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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; July - 2021

Utilization of Electrical Power

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer any **FIVE** full questions.*

1	a.	Mention the advantages of electric heating.	4
	b.	With neat diagram, explain Ajax-Wyatt vertical core type furnace and its advantages.	8
	c.	A 20 kW single phase 220 V resistance oven employs circular nickel chrome wire for its heating elements. If the wire temperature is not to exceed 1170°C and the temperature of the charge is to be 500°C, calculate the length and size of the wire required. Take radiating efficiency is 0.6, emissivity is 0.9 and specific resistance of the element is 101.6×10^{-6} Ωcm	8
2	a.	Explain different methods of resistance welding with neat sketches.	10
	b.	Explain the method of heating by direct and indirect arc furnace.	4
	c.	A piece of plywood is to be heated by dielectric heating. The size of the plywood is 10x10x3 cm. A frequency of 25 MHz is used and the power absorbed is 500 watts. Calculate the voltage to be applied and the current that flows through the material. The material has the relative permittivity of 5 and power factor of 0.05.	6
3	a.	State and explain laws of illumination.	8
	b.	The candle power of a lamp is 120. A plane surface placed at a distance of 2.5 meters from this lamp. Calculate the illumination of the surface when it; i) Normal ii) Inclined to 45° iii) Parallel to rays	6
	c.	Define the following terms: i) Solid angle ii) Luminous flux iii) Illumination iv) Candle power	6
4	a.	Explain the principle, construction and working of incandescent lamp.	10
	b.	Explain the following: i) Factory lighting ii) Flood lighting iii) Street lighting	10
5	a.	Explain system of traction and mention merits and demerits.	14
	b.	List the requirement of an ideal traction system.	6

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6	a.	Explain clearly systems of railway electrification.	14
	b.	What are the merits and demerits of DC system of traction electrification?	6
7	a.	Draw and explain a typical speed time curve of an electric train movement.	8
	b.	Define; i) Crest speed ii) Average speed iii) Schedule speed	6
	c.	A train has a schedule speed of 65 km/hr between the stops which are 6 km apart. Determine the maximum speed over the run, if the duration of the stop is of 30 secs. The values of acceleration and retardation are 2 km phps and 3 km phps respectively. Assume simplified trapezoidal speed time curve.	6
8	a.	What is tractive effort? Derive an expression for tractive effort of train considering the gradient and train resistance.	10
	b.	Derive an expression for specific energy output on level track using simplified trapezoidal speed time curve.	10
9	a.	Explain how energy saving is achived by series parallel control method?	10
	b.	Explain the following : i) Plugging ii) Rheostatic breaking	10
10	a.	Discuss briefly desirable properties of traction motors.	10
	b.	Discuss the suitability of series motors for traction duties with the help of characteristics curve and phasor diagram.	10

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