U.S.N P.E.S. College of Engineering, Mandya - 571 401 (An Autonomous Institution affiliated to VTU, Belgaum) Seventh Semester, B.E. – Electrical and Electronics Engineering Make-up Examination; Jan / Feb - 2017 **Utilization of Electrical Power** *Time: 3 hrs* Max. Marks: 100 *Note*: Answer *FIVE* full questions, selecting *ONE* full question from each unit. UNIT - I 1 a. Mention the advantages of electrical heating and explain the modes of heat transfer. 6 7 b. With a neat sketch, explain direct resistance heating. c. A 20 kW 16, 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 to be 500°C. Calculate the length and 7 is size of the wire required. Take radiating efficiency = 0.6, emissivity = 0.9 and specific resistance of the element = $101.6 \times 10^{-6} \Omega$ -cm. 7 2 a. With a neat sketch, explain AJAXWYATT vertical core type furnace. b. Mention the different types of electrical welding and explain : 8 i) Butt welding ii) Spot welding. c. Find the current in the line in a 3ϕ arc furnace to melt 5 metric tonne of steel in one hour at 5 an overall efficiency of 50%. If the arc voltage is 115 V, initial temperature 18°C, melting point of steel 1370°C. Specific heat of steel 0.12 and latent heat of steel is 8.89 k-cal/kg. UNIT - II State and explain laws of Illumination. 6 3 a. b. Two lamps of 250 candle power and 400 candle powers are on two lamp posts 100 m apart. The posts have different heights of 15 m and 30 m. Calculate the illumination midway 6 between the lamp posts. c. With a neat sketch, explain construction and working of sodium vapour lamp. 8 Explain : 4 a. i) Candle ii) LUX 8 iii) Lumen iv) MHCP. b. Explain: 12 i) Factory lighting ii) Construction and working of Mercury vapour lamp.

UNIT - III

5 a.	Explain :	
	i) Direct steam engine system	10
	ii) Direct internal combustion engine system of traction with merits and demerits.	
b.	Explain any two system of track electrification for traction purpose.	10
6 a.	What are the requirements of an ideal traction system?	6
b.	Explain the Battery-Electric drive system of traction with merits and demerits.	7
с.	What is meant by composite system of track electrification? Briefly explain.	7
	UNIT - IV	
7 a.	Draw and explain typical speed time-curve for an electric train and also explain,	12
	i) Crest speed ii) Scheduled speed.	12
b.	An electric train has an average speed of 48 kmph on a level track between stops 1.6 km	
	apart. If the acceleration and retardation are 1.8 km phps and 3.2 km phps. Draw the speed	
	time curve for the run. Determine the energy consumption at the axles of the train per	8
	tonne km. Take tractive resistance constant at 50 NW per tonne and allow 10% for the effect	
	of rotational inertia.	
8 a.	Explain in detail Quadrilateral speed time curve.	8
b.	Write a note on co-efficient of adhesion.	6
c.	A train has a scheduled 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	6
	values of acceleration and retardation are 2 km/hr/sec and 3 km/hr/sec respectively. Assume	0
	simplified trapesoidal speed time curve.	
UNIT - V		
9 a.	Explain the desirable properties of traction motors.	6
b.	Explain how energy saving is achieved by series parallel control?	8
c.	Write a note on train tighting system.	6
10 a.	With the help of phasor diagrams, explain characteristics of AC series motor.	8
b.	Explain the following :	
	i) Plugging	12
	ii) Rheostatic braking	12
	iii) Regenerative braking applied to DC shunt motor.	