

Code No: 07A80201

R07**Set No. 2**

IV B.Tech II Semester Examinations, April/May 2012

UTILIZATION OF ELECTRICAL ENERGY

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What is rheostatic braking and what precautions are taken when rheostatic braking is applied to d.c series traction motor? [16]
2. (a) What are the various methods of electric welding?
(b) Describe the various types of electric Arc welding processes. [8+8]
3. (a) Discuss in detail the various light fittings used for indoor lighting giving special applications of each of them.
(b) What are the qualities required in the fittings meant for out door installation? [8+8]
4. Explain how an actual Speed-Time curve can be replaced by a curve having simple geometric shape. [16]
5. (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]
6. Draw the connection diagram of the equipment for automatically starting:
 - (a) A squirrel cage induction motor by means of an auto-transformer
 - (b) A slip ring induction motor by means of resistive in the rotor circuit. [8+8]
7. The distance between two stations is 1.92km. Scheduled speed and duration of stop is 40 kmph and 20 sec. Assume quadrilateral approximation of speed-Time curve and wasting and braking retardations as 0.16kmphs and 3.2kmphs respectively, the weight of the train as 200 tons, the accelerating weight is 1.1 times that of dead weight and train resistance during accelerating period as 4.53kg/ton, determine:
 - (a) Specific energy output of the run
 - (b) Energy dissipated in brakes
 - (c) Energy utilized during coasting

Code No: 07A80201

R07**Set No. 2**

- (d) The mean train resistance during coasting. [16]
8. (a) What are the characteristics of heating element? Explain the design of heating element is resistance heating.
- (b) A 50KW, 3-phase, 440V resistance furnace is to employ nickel-chrome strip of 0.3 mm thick for star connected elements. The temperature of the strip is to be 1500 °C and that of charge 1000 °C. Find the length and width of the strip. Take $e = 0.91$ and $K = 0.6$. [8+8]

JNTUWORLD

Code No: 07A80201

R07**Set No. 4**

IV B.Tech II Semester Examinations, April/May 2012

UTILIZATION OF ELECTRICAL ENERGY

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Derive an expression for tractive effort for:
 - (a) Acceleration
 - (b) On a gradient
 - (c) Resistance. [16]
2. (a) Describe the construction and principle of working of an induction furnace.
 (b) Determine the energy required to melt 500 kg of brass in 30 minutes. Assuming specific heat = 0.095, Latent heat of fusion of brass = 39 cal/kg. melting point of brass = 920⁰, furnace $\eta=50\%$, temperature of cold charge = 20⁰C. [8+8]
3. Discuss the application of rheostatic braking as applied to series and a.c induction motors with neat diagram. [16]
4. Explain the various factors to be taken into account for designing schemes of:
 - (a) Flood lighting
 - (b) Highway lighting. [16]
5. With the help of a complete Speed-Time curve, discuss how different parameters of this curve change with the type of train service. [16]
6. (a) What are the various methods of welding?
 (b) What are the advantages of coated electrodes in welding process? [16]
7. (a) What are polar curves as applied to light sources? Show how these curves are used for finding in MHCP and MSCP.
 (b) Prove that the relationship between plane angle and solid angle is:

$$\omega = 2\pi(1 - \frac{\cos\phi}{2}).$$
 [8+8]
8. (a) Compare the 3-Phase induction motor and DC shunt motors from the point of view of ease of speed control.
 (b) A 230V, dc shunt motor runs at 900 rev/min on no-load with full field and has an armature resistance of 0.7 ohms. The armature current to give full load torque is 15A. if a resistance of 6 ohms is put in series with the armature, determine the speed-torque characteristic. Also find the current drawn from the supply. [8+8]

Code No: 07A80201

R07**Set No. 1**

IV B.Tech II Semester Examinations, April/May 2012

UTILIZATION OF ELECTRICAL ENERGY

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Derive an expression for the distance traveled by an electric train using quadrilateral Speed-Time curve. [16]
2. (a) Explain the characteristics of induction heating.
(b) A low frequency induction furnace opening at 10V in the secondary circuit, takes 400 kw at 0.6 power factor when the hearth is full. If the secondary voltage be maintained at 10V, estimate the power absorbed and the power factor when the hearth is full. Assume the resistance of the secondary circuit is to be there by doubled and the reactance to remain the same. [6+10]
3. Explain the various traction systems that are existing, highlighting their advantages and disadvantages. [16]
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 how does the operation of a fluorescent tube differ when it is used on:
 - (a) ac
 - (b) dc supply. [16]
6. (a) What are polar curves? Explain Rousseau diagram and its importance in illumination engineering.
(b) What is photometry? Describe photovoltaic method of photometry and discuss its limitations. [8+8]
7. Describe the speed control of the following motors:
 - (a) DC shunt motor 10 hp, 440 volts of a lathe
 - (b) DC series motor 15 hp, 440 volts of exhaust fan

Code No: 07A80201

R07**Set No. 1**

- (c) Squirrel cage induction motor, 40hp, 400 volts of a cement mill
- (d) Synchronous motor, 20hp, 400V ice freezing unit. [4×4=16]
8. A 200 Tonne motor coach having 4 motors, each developing 6000 N-m torque during acceleration, starts from rest. If up gradient is 30 in 1000, gear ratio 4, gear transmission efficiency 90%; wheel radius 45 cm, train resistance 50 N/Ton, addition of rotational inertia 10%, calculate the time taken to attain speed of 50 kmph. If line voltage is 3000V d.c and efficiency of motors 85%, find the current taken during notching period. [16]

JNTUWORLD

Code No: 07A80201

R07**Set No. 3**

IV B.Tech II Semester Examinations, April/May 2012

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) Write short notes on electric welding.
(b) Name and describe various resistance welding processes. [6+10]
2. Discuss in detail the various categories of light fittings employed for indoor lighting, describing the application of each type. [16]
3. What are the methods available for starting induction motors? Draw connection diagrams for a star-delta starter and Auto-Transformer starter. [16]
4. Discuss various factors which are taken into account while deciding the changeover from existing system of electrification to a new system of electrification. [16]
5. With suitable Speed-Time curves, explain the various services available for a traction system. [16]
6. (a) Describe the constructional features of a Resistance Oven. What properties the element must possess?
(b) A 40 KW, 3-phase 400V resistance oven is to employ Ni-cr strip of 0.3 mm thickness. The heating elements are star connected. If the wire temperature is to be 1127°C and heat of charge is to be 727°C , estimate the suitable width and length of the wire required. Radiating efficiency = 0.6, specific resistance of Ni-cr 1.03 micro-ohm-m. Emissivity 0.9. [6+10]
7. (a) What are polar curves? Explain Rousseau diagram and its importance in illumination engineering.
(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. [8+8]
8. An electric train weighing 400 tonnes runs along an up gradient of 1% with following speed-Time curve:
 - (a) Uniform acceleration of 1.5 kmphps for 30sec.
 - (b) Free running for 36 seconds
 - (c) Coasting for 25 seconds
 - (d) Braking at 2.6 kmphps to rest.

Code No: 07A80201

R07**Set No. 3**

If tractive resistance is 45 N/tonne, rotational inertia effect 10%, overall efficiency of transmission and motor 75%, determine specific energy consumption. [16]

JNTUWORLD