PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023

Semester : Semester VI - 2020
Course Code : EEE3031
Course Name : Sem VI - EEE3031 - Electrical Power Utilization
Program : EEE

Date : 16-JUN-2023
Time : 9.30AM - 12.30PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   **(10 X 3 = 30M)**

1. The materials used for heating element should have the some salient properties. List 5 characteristics a heating element should possess.

   (CO1) [Knowledge]

2. This phenomenon takes place in solid, liquid and gas. Heat transfer is proportional to the difference of temperatures between two faces. Name the phenomenon and describe the actual motion of molecules in this type of heat transfer.

   (CO1) [Knowledge]

3. Normally, the coefficient of adhesion will be affected by the running of train, parentage gradient, condition of track, etc. for the wet and greasy track conditions. The value of the coefficient of adhesion is much higher compared to dry and sandy conditions. Define coefficient of adhesion and give the expression for the same.

   (CO4) [Knowledge]

4. When the train is moving on up gradient, the gravity component of the dead weight opposes the motion of the train in upward direction. In order to prevent this opposition, the tractive effort should be acting in upward direction. Express the tractive effort required to overcome the effect of gravity. Explain in brief about the effect of change in gradient in the tractive force.

   (CO4) [Knowledge]

5. Fluorescent Tube is a low pressure mercury vapor lamp. It consists of a glass tube 25 mm in diameter and 0.6 m, 2 m and 1.5 m in length. The tube contains argon gas at low pressure about 2.5 mm of mercury. At the two ends, two electrodes coated with some electron emissive material are placed. Name the different materials of florescent tube producing colors.

(CO2) [Knowledge]

6. Quadrilateral speed–time curve for urban and suburban services for which the distance between two stops is less. Illustrate the quadrilateral speed-time graph.

(CO4) [Knowledge]

7. In electric traction again various system of track electrification are employed depending upon the availability of power from overhead network. Classify various system of track electrification based on their supply range.

(CO3) [Knowledge]

8. This speed time curve provided complete information of the motion of the train from starting to stoppage at next station. The slop of the curve at any point gives the acceleration at the corresponding instant of speed of train at that instant. The area covered by the curve represents the distance covered by the train in the corresponding time. List the four components of speed time graph?

(CO3) [Knowledge]

9. One of the disadvantages of single phase AC to DC traction system is unbalanced in power supply. State three ways to remove the same.

(CO3) [Knowledge]

10. On the basis of pressure inside the discharge tube, the mercury vapor lamps are classified as high-pressure Mercury Vapor Lamp and low pressure Mercury Vapor Lamp. Classify the different types of High pressure M.V. Lamps? Also, list their voltge and power range.

(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS   **(3 X 10 = 30M)**

11. The ratio of the distance covered between two stops to the total time of the run including the time for stop is known as schedule speed while schedule time is defined as the sum of time required for actual run and the time required for stop. Classify the key factors significantly influence the schedule speed of a train, and how do these factors interplay to shape the overall efficiency, reliability, and punctuality of railway systems, prompting us to reconsider the potential for enhancing transportation networks?

(CO4) [Comprehension]

12. Trapezoidal speed–time curve can be approximated from the actual speed–time curves of different services by assuming that:

- The acceleration and retardation periods of the simplified curve is kept same as to that of the actual curve.
- The running and coasting periods of the actual speed–time curve are replaced by the constant periods.

Analyze the deeper insights can be gained from exploring the intricate relationship between principal quantities in a trapezoidal diagram, and how does this understanding contribute to our comprehension of complex systems and their behaviour?

(CO3) [Comprehension]

13. Quadrilateral speed–time curve for urban and suburban services for which the distance between two stops is less. The assumption for simplified quadrilateral speed–time curve is the initial acceleration and coasting retardation periods are extended, and there is no free-running period. What critical revelations can be uncovered through the analysis of quadrilateral speed-time graphs, and how does this examination enable us to unravel the intricate dynamics and underlying factors influencing the performance and efficiency of complex systems?

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS (2 X 20 = 40M)

14. 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%. Calculate 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.

(CO4) [Application]

15. Two sources of having luminous intensity 400 candela are hung at a height of 10 m. The distance between the two lamp posts is 20 m. Calculate the illumination (i) beneath the lamp and (ii) in the middle of the posts.

(CO3) [Application]