

Code No: 07A80201

R07

Set No. 2

IV B.Tech II Semester Examinations, APRIL 2011
 UTILIZATION OF ELECTRICAL ENERGY
 Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) Discuss the features of DC arc welding.
 (b) Enlist the advantages of AC arc welding machines. [8+8]
2. (a) Explain skin effect and pinch effect compare the performance of Ajax wyatt and core-less furnace.
 (b) Estimate the rating of induction, furnace to melt two tones 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. [8+8]
3. Discuss in detail the various categories of light fittings employed for indoor lighting, describing the application of each type. [16]
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+8]
5. Derive expression for:
 - (a) The tractive effort for propulsion of a train on level track
 - (b) The tractive effort for propulsion of a train up and down a gradient. [16]
6. Discuss the various factors on which final choice of traction system depends. [16]
7. Derive the expressions for the speed - Torque characteristics of dc shunt motor under the following conditions:
 - (a) Without control
 - (b) External resistance in the armature circuit
 - (c) External resistance in the field circuit
 - (d) Armature shunted with resistance R.
 Draw the typical characteristics for all the conditions. [16]

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8. 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 kmphs, coasting retardation to 0.16, braking retardation to 3.2, find the duration of a acceleration, coasting and braking periods. [16]

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1. (a) State the principle of operation application and relative merits & demerits of direct type of induction furnace.
- (b) What must be useful rating of a tin melting furnace in order to melt 50 Kg of tin per hour. Melting temperature of tin = 235° , specific heat = 0.055, Latent heat of liquidification = 13.31 kcal/kg. Take the initial temperature of the metal is 150°C . [8+8]
2. Discuss in detail the effect of weight transfer on the performance of traction unit while accelerating and while braking. [16]
3. (a) What do you understand by load equalization?
- (b) Explain the various factors that affect the final temperature rise of a motor on load. [8+8]
4. (a) Derive 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. [6+10]
5. Explain the different types of lamp fittings and lighting systems with the help of light distribution Graphs. [16]
6. (a) State the inverse square law and cosine law.
- (b) A lamp taking 3.5A at 100V emits 6000 lumens. Calculate its efficiency in:
 - i. Lumens per watt
 - ii. Mean spherical candle power per W
 - iii. A lamp taking 0.5A and 250V is rated at 125 MHCP. Find its efficiency in:
 - A. MHCP per watt
 - B. Lumens per watt. [8+4+4]

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7. Derive the relationship between acceleration, retardation, maximum speed, running time and distance between two stops assuming a trapezoidal Speed-Time curve. [16]
8. (a) Explain characteristics of d.c series motors and why these are used in traction.
(b) Describe the d.c series motor control with details of components used. [8+8]

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Set No. 1

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1. Calculate the brightness of the snow under an illumination of:
 - (a) 44,000 lux
 - (b) 0.22 lux. Assume that the snow behaves like a perfect diffuser having a reflection factor of 85%. [16]
2. (a) Enumerate the various points which govern the choice of motor for a particular industrial drive.
- (b) Compare the characteristics of DC series motor and 3- ϕ induction motor. [8+8]
3. (a) Explain the Principle of dielectric heating and 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? [6+10]
4. Explain electric braking by plugging. Why in case of shunt motor connections are reversed for armature? [16]
5. With the help of trapezoidal speed time curve, derive an expression for the maximum speed and hence estimate the values of acceleration and retardation. [16]
6. Explain the various factors to be taken into account for designing schemes for:
 - (a) Flood lighting
 - (b) Highway lighting. [16]
7. An electric train has an average speed of 42 km/hr on a level track between stops 1400 m apart. It is accelerated at 1.7 km/hr/sec and it is braked at 3.3km/hr/sec. Draw the speed-Time curve and estimate the specific energy consumption. Assume tractive resistance as 50 NW/Tonne and allow 10% rotational inertia. [16]
8. Write short notes on the following:
 - (a) Resistance welding
 - (b) Arc welding
 - (c) Welding transformer characteristics
 - (d) Advantages of coated electrodes in welding process. [4+4+4+4]

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R07**Set No. 3**

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1. (a) Describe:
 - i. Seam welding
 - ii. Butt welding
 - iii. Projection welding.
 (b) Discuss the features of DC arc welding. [8+8]
2. (a) Explain the advantages and applications of dielectric heating.
 (b) A electric furnace consuming 5kw takes 15 minutes to just melt 1.816 kg of aluminium from 15°. Find the efficiency of the surface. Specific heat of aluminium = 221.8J/Kg/°C, melting point 658 °C and latent heat of fusion = 806785/kg. [8+8]
3. Determine the height at which a light source having uniform spherical distribution should be placed over a floor in order that the intensity of horizontal illumination at a given distance from its vertical line may be greatest. [16]
4. With the help of a complete Speed-Time curve, discuss how different parameters of this curve change with the type of train service. [16]
5. Discuss various factors which are taken into account while deciding the changeover from existing system of electrification to a new system of electrification. [16]
6. What is coefficient of adhesion? How the value of coefficient of adhesion affects the slipping and skidding of the driving wheels of traction unit? [16]
7. (a) Discuss the various factors governing the choice of motors.
 (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 out put 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. [6+10]
8. A building measuring 30m×20m is to be flood lit on the front side with brightness of 25lumen/sq.mt. Coefficient of reflection of building surface is 0.25. Lamps of 500w having lumens output of 8000 each are used. Assuming beam factor as 0.6; Waste light factor 1.2 and maintenance factor as 0.75, determine the number of lamps required. [16]
