Course Code: 20EE0234 **R20**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code: Utilization of Electrical Energy20EE0234) **Course & Branch**: B.Tech - EEE

Year & Sem: IV-B.Tech &I-Sem **Regulation:** R20

UNIT –I

ILLUMINATION

1	a) Draw and explain the operation of sodium vapour lamp with neat diagram and enumerate its advantages and disadvantages.	[L1] [CO1]	**[6M]**
	b)Alamp having a uniform cp of 100 in all directions provided with a reflector which directs 60% of the light uniformly on to a circular area of 10m diameter. The lamp is hung 5m above the area. Calculate the illumination at the center.	[L2] [CO1]	**[6M]**
2	a) State and explain laws of illumination.	[L1] [CO1]	**[6M]**
	b)Six lamps are used to illuminate a certain room. If the luminous efficiency of each lamp is 12lumens/watt and the lamps have to emit a total lux of 10,000 lumens ,calculate (i)Theme an spherical luminous intensity (ii)The cost of energy consumed in 3hours if the charge for electrical energy is 50 paisa per unit.	[L3] [CO1]	**[6M]**
3	a)If a lamp of 200 cp is placed 1m below a plane mirror which reflects 90% of light falling on it, determine illumination at a point 3m away from the foot of the lamp which is hung 4m above ground.	[L3] [CO1]	**[6M]**
	b)Explain with sketch the principle and operation of incandescent lamp and enumerates its advantages and disadvantages.	[L1] [CO1]	**[6M]**
4	a) A 250CP lamp is hung 4m above the center of a circular area of 6m diameter. Calculate the illumination at the (i)Centre of area.(ii)Periphery of the area.(iii)Average illumination	[L3] [CO1]	**[6M]**
	b)Explain the various factors to be taken into account for designing schemes for. (i)Factory lighting (ii)Street lighting	[L2] [CO1]	**[6M]**
5	A machine shop 40m×20m is to have an illumination of 160 lux on working plane. The lamps are mounted on 6 m above the working plane.Give the layout of suitable installation. a)Using filament lamp. b)Using 50watts fluorescent lamp. Assume necessary data.	[L3] [CO1]	**[12M]**
6	a) Write short notes on polar curves and explain the Rousseau's construction for calculating MSCP of lamp.	[L1] [CO1]	**[6M]**
	b) A filament lamp of 500W is suspended at a height of 4.5 m above the working plane and gives uniform illumination over an area of 6 m diameter. Assuming an efficiency of the reflector as 70% and efficiency of lamp as 0.8 watt per candle power, determine the illumination on the working plane	[L3] [CO1]	**[6M]**
7	State the laws of illumination. Explain the laws with the help of suitable diagrams and derive an equation of the same.	[L1] [CO1]	**[12M]**
8	a) A room measuring 30m×15m is to be illuminated by 10 lamps and the average illumination is to be 85 lux. Determine the MSCP of each lamp if the utilization and depreciation factors are 0.5 and 0.8 respectively	[L3] [CO1]	**[6M]**
	b) Briefly explain the requirement of good lighting scheme.	[L2] [CO1]	**[6M]**

Course Code: 20EE0234 **R20**

9	a) Explain with sketch the principle and operation of fluorescent lamp	[L3] [CO1]	**[6M]**
	b) Write short notes on flood lighting	[L2] [CO1]	**[6M]**
10	Write short notes on a) source of light b) Define Mean spherical candle power c) Define lamp efficiency d) Define space-height ratio	[L2] [CO1] [L2] [CO1] [L2] [CO1] [L2] [CO1]	**[3M]** **[3M]** **[3M]** **[3M]**

UNIT –II
ELECTRIC HEATING &WELDING

1	a) Briefly discuss the method of Dielectric heating used in the electric heating.	[L2][CO2]	**[6M]**
	b) Briefly discuss the applications of resistance heating.	[L2][CO2]	**[6M]**
2	a) Describe direct and indirect core type furnace with neat sketches	[L2][CO2]	**[6M]**
	b) Explain application of induction heating	[L3][CO2]	**[6M]**
3	a) What are the different types of heating? Write advantages of electric heating.	[L1][CO2]	**[6M]**
	b) A low frequency induction furnace whose secondary voltage is maintained constant at 10 volts, takes 400 kW at 0.6 pf, when the hearth is full. Assuming the resistance of the secondary to vary inversely as the height of the charge and reactance to remain constant, height up to which the hearth should be filled to obtain maximum heat.	[L3][CO2]	**[6M]**
4	a) Discuss briefly about induction and dielectric heating process	[L2][CO2]	**[6M]**
	b) A slab of insulating material 150 sq cm in area and 1 cm thick is to be heated by dielectric heating. The power required is 400 W at 30 × 106 cps. Materials has permittivity of 5 and power factor of 0.05. Determine voltage necessary	[L3][CO2]	**[6M]**
5	a) Write briefly about ultrasonic welding and defects in welding process.	[L3][CO2]	**[6M]**
	b) Differentiate between A.C and D.C welding. Discuss about the techniques used for arc welding.	[L2][CO2]	**[6M]**
6	a) Briefly discuss the welding electrodes of various metals.	[L3][CO2]	**[6M]**
	b) Explain briefly the types of electric arc welding.	[L3][CO2]	**[6M]**
7	Explain the different methods of electric welding and their relative advantages	[L3][CO2]	**[12M]**
8	Discuss the various applications of electrolysis in detail.	[L2][CO2]	**[12M]**
9	a) Discuss the advantages of reverse current process of electro plating	[L2][CO2]	**[6M]**
	b) Discuss faraday's laws and applications of electrolysis in detail	[L2][CO2]	**[6M]**
10	Write short notes on a) Welding transformer characteristics. b) Explain Spot welding c) What are various modes of heat transfer? d) What is electro-deposition?	 [L1][CO2] [L2][CO2] [L3][CO2] [L1][CO2]	 **[3M]** **[3M]** **[3M]** **[3M]**

UNIT –III
ELECTRIC DRIVES

1	What is an electric drive? What are the different typed of electric drives? Explain.	[L1][CO3]	**[12M]**
2	What are the factors influencing the choice of electrical drives?	[L1][CO3]	**[12M]**
3	a).What is the Classification of Electrical Drives?	[L2][CO3]	**[6M]**
	b). What are the advantages and disadvantages of Electric drives?	[L3][CO3]	**[6M]**
4	a). How do you select a motor for an industrial application?	[L2][CO3]	**[6M]**
	b). what are the different Industrial motor load types? Explain.	[L3][CO3]	**[6M]**
5	What are the starting and running characteristics of electric drives?	[L2][CO3]3	**[12M]**
6	What are the different Types of Industrial Loads? Explain in detail.	[L3][CO3]	**[12M]**

Course Code: 20EE0234 **R20**

7	What are the applications of Electric drives in day to day life?	[L2][CO3]	**[12M]**
8	What is individual drive, group drive and multi motor drive? Explain with suitable examples.	[L3][CO3]	**[12M]**
9	What is temperature rise in motor? Derive the equation for Heating of Motor.	[L2][CO3]	**[12M]**
10	a). What is load equalization?	[L3][CO3]	**[6M]**
	b). what are the advantages of group drive?	[L3][CO3]	**[6M]**

UNIT –IV
ELECTRIC TRACTION – I

1	a) Compare A.C traction with D.C traction with necessary examples.	[L2][CO4]	**[6M]**
	b) Explain about the different methods of electric braking systems in the case of traction.	[L3][CO4]	**[6M]**
2	Discuss the characteristic features of a traction motor for effective traction systems	[L2][CO4]	**[12M]**
3	a) What are the special features of traction motors?	[L3][CO4]	**[4M]**
	b) A goods trains weighing 300 tonnes is to be hauled by a locomotive up a gradient of 2% with an acceleration of 1 kmph/s. Coefficient of adhesion is 20%. Track resistance = 45 W/Ton and effect of rotational masses is 15% of dead weight. If axle load is not to exceed by 20 tonnes, determine the weight of locomotive and number of axles.	[L3][CO4]	**[8M]**
4	a) How the electric traction system is classified? Briefly discuss.	[L1][CO4]	**[6M]**
	b) A train has schedule speed of 30 km/hr over a level track distance between stations being 1 km. Duration of stop is 20 sec. Assuming braking retardation of 3 km/hr/sec and maximum speed 25% greater than average speed, calculate acceleration required to run the service.	[L3][CO4]	**[6M]**
5	A train is to run between two stations 1.6 km apart at an average speed of 40 kmph, the run is to be made to a quadrilateral N-T curve. Maximum speed is to be limited to 64 kmph, acceleration, to 2 kmph/s, coasting retardation to 0.16, and braking retardation to 3.2, Determine the duration of a acceleration, coasting and braking periods.	[L3][CO4]	**[12M]**
6	a) Discuss the speed-time curves for urban service.	[L2][CO4]	**[6M]**
	b) A sub urban electric train has a maximum speed of 70 km/hr. The schedule speed including a station stop of 30 sec in 45 km/hr. If the acceleration is 1.5 km/hr/sec. Find the value of retardation when the average distance between stops is 600 m.	[L3][CO4]	**[6M]**
7	Describe how Plugging, Rheostatic braking and Regenerative braking are employed with DC series motor	[L2][CO4]	**[12M]**
8	a) Discuss the speed-time curves for main line services.	[L2][CO4]	**[6M]**
	b) A train has schedule speed of 60 km/hr between the stops which are 6 km apart. Determine the crest speed over the run assuming trapezoidal speed time curve. The train accelerates at 2 km/hr/sec and retards at 3 km/hr/sec. Duration of stops is 60s.	[L3][CO4]	**[6M]**
9	An electric train is to have acceleration and breaking retardation of 0.8 km/hr/sec and 3.2 km/hr/sec respectively. If the ratio of maximum to average speed is 1.3 and time for stop is 26 sec, find the schedule speed for a run of 1.5 km. Assume simplified trapezoidal speed time curve.	[L3][CO4]	**[12M]**
10	With the help of Speed-Time curve, define and explain the importance of following factors in a traction system. a. Notching period. b. Free running period. c. Coasting period. d. Braking period.	 [L2][CO4] [L2][CO4] [L2][CO4] [L2][CO4]	 **[3M]** **[3M]** **[3M]** **[3M]**

Course Code: 20EE0234 **R20**

UNIT –V
ELECTRIC TRACTION - II

1	Explain the calculations of tractive effort required for train propulsion.	[L2][CO5]	**[12M]**
2	An electric train has an average speed of 42 km/hr on a level track between stops 1400 m apart. It is accelerated at 1.7 km/hr/sec and it is braked at 3.3 km/hr/sec. Draw the speed-time curve and estimate the specific energy consumption. Assume tractive resistance as 50 NW/Tone and allow 10% rotational inertia.	[L3][CO5]	**[12M]**
3	a) Write short notes on specific energy consumption.	[L1][CO5]	**[6M]**
	b) What factors affect the specific energy consumption?	[L1][CO5]	**[6M]**
4	a) What is the tractive effort for propulsion of a train on level track?	[L1][CO5]	**[6M]**
	b) What is the tractive effort for propulsion of a train up and down a gradient?	[L1][CO5]	**[6M]**
5	An electric train of weight 250 ton has eight motors geared to driving wheels, each is 85 cm diameter. The tractive resistance is of 50/ton. The effect of rotational inertia is 8% of the train weight, the gear ratio is 4–1, and the gearing efficiency is 85% determine. The torque developed by each motor to accelerate the train to a speed of 50 kmph in 30 s up a gradient of 1 in 200.	[L3][CO5]	**[12M]**
6	A train is to run between two stations 1.6 km apart at an average speed of 40 kmph, the run is to be made to a quadrilateral N-T curve. Maximum speed is to be limited to 64 kmph, acceleration, to 2 kmphps, coasting retardation to 0.16, and braking retardation to 3.2, determine the duration of a acceleration, coasting and braking periods.	[L3][CO5]	**[12M]**
7	A 100-ton weight train has a rotational inertia of 10%. This train has to be run between two stations that are 3 km a part and has an average speed of 50 km/hr. The acceleration and the retardation during braking are 2 kmphps and 3 kmphps, respectively. The percentage gradient between these two stations is 1% and the train is to move up the incline the track resistance is 50 N/ton, and then determine: 1. Maximum power at the driving axle. 2. Total energy consumption. 3. Specific energy consumption.	[L3][CO5]	**[12M]**
8	A train weighing 200-ton accelerates uniformly from rest to a speed of 40 kmph up a gradient of 1 in 100, the time taken being 30 s. The power is then cut off and train coasts down a uniform gradient of 1 in 1,000 for period of 40 s. When brakes are applied for period of 20 s so as to bring the train uniformly to rest on this gradient Determine: 1. The maximum power output from the driving axles. 2. The energy taken from the conductor rails in kW-hr assuming an efficiency of 70%.Assume tractive resistance to be 45 N/ton at all speeds and allows 10% for rotational inertia.	[L3][CO5]	**[12M]**
9	What is coefficient of adhesion? How the value of coefficient of adhesion affects the slipping and skidding of the driving wheels of traction unit?	[L1][CO5]	**[12M]**
10	An electric train has quadrilateral speed–time curve as follows: 1. Uniform acceleration from rest 2 kmphps for 30 s. 2. Coasting for 40 s. 3. Braking period of 25 s. The train is moving a uniform down gradient of 1% and the tractive resistance of 50 N/ton. The rotational resistance is 10% of the dead weight, the duration of the stop is 20 s and the overall efficiency of the transmission the gear and the motor as 80%. Calculate its schedule speed and specific energy consumption.	[L3][CO5]	**[12M]**

Prepared by:**N. BINDU MADHAVI**