Code No: R32023 **R10** **Set No: 1**

III B.Tech. II Semester Supplementary Examinations, January -2014
UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Derive the relation between the temperature of a motor at a particular time during operation and final temperature.
   (b) What do you understand by load equalization?

2. (a) What are the various types of induction furnace? Make a neat sketch and describe one of them.
   (b) 100kg of tin is to be melt during an hour in a melting furnace. Determine the suitable rating of the furnace, if melting temperature of tin is 235^0C. Specific heat = 0.055, latent heat = 13.3Kcal/kg. Take initial temperature of the metal as 35^0C.

3. (a) What is fundamental difference between electric arc welding and resistance welding? Explain.
   (b) Compare the AC and DC systems of welding methods.

4. (a) Define
   (i) Mean spherical Candlepower (ii) Waste light factor
   (iii) Solid angle (iv) Luminous intensity
   (b) A lamp of 100 CP is suspended 3 meters above horizontal plane. Calculate the illumination at a point on the horizontal plane
   (i) directly below the lamp (ii) 3 meters away from the vertical axis

5. (a) Explain the operation and constructional features of a filament lamp with a neat sketch.
   (b) An area 300m X 45m has to be illuminated by projector lamps 1000W each. Illumination level required is 8 lux. Efficiency of lamps is 18 lm/watt, beam factor of 0.4, maintenance factor of 0.67 and waste light factor of 1.2. Find the number of projectors required.

6. (a) Discuss the merits and demerits of the D.C and 1-Φ A.C systems for the line electrification of the railways.
   (b) A train has a scheduled speed of 40km/hr between two stops, which are 4km apart. Determine the crest speed over the run, if the duration of stops is 60 sec and acceleration and retardation both are 2km/hr/sec each. Assume simplified trapezoidal speed-time curve.

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7. (a) Define coefficient of adhesion. Explain the factors which influence the value of coefficient of adhesion.
   (b) An electric train has an average speed between start to stop, Va = 40km/hr, acceleration 2.4km/hr/sec and retardation 4km/hr/sec, specific tractive resistance 55 newtons/tonne and average motor efficiency 75%. Estimate the average consumption of energy over a run of 800m, assuming trapezoidal speed time curve. Add 8% for the rotational inertia.

8. Discuss the importance of demand side management and various energy efficiency techniques.

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Code No: R32023 **R10** **Set No: 2**

III B.Tech. II Semester Supplementary Examinations, January -2014
UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
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1. (a) Give with reasons the type of application for which the following motors are best suited:
(i) DC shunt motor (ii) DC series motor (iii) Synchronous motor (iv) 3-Phase induction motor.
(b) Though a.c. is superior to d.c. for electric drives, sometimes d.c. is preferred. Give the reasons and mention some of the applications.

2. (a) What do you understand by electric heating? What are the advantages over other methods of heating?
(b) What are the characteristics of heating element? Explain the design of heating element in resistance heating.

3. (a) Describe:
(i) Seam welding (ii). Butt welding (iii). Projection welding.
(b) Discuss the features of DC arc welding.

4. (a) Enumerate four factors which have to be considered while designing any lighting scheme.
(b) Six lamps are used to illuminate a certain room. If the luminous efficiency of each lamp is 11 lumens/watt and the lamps have to emit a total flux of 10,000 lumens, calculate
(i) the mean spherical luminous intensity
(ii) the cost of energy consumed in 4 hours if the charge for electrical energy is 50 paise per unit.

5. (a) Discuss the operation of mercury vapour lamp.
(b) A machine shop 30m X 15m is to have an illumination of 150 lux on working plane. The lamps are mounted 5m above the working plane. Give the layout of a suitable installation using filament lamp. Assume suitable data?

6. (a) Write short notes on feeding and distributing system on A.C Traction and for d.c tram ways.
(b) A 400 ton goods train is to be hauled by a locomotive on a gradient of 2% with an acceleration of 1 kmphps. Coefficient of adhesion is 0.2, track resistance is 40N/Ton and effective rotating masses 10% of dead weight. Find the weight of the locomotive and number of axles if the axle load is not to be beyond 22 tonnes.

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7. (a) Define and discuss the significance of the following terms:
(i) Dead weight (ii). Accelerating weight (iii). Adhesive weight.
(b) Calculate the specific energy consumption if a maximum speed of 12.2m/s and for a given run of 1525 meters an acceleration of 0.366 m/s^2 are desired. Train resistance during acceleration is 52.6 newtons/1000kg and during coasting is 6.12 newtons/1000kg, 10% being allowable for rotational inertia. The efficiency of the equipment during the acceleration period is 50%. Assume a quadrilateral speed time curve.

8. Discuss the significance of energy star rating of the equipment. Explain various energy efficiency techniques.

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Code No: R32023 **R10** **Set No: 3**

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UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the characteristics of D.C. compound motors and explain its advantage over the series motor.
   (b) Write about various types of industrial loads with their examples and load characteristics.

2. (a) What is the method by which pinch effect in direct core type of induction furnace has been eliminated?
   (b) Explain the principle of dielectric heating and applications.

3. (a) What is electric welding and classify different types of electric welding.
   (b) Explain seam welding and projection welding in detail.

4. (a) Define and explain laws of illumination.
   (b) Define (i) Luminous flux (ii) Incandescence (iii) Luminance and (iv) Illuminance

5. (a) Explain the operation of a fluorescent lamp with a connection diagram.
   (b) A room measuring 10m×10m is to be illuminated by 5 lamps and the average illumination required is 40 lumen/m^2. Taking utilization and depreciation factor as 0.5 and 1.2 respectively, determine the mean spherical candlepower per lamp.

6. (a) Discuss the requirements to be satisfied by an ideal traction system?
   (b) An electric locomotive is required to haul a train of 12 coaches each weighing 30 tonnes on the main line service requiring an initial acceleration of 0.8km/hr/sec up a gradient of 1 in 100. Estimate the adhesive weight and hence the number of driving axles the locomotive must have, if the permissible axle loading is 20 tonnes per axle. Assuming for rotational inertia to be 4%, for the coaches and 15% for the locomotive. Maximum coefficient of adhesion is 0.2 and the tractive resistance 5kg/tonne.

7. (a) Define coefficient of adhesion and specific energy consumption.
   (b) A train is to run between two stations 1.6km apart at an average speed of 40kmph, 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, braking retardation to 3.2, and the duration of a acceleration, coasting and braking periods.

8. Discuss the importance of demand side management and various energy efficiency techniques.

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Code No: R32023 **R10** **Set No: 4**

III B.Tech. II Semester Supplementary Examinations, January -2014
UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
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1. (a) Compare the characteristics of DC series motor and 3-phase induction motor.
(b) A motor has to exert power starting from zero and rising uniformly to 200 hp in 10 minutes after which it works at a constant output of 120 hp for five minutes. The motor remains on no load for next five minutes. The load cycle starts again and is repeated indefinitely. Determine the suitable size of motor. Explain the reasoning employed.

2. (a) Explain the principle of Induction heating, What are the applications of induction heating?
(b) With a neat sketch explain the working principle of coreless type induction furnace.

3. (a) Define the welding. Explain the welding process.
(b) Explain spot welding and butt welding in detail.

4. (a) Define and explain laws of illumination.
(b) A lamp of 500 candle power is placed at the centre of a room, 20m×10m×5m. Calculate the illumination in each corner of the floor and a point in the middle of a 10m wall at a height of 2m from floor.

5. (a) Compare fluorescent and filament lamps
(b) A work shop measures 15m×36m, 20 lamps of 500W each are used for lighting the workshop. The luminous efficiency of lamp is 15 Lumens/watt. Determine the illumination on the working plane, if the depreciation factor is 0.7 and the coefficient of utilization is 0.5. Show the disposition of lamps.

6. (a) Why electric traction is preferred to other types of traction?
(b) An electric train weighing 200 tonnes has 8 motors geared to driving wheels, each wheel is of 80cms diameter. Determine the torque developed by each motor to accelerate the train to a speed of 48km/hr in 30seconds up a gradient of 1 in 200. The tractive resistance of 50newtons/tonne, the effect of rotational inertia is 10% of the train weight, the gear ratio is 4 in 1 and gearing efficiency is 80%.

7. (a) Explain briefly the tractive effort required, while the train is moving up the gradient and down the gradient.
(b) A train is required to run between stations 1.6kms apart at an average speed of 40km/hr. The run is to be made from a quadrilateral speed-time curve. The acceleration is 2km/hr/sec. The coasting and braking retardations are 0.16km/hr/sec and 3.2km/hr/sec respectively. Determine the duration of acceleration, coasting and braking and the distance covered in each period.

8. Discuss the significance of energy star rating of the equipment. Explain various energy efficiency techniques.

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