**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR-517 583**
**(AUTONOMOUS)**
Siddharth Nagar, Narayanavanam Road– 517583

**QUESTION BANK (DESCRIPTIVE)**
**Subject with Code: APPLICATION OF ELECTRICAL POWER (20EE0243)**

**Course & Branch**: B.Tech & CE, ME, ECE

**Year &Sem:** IV-B.Tech & I-Sem **Regulation:** 20

## UNIT –I
## ILLUMINATION

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| **1** | a) Draw and explain the operation of sodium vapor lamp with neat diagram. | **[L1][CO1]** | **[6M]** |
| | b) A lamp having a uniform cp of 100 in all direction is provided with a reflector which directs 60% of the light uniformly on to a circular area of10m 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 briefly. | **[L1][CO1]** | **[6M]** |
| | b) Six lamps are used to illuminate a certain room. If the luminous efficiency of each lamp is 12 lumens/watt and the lamps have to emit a total lux of 10,000 lumens, calculate (i) The mean spherical luminous intensity (ii) The cost of energy consumed in 3 hours if the charge for electrical energy is 50 paise 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 3 m away from the foot of the lamp which is hung 4 m 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 250 CP 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 160lux on working plane. The lamps are mounted on 6m above the working plane. Give the layout of a suitable installation.<br>a) Using filament lamp.<br>b) Using 50 watts fluorescent lamp. Assume necessary data. | **[L3][CO1]** | **[12M]** |
| **6** | a) Write short notes on polar curves. | **[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]** |
| **9** | a) Explain with sketch the principle and operation of fluorescent lamp. | **[L3][CO1]** | **[6M]** |
| | b) Write short notes on incandescent lamp. | **[L2][CO1]** | **[6M]** |

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| **10** | Write short notes on:<br>i) Define luminous flux.<br>ii) Define Mean spherical candle power<br>iii) Define lamp efficiency<br>iv) Define space-height ratio<br>v) Define luminance. | **[L2][CO1]**<br>**[L2][CO1]**<br>**[L2][CO1]**<br>**[L2][CO1]**<br>**[L2][CO1]** | **[12M]** |

## UNIT –II
## ELECTRIC HEATING

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| **1** | a) Briefly discuss the method of Dielectric heating. | **[L2][CO2]** | **[8M]** |
| | b) Briefly discuss the applications of resistance heating. | **[L2][CO2]** | **[4M]** |
| **2** | a) Describe direct core type furnace with neat sketch. | **[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 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 $30 \times 10^6$ cps. Materials has permittivity of 5 and power factor of 0.05. Determine voltage necessary. | **[L3][CO2]** | **[6M]** |
| **5** | a) Explain with a neat sketch the principle of coreless type induction furnace. | **[L1][CO2]** | **[8M]** |
| | b) What are the causes of failure of heating element? | **[L2][CO2]** | **[4M]** |
| **6** | a) Explain the working of Ajax Wyatt vertical core furnace with a neat sketch | **[L1][CO2]** | **[6M]** |
| | b) Explain the principle of Induction heating. What are the applications of Induction heating. | **[L2][CO2]** | **[6M]** |
| **7** | a) Describe Indirect core type furnace with neat sketch. | **[L2][CO2]** | **[6M]** |
| | b) Briefly discuss the applications of Dielectric heating? | **[L2][CO2]** | **[6M]** |
| **8** | Discuss the principle ,advantages and disadvantages of dielectric heating. | **[L2][CO2]** | **[12M]** |
| **9** | a) What are the disadvantages of direct core type induction furnace? | **[L2][CO2]** | **[6M]** |
| | b) Determine the amount of energy required to melt brass at the rate of one ton per hour in a single phase Ajax Wyatt furnace. Specific heat of brass is 0.094 Kcal/ Kg/$^o$C. Latent heat of fusion is 40 Kcal/Kg, initial temperature is 24 $^o$C, melting point of brass is 920 $^o$C. Assume efficiency to be 65 %. | **[L3][CO2]** | **[6M]** |
| **10** | Write short notes on:<br>i) Infrared heating<br>ii) pinch effect in induction heating.<br>iii) various modes of heat transfer.<br>iv) advantages of coreless induction furnace<br>v) disadvantages of direct core type induction furnace | **[L1][CO2]**<br>**[L2][CO2]**<br>**[L3][CO2]**<br>**[L1][CO2]**<br>**[L1][CO2]** | **[12M]** |

## UNIT –III
## ELECTRIC WELDING

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| **1** | a) Write briefly about flash welding. | **[L1][CO3]** | **[6M]** |
| | b) Differentiate between A.C and D.C welding. | **[L2][CO3]** | **[6M]** |
| **2** | a) Briefly discuss the welding electrodes of various metals. | **[L1][CO3]** | **[6M]** |
| | b) Explain briefly the arc welding process. | **[L1][CO3]** | **[6M]** |
| **3** | Explain the different methods of electric welding and their relative advantages. | **[L1][CO3]** | **[12M]** |
| **4** | Discuss about the techniques used for arc welding. | **[L2][CO3]** | **[12M]** |
| **5** | Describe with a neat sketch the various methods of electric resistance welding. | **[L1][CO3]** | **[12M]** |
| **6** | a) Explain about metal arc welding, carbon arc welding methods with necessary illustrations. | **[L2][CO3]** | **[6M]** |
| | b) What type of electric supply is suitable for electric arc welding? | **[L2][CO3]** | **[6M]** |
| **7** | Explain in detail about the following with respect to Welding:<br>i) Spot welding ii) Seam welding iii) Butt welding iv) projection welding | **[L2][CO3]** | **[12M]** |
| **8** | a) Write about various types of equipment used for electric welding. | **[L3][CO3]** | **[6M]** |
| | b) Discuss the advantages and disadvantages of welding? | **[L2][CO3]** | **[6M]** |
| **9** | a) Explain about inert gas arc welding, atomic hydrogen arc welding methods with necessary illustrations. | **[L2][CO3]** | **[6M]** |
| | b) What are the qualities of a good weld? | **[L2][CO3]** | **[6M]** |
| **10** | Write short notes on:<br>i) Welding transformer characteristics.<br>ii) Spot welding.<br>iii) arc stability<br>iv) arc welding accessories<br>v) advantages of resistance welding. | **[L1][CO3]**<br>**[L1][CO3]**<br>**[L1][CO3]**<br>**[L1][CO3]**<br>**[L2][CO3]** | **[12M]** |

## UNIT –IV
## ELECTROLYSIS

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| **1** | a) What is electrolysis? Give advantages of using this processing method. | **[L2][CO4]** | **[6M]** |
| | b) Explain the widely used areas of electrolysis. | **[L2][CO4]** | **[6M]** |
| **2** | Discuss the various applications of electrolysis in detail. | **[L2][CO2]** | **[12M]** |
| **3** | a) Discuss about the process of electro plating. | **[L2][CO2]** | **[6M]** |
| | b) Discuss about Faraday's laws of electrolytic process. | **[L2][CO2]** | **[6M]** |
| **4** | Describe briefly the process of electrolysis and power supply for electrolysis. | **[L1][CO4]** | **[12M]** |
| **5** | Ii is required, to repair a worn out circular shaft 15 cm in diameter and 32 cm long bv coating it with a layer of 1.6 mm of nickel. Determine the theoretical quantity of electricity required and the time taken if the current density used is 210 $A/m^2$. Electrochemical equivalent of nickel is $30.4x10^{-8}$ Kg/C of electricity and density of nickel is $8.9 x10^3$ $Kg/m^3$. | **[L3][CO4]** | **[12M]** |
| **6** | a) Explain the factors on which quality of electrodeposition depends. | **[L2][CO4]** | **[6M]** |
| | b) Explain the terms used in electrolytic processes:<br>(i) Current efficiency (ii) Energy efficiency | **[L3][CO4]** | **[6M]** |
| **7** | Calculate the thickness of copper deposited on a plate area of 2.2 $cm^2$ during electrolysis if a current of 1 A is passed. for 90 minutes. E.C.E. of copper = $32.95 x 10^{-8}$ kg/C and density of copper is 8900 $Kg/m^3$. | **[L3][CO4]** | **[12M]** |
| **8** | a) Explain Electrodeposition of rubber in detail. | **[L2][CO4]** | **[6M]** |
| | b) What are the various operations involved in electroplating. | **[L1][CO4]** | **[6M]** |
| **9** | a) Explain about Electro-polishing. | **[L1][CO4]** | **[6M]** |
| | b) What are the objectives of electroplating. | **[L1][CO4]** | **[6M]** |

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| **10** | Calculate the quantity of aluminium produced from aluminium oxide in 24 hours if the average current is 2800 A and. current efficiency is 95 per cent. Aluminiurn is trivalent and atomic weight is 27. The chemical equivalent weight and E.C.E of sliver are 107.98 and $111x10^{-8}$ Kg/C respectively. | **[L3][CO4]** | **[12M]** |

## UNIT –V
## ELECTRIC TRACTION

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|---|---|---|---|
| **1** | a) Compare A.C traction with D.C traction. | **[L2][CO5]** | **[6M]** |
| | b) Explain about the different methods of electric braking systems in the case of traction. | **[L3][CO5]** | **[6M]** |
| **2** | Discuss the electrical features of a traction motor for effective traction systems | **[L2][CO5]** | **[12M]** |
| **3** | a) What are the mechanical features of traction motors? | **[L3][CO5]** | **[4M]** |
| | b) What are the requirements of ideal traction system? | **[L2][CO5]** | **[8M]** |
| **4** | a) How the electric traction system is classified? Briefly discuss. | **[L1][CO5]** | **[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][CO5]** | **[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 kmphps, coasting retardation to 0.16, and braking retardation to 3.2, Determine the duration of acceleration, coasting and braking periods. | **[L3][CO5]** | **[12M]** |
| **6** | a) Discuss the speed-time curves for urban service. | **[L2][CO6]** | **[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][CO6]** | **[6M]** |
| **7** | Describe how Plugging, Rheostatic braking and Regenerative braking are employed with DC series motor | **[L2][CO5]** | **[12M]** |
| **8** | a) Discuss the speed-time curves for main line services. | **[L2][CO6]** | **[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][CO6]** | **[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][CO6]** | **[12M]** |
| **10** | With the help of Speed-Time curve, define and explain the importance of following factors in a traction system.<br>i) Notching period.<br>ii) Free running period.<br>iii) Coasting period.<br>iv) Braking period.<br>v) Write any two advantages of electric traction system. | <br><br>**[L2][CO5]**<br>**[L2][CO5]**<br>**[L2][CO5]**<br>**[L2][CO5]**<br>**[L2][CO6]** | **[12M]** |

**PREPARED BY**: **Dr G.Muni Reddy**
**Professor**
**Dept. of EEE**
**SIETK, PUTTUR**