



# **BHAGALPUR COLLEGE OF ENGINEERING**

## **Mid Term Examination 2019**

**Branch: Electrical Engineering,**

**Time: 02 hrs.**

**Subject: Utilization of Electric Power**

**Semester: VI**

**Subject Code: (31316)**

**Total Marks: 40**

**A. All questions are compulsory (2x5=10 marks)**

1. What are the advantages & disadvantages of Electric Traction System?
2. Define the terms related to illumination (i) Depreciation Factor (ii) Lamp Efficiency.
3. Define Straight & Reverse Polarity in DC welding.
4. What are the advantages of electric heating over other method of heating?
5. Define the terms related to traction (i) Average speed (ii) Schedule speed.

**B. Answer all three question of 10 marks (3x10=30 marks)**

6. (a) Assuming a simplified speed time curve for a train for a train which has got a scheduled speed of 50 km/hr between two stops 2 km apart. Find the crest speed of the train over the run, if the stop is of 30 seconds duration and the values of acceleration and retardation are 2.5 km/hr/sec and 3.4 km/hr/sec. (5 marks)
- (b) Draw block diagram of an AC locomotive & explain its different components. (5 marks)

**OR**

- (c) Explain Spot Welding and Seam Welding. Also mention application of both types of welding. (5 marks)
- (d) Explain the working principal of Arc Welding. Discuss the conditions for successful welding. (5 marks)
7. (a) A reading room 50m x 15m x 6m, requires an illumination of 40 metre-candle on the reading table. Assuming a space height ratio of 1.2. Calculate (i) the number of lamps required (ii) C.P. of each. Assuming the utilisation factor of 0.4, depreciation factor as 0.75, efficiency of each lamp as 0.75 watts per candle power and the height of lamps above the reading table as 4 m. Draw a sketch of arrangement of lamps. (5 marks)
- (b) Draw the construction diagram of Mercury Vapour Lamp & explain its working principal. (5 marks)

**OR**

- (c) Two arc lamps of 1000 CP and 5000 CP respectively (assumed same in all direction) are suspended 15 meter above the ground level and are 30 meters apart. Find the intensity of illumination at a point on the ground in line with the two lamps and 15 meters from the base of the more powerful lamp. (5 marks)

(d) Explain the working principal of Fluorescent Tube. What is the function of Starter & Choke in fluorescent tube? (5 marks)

8. (a) Draw & explain the working of Ajax-Wyatt Vertical Core Type Furnace. (5 marks)

(b) Dielectric heating is to be employed to heat a slab of insulating material 20 mm thick and 1530 mm<sup>2</sup> in area. Power required is 200 watts and a frequency of 3 MHz is to be used. The material has a permittivity of 5 and p.f. of 0.05. Determine the voltage necessary and the current which will flow through the material. (5 marks)

**OR**

(c) What is tractive effort? Derive expression for tractive effort and hence for power output from driving axles? (5 marks)

(d) A 400 tone train travels down a gradient 1 in 70 for 120 sec. during which period its speed is reduced from 80 km/hr to 50 km/hr by regenerative braking. Find the energy returned to the lines if tractive resistance is 5 kg/tone and allowance for rotational inertia is 7.5%. Overall efficiency of motors is 75%. (5 marks)



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**Total Marks: 40**

**A. All questions are compulsory (2x5=10 marks)**

1. What is ideal traction system?
2. Define Luminous Intensity & Co-efficient of utilisation.
3. What is schedule speed? What are the factors affecting schedule speed?
4. Define arc stability & arc blow.
5. What are the advantages of electric heating over other method of heating?

**B. Attempt any 3 (three) question of 10 marks (3x10=30 marks)**

6. (a) An electric train accelerates uniformly from rest to a speed of 50 kmph in 25 seconds. If then coasts for 1 minute 10 seconds against a constant resistance of 70 N per tonne and is braked to rest at 4 kmphs in 10 seconds. Calculate the schedule speed, if the station stops are of 15 seconds duration. Assume  $W_e = 1.1 W$  (6 marks)
- (b) Explain the following components of an AC locomotive (i) Catenary (ii) Current Collector System (4 marks)

**OR**

- (c) A train is required to run between two stations 4 km apart at an average speed of 60 kmph. The run is to be made to a simplified quadrilateral speed-time curve. If the maximum speed is to be limited to 80 kmphr, acceleration to 2.0 kmphs and coasting & breaking retardation to 0.16 kmphs & 3.2 kmphs respectively, determine the duration of accelerating, coasting & breaking periods. (6 marks)
- (d) What are the advantages & disadvantages of Electric Breaking over Mechanical breaking? (4 marks)
7. (a) What is Polar Curve? Explain Rousseau's construction method. (5 marks)
- (b) Explain the working principle of Gaseous Discharge Lamp. (5 marks)

**OR**

- (c) The powerful street lamps of 1000 candela and 800 candela (assumed uniform in all directions) are mounted 12.5 metres above the road level and are spaced 25 meter apart. Find the intensity of horizontal illumination produced at a point on the ground in between the lamp posts and just below the lamp post. (5 marks)
- (d) Write short notes on Sodium Vapour Lamp. (5 marks)
8. (a) What is Resistance welding? Explain different types of Resistance welding. (10 marks)

**OR**

- (b) Compare between AC & DC welding. (4 marks)
- (c) Explain the working principal of Laser Welding. Discuss advantage & disadvantage of Laser welding & its area of application. (3+1+1+1 =6 marks)