U.S.N ☐☐☐☐☐☐☐☐☐☐

P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Aug. / Sep. - 2020

Utilization of Electrical Power

Time: 3 hrs   Max. Marks: 100

*Note: i) Answer **TWO** full questions, selecting **ONE** full question from UNIT - I and UNIT - II.*

*ii) Answer any **THREE** full questions, choosing from UNIT - III, UNIT - IV and UNIT - V.*

UNIT - I

1	a.	What are the advantages of electrical heating and explain different modes of transfer of heat in brief.	7
	b.	Explain the different methods of resistance heating with neat figure.	7
	c.	A low frequency induction furnace where secondary voltage is maintained constant at 10 V, takes 400 kW at 0.6 pf, when the hearth in full. Assuming the resistance of the secondary circuit to vary inversely as the height of the charge and reactance to remain constant. Calculate the height up to which the hearth should be filled to obtain maximum heat.	6

OR

2	a.	Give the classification of electric welding and explain resistance welding.	7
	b.	Explain with the help of neat sketch, the working of Ajax Wyatt furnace. What is its field of application?	7
	c.	A piece of plywood is to be heated by dielectric heating. The size of the plywood is 10 x 10 x 3 cm. A frequency of 25 MHz is used and the power absorbed is 500 watts. Calculate the voltage to be applied and current that flows through the material. The materials have the relative permittivity of 5 and power factor of 0.05.	6

UNIT - II

3	a.	State and explain laws of illumination	6
	b.	A loop having uniform CP of 250 in all directions is provided with a reflector which directs 65% of total light uniformly on to a circular area of 8 m diameter. The lamp is hang 6.5 m above the area. Calculate the illumination; i) At the center ii) At the edge of the surface with and without reflector	6
	c.	Write a short note on : i) Factory lighting ii) Flood lighting	8

OR

4	a.	Explain different types of lighting schemes.	10
	b.	Explain the principle, construction and working of incandescent lamp.	10

Dr. N. L. MURALI KRISHNA
Controller Of Examinations
P.E.S. College of Engineering
Autonomous Institution under VTU, Belgaum)
MANDYA-571 401 Karnataka

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UNIT - III

5 a. What are the requirement of an ideal traction system?   6

   b. Give the classification of electric fraction and also explain electric trains.   7

   c. Mention the methods of supplying power to railway trains and discuss the applications of system for railway electrification.   7

6 a. Explain systems of track electrification.   10

   b. Explain the various types of traction systems and enumerate the advantages and disadvantages.   10

UNIT - IV

7 a. Draw and explain typical speed time curve for an electric train.   8

   b. Define Crest speed, Schedule speed and Coefficient of adhesion.   6

   c. A train is running between two stations 2 km apart at an average speed of 45 kmph, if the maximum speed to be limited to 65 kmph, acceleration to 2 kmphps, coasting retardation to 0.2 kmphps and braking retardation 3 kmphps. Determine the duration of acceleration, coasting and braking based on quadrilateral speed time curve.   6

8 a. What is tractive effort? Derive an expression for tractive effort required for propulsion of a train.   10

   b. Derive an expression for specific energy output on level track using a simplified speed time curve. Give the factors on which specific energy consumption depends.   10

UNIT - V

9 a. List out the electrical and mechanical characteristics of traction motors.   10

   b. Explain series-parallel control of traction motors.   10

10 a. With the help of phasor diagram, explain the characteristics of an a.c series motor.   10

   b. Classify the electrical braking for traction motor and mention the advantages and disadvantages of regenerative braking.   10

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