State and explain refrigeration process.	2
(g)	Give examples of various traction systems in daily life.	2
(h)	What is meant by schedule speed of a train ?	2
(i)	Why the magnetic circuit of a traction motor is not made of cast iron ?	2
(j)	State the significant features of traction drives.	2

SECTION - B

Attempt ***Any Three*** of the following		3*10 = 30
Q2	**Questions**	**Marks**
(a)	Explain the working of arc furnaces and describe with the help of a sketch the construction and working of any one type of arc furnace.	10
(b)	Explain arc blow effect at the edges and due to ground currents. What are the advantages of using coated welding electrodes ?	10
(c)	Define air conditioning. On what factor does the air conditioning depends ? Explain in detail.	10
(d)	The distance between two stops is 1.4 km. A schedule speed of 50 kmph is required to cover that distance. The stop is of 20 seconds duration. The values of the acceleration and retardation are 2 kmphp and 3 kmphp, respectively. Then, determine maximum speed over the run. Assume a simplified trapezoidal speed-time curve.	10
(e)	Explain the theory, working and characteristics of linear induction motor for traction purposes.	10

SECTION - C

Attempt ***Any One*** of the following		5*10 = 50
Q3	**Questions**	**Marks**
(a)	Explain the method of induction heating and describe coreless type of induction furnace.	10
(b)	What is dielectric heating ? Explain the factors on which the dielectric loss in a dielectric material depends.	10
Q4	**Questions**	**Marks**
(a)	Draw a neat sketch of a spot welding machine and describe its construction and working in detail.	10
(b)	It is required to repair a worn out circular shaft 15 cm in diameter and 32 cm long by coating it with a layer of 1.6 mm of nickel. Determine the theoretical value of quantity of electricity required and time taken if the current density used is 210 A/m^2. Electro-chemical equivalent of nickel is 30.4×10^{-8} Kg/C of electricity and density of nickel is 8.9×10^3 Kg/m^3.	10
Q5	**Questions**	**Marks**
(a)	Explain the working of a fluorescent tube with the help of the circuit diagram giving the function of various parts.	10
(b)	A room with an area of 6 x 9 m is illustrated by ten 80-W lamps. The luminous efficiency of the lamp is 80 lumens/W and the coefficient of utilization is 0.65. Find the average illumination.	10
Q6	**Questions**	**Marks**

(a)	What is tractive effort of a train and what are its functions ? Derive an expression for the tractive effort developed by a train unit.	10
(b)	What are the advantages of single-phase low frequency system of track electrification ? What are the factors due to which its wide spread application remains limited ?	10
Q7	**Questions**	**Marks**
(a)	Discuss the problem associated with diesel-electric traction and indicate how these are overcome in practice.	10
(b)	How direction of rotation of a traction motor is reversed ? Explain the working principle of metadyne control of traction motor. Also discuss its merits and demerits.	10