Anjuman-I-Islam's
ABDUL RAZZAK KALSEKAR POLYTECHNIC
Sector. 16, plot.03, Near Garden Hotel, Opp. Karnala Sports Academy.
New panvel. 410 206, Navi Mumbai.
Tel 27454670 & 27481508.

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DATE:

MODEL QUESTIONS. UEE [Utilization of Electrical Energy]

Module 3 Illumination Engineering. [10 hrs]

THEORY

Q1. State and explain laws of illumination

Q2. With a neat labelled diagram, explain the working principle of incandescent lamps. Write its advantages and disadvantages.

Q3. What is polar curve? Why it is required in illumination? Explain the working principle of integrating sphere photometer.

Q4 Explain working principle of CFL bulbs

Q5 Explain the working principle of sodium vapour lamp

Q6. Explain the working principle of high pressure mercury vapour lamp.

Q7. What are the types of lightining scheme and Explain in Brief.

Q8. Briefly explain the factory lightining.

Q9. Write the design steps involved in illumination of an office room with an example?

Q10. What are the methods of lightining calculation

NUMERICALS

Q1. A small light source with intensity uniform in all directions mounted at a height of 10m above a horizontal surface. Two points A and B lie on the surface with point A directly beneath the source. How far is point B from point A if the illumination at point B is only 1/10 as great as at point A?

Q2. Two lamps posts are 16m apart and are fitted with a 100 CP lamp each at height of 6m above ground. Calculate the illumination on the ground (a) under each lamp (b) midway between the lamps.

Q3. Two lamps similar are having uniform intensity of 500 CP in all directions below the horizontal are mounted at a height of 4m. What must be the maximum spacing between the lamps so that a illumination on the ground midway between the lamps shall

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be atleast one half the illumination directly under the lamps.

Q4. A machine shop 30mt X 15mt is to have an illumination of 160 lux on the working plane. The lamps are mounted 5mt above the workir plane. Give the layout of a suitable installation using 80 watt fluroscent lamps. Assume suitable data and jushify your assumphions.

Q5. It is desired to illuminate a drawing hall with an average illumination of about 250 lux. The area of the hall is 30m x 20m. The lamps are to be fitted at 5m height. Find out the number and size of incandescent lamps required for an efficiency of 12 lumens/watt. Utilisation factor = 0.4 and maintena factor = 0.85

MODULE 1 — SYSTEM OF TRACTION [12 hrs]

THEORY

Q1. What is the difference between electric and non-electric traction?

Q2. Derive an expression for trachive effort produced by electric motors to wheel.

Q3. With a neat diagrams, derive an expression for the energy consewation in traction

Q4. What are the factors which are affeching the schedule speed

Q5. What are the requirements of ideal trachion?

Q6. Compare the features of different types of trachion.

Q7. Analyze the quadrilateral speed time characterstics and Derive an expression for the distance in terms of V_1, V_2, T, α, β_c and β

Q8. Derive the trapeziodal speed time curve

Q9. Define (a) Average Speed (b) Schedule Speed (c) Crest Speed.
(d) Co-efficient of Adhesion.
(e) Dead Weight
(f) Accelerating Weight
(g) Trachive Effort

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Q10. What are the factors which affects the specific energy consumption in electric trains?

Q11. Explain the Mechanics of train movement

Q12. Derive an expressions for:
(i) the tractive effort for propulsion of a train on level track
(ii) The tractive effort for propulsion of a train up and down a gradient

Q13. Explain the systems of Track Electrification

Q14. Describe in brief system of Electric Traction.

Q15. What are different systems of Traction.

NUMERICALS

Q1. An electric train has an average speed of 42Kmph on a level track between stops 1400m apart. It is accelerated at 1.7 Kmphps and is braked at 3.3 kmphps. Draw the speed time curve of the run.

Q2. An electric train is to have acceleration and braking retardation of 0.8 Kmphps and 3.2 Kmphps respectively. If the ratio of maximum to average speed is 1.3 and time for stops 26 sec. find schedule speed for a run of 1.5 km. Assume simplified trapeziodal speed-time curve.

Q3. A train has a schedule speed of 30Kmph over a level track, distance between stations being 1Km. Station stopping time in 20 sec Assuming braking retardation of 3Kmphps and maximum speed 125 % greater than average speed, calculate acceleration required to run the sevice if the speed-time curve is approximated by a trapeziodal curve.

Q4. A suburban electric train has a maximum Speed of 70 Kmph. The schedule speed including a station stop of 30 seconds is 45 Km If the accelerating is 1.5 kmphps, find the value of retardation when the average distance between stops is 4Km.

Q5. A train is required to run between two stations 1.6 km apart at an average speed of 40Kmph. The run is to be made Simplified quadrilateral speed time curve. If the maximum

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speed is to be limited to 64 Kmph, acceleration to 2.0 Kmphps and coasting and braking retardation to 0.16 Kmphps and 3.2 kmphps respectively. Determine the duration of acceleration, coasting and braking periods.

Q6. An electric train weighing 200 tonne has 8 motors geared to driving wheels, each wheel is 90 cm diameter. Determine the torque developed by each motor to accelerate the train of speed of 48 K in 30 seconds up a gradient of 1 in 200. The tractive resistance is 50 N/tonne, the effect of rotational inertia is 10% of the train weight, the gear ratio is 4 to 1 and gearing efficiency is 80%.

Q7. A 200 tonne motor coach having 4 motors each developing 6,000 N-m torque during acceleration, starts from rest. If the gradient is 30 in 1000, gear ratio 4, gear transmission efficiency 90%, wheel radius 45 cm, train resistance 50 N/tonne addition of rotational inertia 10%, calculate the time taken to attain a speed of 50 kmph. If the line voltage is 3000 V and efficiency of motor 85% find the current during notching period.

MODULE NO : 2 Electric Traction Motors & Control

[6 hrs]

THEORY

Q1. Draw and Explain Speed Control Methods of DC motors.

Q2. Write a short note on overhead equipments used for electric traction.

Q3. What are the requirements of electric motors used for traction work?

Q4. Explain Rheostatic and Regenerative Braking briefly?

Q5. Explain in brief traction SCADA and Signaling?

Q6. What are the Overhead equipments or describe in detail Current Collection System?

Q7. Describe the substation location & distribution System?

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MODULE 4 : Hybrid Electric Vehicles and Electric Vehicles.

THEORY [03 hrs]

Q1. Explain the architecture of an Electric Vehicle & HEV

Q2. Explain the Electric Vehicle (EV) Configuration based on Power Transmission mode.

Q3. Explain the Electric Vehicle (EV) configuration based on Power flow source.

Q4. Explain briefly (i) Series Hybrid Vehicles
(ii) Parallel Hybrid Vehicles
(iii) Series-Parallel Hybrid Vehicles.
(iv) Complex Hybrid Vehicles.

Q5. Draw the power flow configurations of series and parallel type Electric hybrid vehicles.

MODULE 5 : Other Applications of Electrical Energy.

THEORY [03 hrs]

Q1. Define (i) Refrigeration (ii) Refrigeration system
(iii) Air conditioning (iv) Tonne of Refrigeration.

Q2. Draw and explain Vapour compression and absorption type refrigeration system and compare their features in terms of energy efficiency and applications.

Q3. Explain the electric circuit of domestic refrigeration System.

Q4. Explain Air conditioning for window type and split type.

MODULE 6 : Electric Heating and Welding.

THEORY [02 hrs]

Q1. What are the different electric Heating Methods.

Q2. Write a short note on Electric welding methods.

Q3. Basic working principle of Arc furnace & Induction furnace explain briefly

Q4. What are the power supply requirements for arc furnaces and welding.