

R09

Code No: 09A70202

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech IV Year I Semester Examinations, November/December-2012

**UTILIZATION OF ELECTRICAL ENERGY
(ELECTRICAL AND ELECTRONICS ENGINEERING)**

Time: 3 hours

Max. Marks: 75

**Answer any five questions
All questions carry equal marks**

1. An induction motor has a short circuit current equal to 6-times the full load current at normal voltage. It has a slip of 5 percent on full load. Calculate the starting torque in terms of full load torque if started by:
 - (a) A star-delta starter
 - (b) An auto-transformer with 60 percent tapping. Ignore the magnetizing current.

[15]
- 2.a) Explain the principle of dielectric heating and its applications.
b) The power required for dielectric heating of a slab of resin 150sq cm in area and 2 cm thick is 200 watts at a frequency of 30 MHz. The material has relative permittivity of 5 and a p.f 0.05. Determine the voltage necessary and current flowing through the material. If the voltage is limited to 600V, what will be the value of the frequency to obtain the same heating?

[8+7]
- 3.a) Define the following terms:
 - i) Squeeze time
 - ii) Weld time
 - iii) Hold time.b) Explain the following resistance welding process:
 - i) Spot welding
 - ii) Seam welding
 - iii) Butt welding
 - iv) Projection welding.

[3+12]
- 4.a) Define:
 - i) Space to height ratio
 - ii) Specific output
 - iii) Coefficient of utilization
 - iv) Coefficient of reflection.b) A room measuring 20m×15m is to be illuminated by 10 lamps and the average illumination is to be 75 lux. Determine the MSCP of each lamp if the utilization and depreciation factors are 0.5 and 0.8 respectively.

[8+7]
- 5.a) Compare the merits and demerits of filament lamps and fluorescent lamps.
b) A corridor is lighted by lamps spaced 9.15 cm and suspended at a height of 4.575m above centre line of the floor. If each lamp gives 100 candle power in all directions below the horizontal, find the maximum and the minimum illumination on the floor along the centre line.

[7+8]

6.a) Explain electric braking by plugging.

b) Discuss various factors which are taken into account while deciding the changeover from existing system of electrification to a new system of electrification. [8+7]

7.a) Derive an expression for the distance traveled by an electric train using trapezoidal speed-time curve.

b) The average speed of a train is 50 kmph. Determine its maximum speed assuming trapezoidal speed-time curve, if the distance between the stops is 2.5 km, acceleration 1.8 kmph/s and retardation 3 kmph/s. [7+8]

8.a) Define and discuss the significance of the following terms:

- i) Dead weight
- ii) Accelerating weight
- iii) Adhesive weight.

b) What is coefficient of adhesion? How the value of coefficient of adhesion affects the slipping and skidding of the driving wheels of traction unit? [6+9]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech IV Year I Semester Examinations, November - 2013****Utilization of Electrical Energy****(Electrical and Electronics Engineering)****Time: 3 Hours****Max. Marks: 75**

Answer any Five Questions
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1. Describe the selection of various types of motors for the following services.
a) Rolling Mills b) Cranes and lifts c) Textile machinery
d) Printing machine e) Household applications [15]
- 2.a) Explain the principle of dielectric heating and state its applications. What are the advantages of dielectric heating?
b) A piece of an insulating material is to be heated by dielectric heating. The size of the piece is $10 \times 10 \times 3 \text{ cm}^3$. A frequency of 20 MHz is used and the power absorbed is 400 watts. Calculate the voltage necessary for heating and the current that flows in the material. The material has permittivity of 5 and a p.f. of 0.05. [7+8]
- 3.a) Describe various types of Electric Arc welding processes.
b) Describe the various methods of current flow control in welding transformers. [8+7]
- 4.a) Discuss Laws of illumination and its limitation in actual practice.
b) Define the following.
i) Luminous flux ii) Luminous intensity iii) Luminous efficiency
iv) Coefficient of Utilization v) MHCP vi) Waste light factor
vii) Depreciation factor. [8+7]
- 5.a) Discuss the common troubles that occur in a fluorescent lamp and the remedies that are to be taken. Also discuss the effect of voltage variation on the life of the lamp.
b) The front of a building measuring 50 m x 10 m is to be flood lighted by means of projectors placed at a distance of 10 m from the wall. The average illumination required is 45 lux. Determine the number and size of projectors required. Assume waste light factor 1.2, depreciation factor 0.8, and coefficient of utilization factor 0.5. Also given that [7+8]
- | | | | | |
|--------|------|------|-------|-------|
| Watts | 300 | 500 | 1000 | 1500 |
| Lumens | 5000 | 9000 | 18000 | 27000 |
- 6.a) What are the advantages of Electric braking? State different types of electric braking. Explain each of them in detail.
b) Explain the characteristic of DC series motor and why these are used in traction? [8+7]

- 7.a) Discuss the main features of the various train services. Assuming simplified speed –time curve for sub urban service, derive the relation between acceleration, retardation, coasting retardation, running time between the stops.
- b) The distance between two stations is 5 Km and the average speed of the train is 50 km. The acceleration, coasting and braking retardation are 3 kmphs, 0.2 Kmphs, 4 kmphs respectively. Taking quadrilateral speed time curve determine the duration of acceleration, coasting and braking periods and distance covered during each period. [7+8]
- 8.a) Derive expression for
- Tractive effort for propulsion of train on level track
 - The tractive effort for propulsion of a train up and down a gradient.
- b) An electric train has an average speed of 42 Kmph on a level track between stops 1400 apart. It is accelerated at 1.7 Kmphs and it is braked at 3.3 Kmphs. Draw the speed time curve and estimate the specific energy consumption. Assume tractive resistance as 50 N/toune and allow 10 % rotational inertia. [7+8]

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B. Tech IV Year I Semester Examinations, June/July - 2014

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 Hours

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Answer any Five Questions
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- 1.a) Derive the relation between the temperature rise of a motor at a particular time during operation and final temperature
- b) Write about various types of industrial loads with their examples and load characteristics.
- 2.a) Explain with a neat sketch the principle of coreless type induction furnace. Give some applications of induction heating.
- b) Estimate the rating of induction furnace to melt two tonnes of zinc in one hour if it operates at an efficiency of 70% specific heat of zinc = 0.1, latent heat of fusion of zinc = 26.67 Kcal/kg. Melting point is 455°C .
3. Write short notes on the following:
 - a) Resistance welding
 - b) Arc welding
 - c) electric welding equipment
 - d) Advantages of coated electrodes in welding process.
- 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) What do you understand by discharge lamp? Explain the construction and working of high pressure mercury lamp.
- b) A drawing hall measuring $30\text{m} \times 15\text{m} \times 5\text{m}$ is to be provided with illumination of 100 lux. Assuming coefficient of utilization of 0.5 and depreciation factor of 0.8, determine the number of lamps required, their spacing, mounting height and total wattage. Luminous efficiency of 300W lamp is 16.67 lumens/watt.
- 6.a) Discuss the merits and demerits of the D.C and 1- Φ A.C systems for the main and suburban line electrification of the railways.
- b) Discuss various methods of electric braking of DC series motors.

- 7.a) Explain the mechanics involved in a train movement.
- b) A 400 tonne goods train is to be hauled by a locomotive up a gradient of 20% with acceleration of 1.5 kmphps. Coefficient of adhesion is 20%, track resistance 40 N/tonne and effective rotating masses 10% of dead weight. Find the weight of locomotive and number of axles, if the axle load is not to increase beyond 20 tonne.
- 8.a) Define coefficient of adhesion, dead weight and adhesive weight. Explain the factors which influence the value of coefficient of adhesion.
- b) An electric train has an average speed between start to stop, $V_a = 40$ km/hr, acceleration 2.4 km/hr/sec and retardation 4 km/hr/sec, specific tractive resistance 55 newtons/tonne and average motor efficiency 75%. Estimate the average consumption of energy over a run of 800 m, assuming trapezoidal speed time curve. Add 8% for the rotational inertia.

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