Code No: RT32023 **R13** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What are the factors governing the selection of motors?	[3M]
	b)	On what factors dielectric losses depend?	[4M]
	c)	Define Illumination?	[4M]
	d)	What is Lamp Efficiency?	[3M]
	e)	What are the advantages of diesel electric traction.	[4M]
	f)	Define the term braking retardation.	[4M]

PART -B

2	a)	What are the advantages of equipment operated from high frequency supply?	[4M]
	b)	What is the advantage of constant current supply system?	[8M]
	c)	Where would you recommend slip coupling method of speed control?	[4M]
3	a)	What is welding?	[3M]
	b)	Describe the construction and principle of working of an induction furnace.	[8M]
	c)	What type of electric supply is suitable for electric arc welding?	[5M]
4	a)	Explain how emitted energy is distributed using spectral distribution curves .	[8M]
	b)	Explain the functionality of a Lux Meter?	[8M]
5	a)	Why tungsten is selected as filament material and on what factors its life depend?	[9M]
	b)	What are the advantages of fluorescent lighting over plain mercury lighting?	[7 M]
6	a)	Write the requirements of fraction motors .	[8M]
	b)	Review the existing electric traction systems in India.	[8M]
7	a)	A 200 tonne electric train with scheduled speed of 40 kmph runs between two stations 2 km apart with an acceleration of 2 kmphps and braking retardation of 3kmphps. The train resistance is 50 Nw-m / tonne, effect of rotational inertia 10%,over all efficiency 70% and station stop 10 sec. calculate. i) The maximum power output from the wheels ii) The specific energy consumption.	[8M]
	b)	Explain the terms i)Adhesive weight ii)Train resistance iii)Speed time curve	[8M]

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Code No: RT32023 **R13** SET - 2

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Mention advantages of electric drives over other drives.	[3M]
	b)	What is the purpose of using reactors in electric arc furnace.	[4M]
	c)	What is Frescher's law of illumination.	[4M]
	d)	What are the factors affecting the design of indoor lighting installations.	[3M]
	e)	What are the disadvantages of diesel electric traction.	[4M]
	f)	Explain train resistance referred to traction.	[4M]

PART -B

2	a)	What factors govern the selection of a motor for particular drive application.	[4M]
	b)	What do you understand by matching of speed torque characteristics of load and motor?	[8M]
	c)	In what way buck and boost method of speed control is superior to ward leonard method?	[4M]
3	a)	What are different types of welding?	[3M]
	b)	Find the energy consumed and the rating of a tin melting furnace in order to melt 500 Kg of tin in 30 minutes. Take melting point of tin as 235^0C, specific heat as 0.055, latent heat of fusion as 13.31Kcal per kg, initial temperature as 20^0C and furnace efficiency of 75%	[8M]
	c)	What are the advantages of using coated welding electrodes?	[5M]
4	a)	Describe two ways of how glare is produced and suggest how it can be avoided?	[8M]
	b)	What are the main faults of lighting systems and how they are overcome?	[8M]
5	a)	Compare fluoresecent and filament lamps on basis of quality of light, capital and running costs.	[8M]
	b)	What are the advantages of coiled coil filament gas filled lamp?	[8M]
6	a)	Explain the function of a reactor used in series with traction motors?	[7M]
	b)	What are special features of a traction motor?	[9M]
7	a)	Derive the necessary expressions for tractive effort of fraction system.	[8M]
	b)	Explain various systems of transmission of drives bringing out their merits and demerits.	[8M]

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Code No: RT32023 **R13** SET - 3

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What are different types of industrial loads?	[3M]
	b)	Why electric heating is preferred over other methods of heating.	[4M]
	c)	What is lambert's cosine law of illumination?	[4M]
	d)	What is illumination level?	[3M]
	e)	What type of motors find application in traction work?	[4M]
	f)	Explain accelerating weight referred to traction.	[4M]

PART -B

2	a)	What are the conditions for stable operation of a motor?	[4M]
	b)	Explain the principle of operation of a saturable reactor?	[8M]
	c)	What are the advantages of electric drive?	[4M]
3	a)	What do you mean by negative resistance characteristics of an electric arc?	[3M]
	b)	A piece of insulating material is to be heated by dielectric heating. The size of the piece is 100 sq.cm area and 2.5cm thick. A frequency of 25 mega cycles is used and the power absorbed is 350W. Calculate the voltage necessary for heating and the current that flows in the material. The material has relative permittivity of 5 and a p.f. of 0.05	[8M]
	c)	What is the advantage of submerged arc welding?	[5M]
4	a)	How is luminous intensity measured, explain?	[8M]
	b)	What are various sources of light? Write short notes on filament lamps.	[8M]
5	a)	What are discharge lamps? Explain.	[8M]
	b)	Write how planned maintenance of lighting installation is done?	[8M]
6	a)	What is the tractive effort required to overcome train resistance, explain?	[8M]
	b)	Discuss the merits and demerits of the D.C and 1-phase A.C systems for the main and suburban line electrification of the railways.	[8M]
7	a)	Explain dead weight, accelerating weight and train resistance referred to traction	[8M]
	b)	A train is required to run between the two stations 1.5 km apart at a schedule speed of 36 km ph, the duration of stop being 25 sec. The braking retardation is 3 kmphps. Assuming a trapezoidal speed/time curve, calculate the acceleration if the ratio of maximum speed to average speed is to be 1.25.	[8M]

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Code No: RT32023 **R13** SET - 4

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017
UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What is load equalization?	[3M]
	b)	What are different methods of heat transfer?	[4M]
	c)	List out the electric welding equipment	[4M]
	d)	What is a cold lamp?	[3M]
	e)	How direction of rotation of a traction motor is reversed?	[4M]
	f)	Explain dead weight referred to traction.	[4M]

PART -B

2	a)	What are relative advantages and disadvantages of d.c.and a.c. drives?	[4M]
	b)	What are the different classifications of load and how they affect the motor selection?	[8M]
	c)	For what type of speed torque characteristic, would you recommend shunt motor?	[4M]
3	a)	What is the technique of weld metal deposition by electric arc?	[3M]
	b)	What are specific advantages and applications of dielectric heating?	[8M]
	c)	What are the qualities of a good weld?	[5M]
4	a)	Explain about typical polar curves of a filament lamp.	[8M]
	b)	What is depreciation factor? Compare the depreciation curves for various types of lamps.	[8M]
5	a)	Write a brief note on LED lighting.	[6M]
	b)	Explain the “silhouette” principle on which modern street lighting depends?	[10M]
6	a)	What is notching up period? Write brief note on speed time curves of trains.	[8M]
	b)	Define the term tractive effort. Derive the condition for tractive effort required to balance the gravitational pull.	[8M]
7	a)	What are the advantages and disadvantages of thyristor controlled traction motors?	[8M]
	b)	Discuss the suitability of d.c.shunt and series machines for regenerative braking.	[8M]

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Code No:RT32023 **R13** SET - 1

III B. Tech II Semester Regular Examinations, April - 2016

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Maximum Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	"If a high degree of speed control is required, d.c. is preferable to a.c. for an electric drive" -Justify.	[4M]
	b)	What do you mean by Load Equalization?	[3M]
	c)	Give the classification of electric heating methods.	[3M]
	d)	Define: i) Mean spherical Candlepower, ii) Mean horizontal Candlepower.	[4M]
	e)	Why a series motor is preferred for the electric traction.	[4M]
	f)	What are the advantages of electric braking over mechanical braking	[4M]

PART -B

2	a)	Discuss the advantages and disadvantages of electric drive over other drives.	[8M]
	b)	A 200 V shunt motor has an armature resistance of 0.5 Ohm. It takes a current of 16 amps on full load and runs at 600 r.p.m. If a resistance of 0.5 ohm is placed in the armature circuit, find the ratio of the starting torque to the full load torque.	[8M]
3	a)	Explain in brief how heating is done in the following cases: i) Resistance heating, ii) Induction heating iii) Dielectric heating.	[8M]
	b)	A 20KW single-Phase, 220V resistance oven employs circular nichrome wire for its heating element, if the wire temperature is not to exceed 1227^0 and the temperature of the charge is to be 427^0C, calculate the size and length of the wire required. Assume emissivity = 0.9, radiating efficiency = 0.6 and specific resistance of wire = 1.09 X 10^{-6} Ω-m.	[8M]
4	a)	Explain the different measurement techniques used for luminous intensity.	[8M]
	b)	A lamp fitted with 120 degrees angled cone reflector illuminates circular area of 200 metre in diameter. The illumination of the disc increases uniformly from 0.5 metre-candle at the edge to 2 metre-candle at the centre. Determine i. the total light received ii. Average illumination of the disc iii. Average c.p. of the source.	[8M]

5 a) Compare Tungsten filament lamp with Fluorescent tubes. [8M]

b) Explain the different types of lighting schemes.. [8M]

6 a) For a quadrilateral speed-time curve of an electric train, derive expression for the distance between stops and speed at the end of the coasting period [8M]

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. [8M]

7 a) Briefly explain the a.c. motors used in traction. [8M]

b) The scheduled speed of a trolley service is to be 53km/hr. The distance between stops is 2.8km. The track is level and each stop is of 30 sec duration. Using simplified speed-time curve, calculate the maximum speed, assuming the acceleration to be 2km/hr/sec, retardation 3.2km/hr/sec, the dead weight of the car as 16 tonnes, rotational inertia as 10% of the dead weight and track resistance as 40 newtons/tonne. If the overall efficiency is 80%, calculate (i) the maximum power output from the driving axles (ii) the specific energy consumption in watt-hr/tonne-km. [8M]

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III B. Tech II Semester Regular Examinations, April - 2016

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Maximum Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	" Torque in a shunt motor varies with the armature current" –Justify	[4M]
	b)	What are various types of electric braking used?	[4M]
	c)	Discuss the various losses that occur in insulating materials	[4M]
	d)	Define i)Mean hemispherical Candlepower ii) Mean spherical Candlepower.	[3M]
	e)	What is plugging.	[3M]
	f)	What is the principle of energy efficient motors.	[4M]

PART -B

2	a)	Compare and contrast the slip ring and squirrel cage induction motors from the application point of view.	[8M]
	b)	A series motor working on 500 V d.c supply runs at a speed of 1000 r.p.m. When The load current is 120 amp. The resistance of the motor 0.15 ohm, of which 0.04 ohm is the resistance of the field. Calculate the speed of the motor when the torque is half of the full load torque and the field winding is connected in parallel with a diverter of resistance 0.08 ohm, assuming an unsaturated magnetic circuit.	[8M]
3	a)	What are the causes of failure in heating elements?	[5M]
	b)	Six resistances each of 40 ohms are used as heating elements in furnace. Find the power of the furnace for various connections to a three phase 230V supply.	[6M]
	c)	An electric arc furnace consuming 5kW takes 15 minutes to just melt 1.5kg of aluminum, the initial temperature being 15^{o} C. Find the efficiency of the furnace. Specific heat of aluminum is 0.212, melting point 658^{o} C and latent heat of fusion is76.8 cal per gram.	[5M]
4	a)	State and explain laws of Illumination.	[8M]
	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.	[8M]
5		Give the construction and working of the following types of lamps: (a) Arc lamp (b) Neon lamp (c) Sodium lamp	[16M]

6 a) For a trapezoidal speed-time curve of an electric train, derive expression for maximum speed and distance between stops. [10M]

b) A train is to be run between two stations 5kms apart at an average speed of 50km/hr. If the maximum speed is to be limited to 70km/hr, acceleration to 2km/hr/sec, braking retardation to 4km/hr/sec and coasting retardation to 0.1km/hr/sec, determine the speed at the end of coasting, duration of coasting period and braking period. [6M]

7 a) Write short notes on sub-traction for single-phase A.C systems. [6M]

b) An electric locomotive is required to haul a train of 12 coaches each weighing 30 tonne 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 tonne 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. [10M]

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Code No:RT32023 **R13** SET - 3

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UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Maximum Marks: 70

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	What do you mean by "Individual drive" and" Group drive".	[4M]
	b)	Define Horizontal polar curve and vertical polar curve.	[4M]
	c)	What are the advantages of radiant heating?	[3M]
	d)	Discuss inverse square law.	[3M]
	e)	What are the advantages and disadvantages of electrification of track?	[4M]
	f)	Discuss why a D.C series motor is ideally suited for traction services.	[4M]

PART -B

2	a)	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.	[8M]
	b)	A d.c. series motor drives a load, the torque of which varies as the square of the speed. The motor takes current of 30 amps, when the speed is 600 r.p.m. Determine the speed and current when the field winding is shunted by a diverter, the resistance of which is 1.5 times that of the field winding. The losses may be neglected.	[8M]
3	a)	What are various types of electric braking used?	[8M]
	b)	Explain how rheostatic braking is done in D.C. shunt motors and series motors.	[8M]
4		Write short notes on :	[8M]
	a)	High pressure mercury vapour lamp	
	b)	Mercury fluorescent lamp.	[8M]
5	a)	Explain the various types of lighting schemes with relevant diagrams.	[10M]
	b)	Briefly explain the various laboratory standards used in Illumination.	[6M]
6		Write a brief notes on the single phase a.c. series motor and comment upon it's suitability for traction services. How is it performance compared with the d.c. series motor?	[16M]
7	a)	Explain the specific energy consumption for given run.	[8M]
	b)	An electric train weighing 200 tonne 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%.	[8M]

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Code No: RT32023 **R13** SET - 4

III B. Tech II Semester Regular Examinations, April - 2016

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	What are the various factors that govern the choice of a motor for a given service?	[3M]
	b)	What are different methods of heat transfer?	[4M]
	c)	Define: i) Luminous intensity, ii) Luminous Flux.	[4M]
	d)	Give some applications of induction heating.	[3M]
	e)	What are the requirements of an ideal traction system?	[4M]
	f)	Define specific energy output and specific energy consumption.	[4M]

PART -B

2	a)	Explain what do you mean by "Individual drive" and "Group drive ". Discuss their relative merits and demerits.	[8M]
	b)	A 500 V d.c. series motor runs at 500 r.p.m. and takes 60 amps. The resistances of the field and the armature are 0.3 and 0.2 Ohms, respectively. Calculate the value of the resistance to be shunted with the series field winding in order that the speed may be increased to 600 r.p.m., if the torque were to remain constant. Saturation may be neglected.	[8M]
3	a)	What are the factors to be considered for inductor design in induction heating?	[8M]
	b)	Give some applications of induction heating.	[8M]
4	a)	Explain with sketches the constructional features of a filament lamp.	[10M]
	b)	A lamp of 500 candle power is placed at the centre of a room, 20m x 10m x 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.	[6M]
5	a)	Discuss the flood lighting with suitable diagrams.	[6M]
	b)	Along the center of a line of a corridor, number of lamps is fitted with reflectors. The distance between the two adjacent lamps is 7.5cm and the height of each lamp from the floor is 5m. The candlepower of each lamp is 100 in all directions below the horizontal. Determine the maximum and minimum illumination along the centerline of the floor and draw a graph showing the variation of the illumination along this line between the two lamps.	[10M]

6 a) Draw the speed-time curve of a suburban service train and explain [8M]

b) A train accelerates to a speed of 48km/hr in 24sec. Then it coasts for 69sec under a constant resistance of 58 newton / tonne and brakes are applied at 3.3km/hr/sec in 11sec. calculate (i) the acceleration (ii) the coasting retardation (iii) the scheduled speed if station stoppage is 20secs. What is the effect of scheduled speed if station stoppage is reduced to 15sec duration, other conditions remaining same? Allow 10% for rotational inertia. [8M]

7 a) Explain dead weight, accelerating weight and train resistance referred to traction. [6M]

b) An electric locomotive of 100 tonne can just accelerate a train of 500 tonne (trailing weight) with an acceleration of 1km/hr/sec on an up gradient 1 in 1000. Tractive resistance of the track is 45 newton/tonne and the rotational inertia is 10%. If this locomotive is helped by another locomotive of 120 tonne, find [10M]

i) the trailing weight that can be hauled up the same gradient, under the same condition

ii) the maximum gradient, the trailing hauled load remaining unchanged. Assume adhesive weight expressed as percentage of total dead weight to be same for both the locomotives.

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UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

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2. Answering the question in **Part-A** is compulsory
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*****

PART –A

1	a)	Distinguish between continuous, Intermittent and variable loads.	[4M]
	b)	List the advantages of coreless induction furnaces.	[4M]
	c)	Explain the terms “Pinch effect” and Skin effect”.	[4M]
	d)	What is a Glare and how it can be minimized.	[3M]
	e)	Why DC series motor is suited for traction applications. Justify?	[3M]
	f)	Explain the driving mechanics of train movement.	[4M]

PART -B

2	a)	Explain the different types of load torques based on the existing load on an electric drive.	[8M]
	b)	A delta connected 415 V, 50 H.P., 750 rpm. Squirrel cage motor takes a full load current of 55 A and has a full load slip of 4.5 percent. The impedance per phase is 2.5 ohms. Determine the starting torque and the starting current taken from the supply if the motor is started by i) D.O.L. starter; ii) Star – Delta starter; iii) An auto transformer starter with 70 % tapping.	[8M]
3	a)	Distinguish in detail between Direct Resistance heating and Indirect resistance heating.	[8M]
	b)	Explain the working of Ajax Wyatt vertical core furnace with a neat sketch.	[8M]
4		Explain the following terms w.r.t illumination Engineering: i)Reduction factor ii)Utilization factor iii)Maintenance factor iv)Absorption factor	[16M]
5	a)	Explain the construction and working of Sodium vapor lamp.	[8M]
	b)	A minimum illumination of 100 lumens/m^2 is required in the factory shed of 60 m x 15 m. calculate the number, the location and wattage of the units to be used. Assume that the depreciation factor is 0.76, coefficient of utilization is 0.54 and efficiency of the lamp units is 20 lumens/ watt.	[8M]
6	a)	Explain the significance of speed time curves? And give its merits.	[8M]
	b)	A train weighting 200 tonnes is to be driven up an incline of 1.8 percent at a speed of 30 Km/h. If the train resistance at this speed is 1.6 kg per tonne, find the current required at 1400 V dc if the efficiency of the motors and gearing is 88 percent. If the current were cut off, how long would the train take to come to rest?	[8M]
7	a)	Explain and derive the necessary relation for the Total Tractive effort for the propulsion of the train.	[8M]
	b)	How does the value of acceleration and retardation affect the specific energy consumption for a given run at a given schedule speed.	[8M]

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Code No: RT32023 **R13** SET - 2

III B. Tech II Semester Regular/Supplementary Examinations, April -2018

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	List the disadvantages of Group drives.	[3M]
	b)	Distinguish between Core type furnace and Coreless induction furnace.	[4M]
	c)	Explain why very high frequencies should not be used for dielectric heating.	[4M]
	d)	Distinguish between the terms plane angle and solid angle with respect to illumination.	[4M]
	e)	Explain the terms adhesive weight and train resistance.	[4M]
	f)	List the merits and demerits of Electric drive.	[3M]

PART -B

2	a)	State and explain the different factors that affect the selection of a motor for Industrial applications.	[8M]
	b)	A 3 – phase, 415 V, 35 H.P., 600 rpm squirrel cage induction motor has a full load efficiency of 0.80 and power factor of 0.88. The motor takes a short circuit current at 160 A at 0.26 lag power factor. The full load slip is 5%. Determine the minimum starting current drawn from the supply if the starting torque required is at least half the full load torque and it is started by i) auto transformer; ii) a series resistance in the stator circuit. Determine the value of the tapping on the transformer and the magnitude of the resistance to be added to each phase.	[8M]
3	a)	Explain the different methods of Electric heating and give an example of each type.	[8M]
	b)	Explain the basic principle of Induction heating along with the characteristics and its applications in Industry.	[8M]
4		Explain the following terms w.r.t illumination Engineering: i) Candle Power ii) Brightness or luminance iii) illumination iv) Luminous intensity	[16M]
5	a)	Explain the process of measuring M.S.C.P. by integrating sphere.	[8M]
	b)	An incandescent lamp has a filament of 0.05cm diameter and 100 cm length. It is required to make another lamp of similar type to work at double the supply voltage and give half the candle power. Assuming that the new lamp operates at the same brilliancy, determine the suitable dimensions of the filament.	[8M]
6	a)	Explain the following terms: i)Crest speed ii) coasting iii)Schedule speed iv)Average speed	[8M]
	b)	A 750 tonne goods train is to be hauled by a locomotive up a gradient of 3% with an acceleration of 2.0 km/h/s. Coefficient of adhesion is 15 %, track resistance 60N/tone and effecting rotating masses15 % of dead weight. Find the weight of the locomotive and number of axles if the axle load is not to exceed 20 tonnes.	[8M]
7	a)	Explain the significance of Energy star rating for electrical motors	[8M]
	b)	What is Specific energy consumption and list the factors that affect it.	[8M]

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Code No: RT32023 **R13** SET - 3

III B. Tech II Semester Regular/Supplementary Examinations, April -2018

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	What is an Electric Drive and give its uses.	[3M]
	b)	Distinguish between direct arc furnace and indirect arc furnace.	[4M]
	c)	What are the different types of Lighting schemes?	[4M]
	d)	Compare between Fluorescent tube and filament lamp.	[4M]
	e)	Explain significance of the term coefficient of adhesion.	[3M]
	f)	Distinguish between adhesive weight and total weight of an electric train.	[4M]

PART -B

2	a)	Distinguish between a Group drive and Individual drive.	[8M]
	b)	Derive an expression for temperature rise of an electrical machine. State the assumptions made.	[8M]
3	a)	Explain the reasons for considering the electric heating as superior compared to other types of heating.	[8M]
	b)	A three phase arc furnace has to melt 10 tons of steel in 2 hours. Determine the average KW input to the furnace if its overall efficiency is 50%. If the current input is 8000A with the above KW input and the resistance and reactance of the furnace are 0.003 ohm and 0.006 ohm respectively, determine the arc voltage and the total KVA taken from the supply. Assume latent heat of steel as 0.12, latent heat of fusion of steel as 8.89 K Cal/Kg, melting point of steel as 1371 ^{0}C and ambient temperature as 20 ^{0}C.	[8M]
4		Explain in detail about the following with respect to Welding: i) Spot welding ii) Seam welding iii) Butt welding iv) projection welding	[16M]
5	a)	State and explain different laws of illumination.	[8M]
	b)	A lamp with reflector is mounted 13 m above the centre of a circular area of 26 m diameter. If the combination of the lamp and reflector gives a uniform C.P. of 1200 over the circular area, determine the maximum and minimum illumination produced on the area.	[8M]
6	a)	Compare between D.C. and A.C. systems of railway electrification from the point of view of main line and suburban line railway service.	[8M]
	b)	An electric train has an average speed of 44 Km/h on a level track between stops 1,200 m apart. It is accelerated at 1.75 Km/h/s and it is braked at 3.2 Km/h/s. Estimate the energy consumption at the axle of the train per tone – km. Take tractive resistance constant at 65 N per tonne and allow 12 % for rotational inertia.	[8M]
7	a)	Derive the expression for specific energy output from the driving axles using a simplified speed time curve Assume the necessary initial conditions.	[10M]
	b)	Explain how come energy efficient motors are different from normal motors	[6M]

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Code No: RT32023 **R13** SET - 4

III B. Tech II Semester Regular/Supplementary Examinations, April -2018

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What is meant by load equalization? Explain how this is achieved in electrical industry.	[4M]
	b)	Distinguish between Power frequency method heating and High frequency heating.	[4M]
	c)	Explain the term Mean spherical candle power w.r.t illumination.	[3M]
	d)	A 220 V lamp has a total flux of 1660 lumens and takes a current of 0.44A. Calculate: i) lumens per watt and ii) M.S.C.P. per watt.	[4M]
	e)	What are the different factors that affect the Scheduled speed?	[4M]
	f)	How the train resistance does play its part in the mechanics of train motion?	[3M]

PART -B

2	a)	List the advantages of Electric drive and explain the different categories or classification of Electric drive.	[8M]
	b)	Explain the terms “Heating time constant” and “Cooling time constant” and also explain why cooling time constant is usually greater than heating time constant.	[8M]
3	a)	List the different properties that are required for a good heating material.	[8M]
	b)	A 30 KW single phase, 220 V resistance oven employees circular nichrome wire for its heating element. If the wire temperature is not to exceed 1120^0C and the temperature of the charge is to be 430^0C, calculate the size and length of wire required. Assume e = 0.9 and radiation efficiency K = 0.6. What would be the temperature of wire when the charge is cold (25^0C)?	[8M]
4	a)	Derive the relationship between the plane angle and Solid angle.	[8M]
	b)	A small area of 5 meters in diameter is to be illuminated by a lamp suspended at a height of 4 meters over the centre of area. A lamp having an efficiency of 28 lumens per watt is fitted with a reflector which directs the light output only over the surface to be illuminated. If the utilization coefficient is 0.66 and illumination 850 lux, determine the wattage of the lamp.	[8M]
5	a)	What are polar curves, explain the construction aspect and what do you attain from them.	[8M]
	b)	Explain the working of Fluorescent tube and how the effect of stroboscopic effect can be minimized in this type of lamp.	[8M]
6	a)	List and explain the various requirements of an ideal traction system.	[8M]
	b)	An electric train has a maximum speed of 80 Km/h. The schedule speed including a station stop of 30 seconds is 45 Km/h. If the acceleration is 2.0 Km/h/s, Find the value of retardation when the average distance between stops is 8.6 Km.	[8M]
7		Write short notes on the following : i) Lux meter ii) Energy efficient motors	[16M]

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Code No: RT32023 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, April/May - 2019

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What is mean by Load Equalization and how it is accomplished?	[3M]
	b)	What is electric heating? What are the advantages over other methods of heating?	[4M]
	c)	Explain the laws of illumination?	[3M]
	d)	Why CFL and LED lamps are becoming more popular now-a-days? Explain technically?	[4M]
	e)	State the merits and demerits of electric traction	[4M]
	f)	What are the factors which affects the specific energy consumption in electric trains?	[4M]

PART -B

2	a)	What is mean by “Individual drive” and “Group drive” explains their relative merits and demerits?	[8M]
	b)	Through AC is superior to DC for electric drives, sometimes DC is preferred. Give the reasons and mention some of the applications.	[8M]
3	a)	Explain in brief how heating is done in the following cases: i) Resistance heating, ii) Induction heating iii) Dielectric heating.	[8M]
	b)	What are the types of electrodes used for welding operation? Give the advantages of coated electrodes.	[8M]
4	a)	Define and explain the terms illumination and illumination intensity in detail?	[8M]
	b)	Two lamps one 200cp and another 500cp are hung at a height of 10m and 25m respectively. The horizontal distance between poles is 80m determine the illumination at the midpoint between the poles and the ground.	[8M]
5	a)	Discuss the construction and principle of operation and applications of i) Filament Lamp ii) Sodium vapour lamp.	[8M]
	b)	A 100 candle power lamp is hung 2m above the centre of a circular area of 3m diameter. Determine the illumination at i) The centre of the area ii) A point on the circumference of the area iii) Average illumination. Find also the average illumination of a reflector of 50% efficiency is used.	[8M]
6	a)	What is the effect of changing wheel diameter and gear ratio on the characteristics of a motor?	[8M]
	b)	A train has schedule speed of 30 kmph over a level track distance between the stations being 1 km. Station stopping speed time is 20 sec. Assuming breaking retardation of 3 kmphps and maximum speed 25% greater than average speed, calculate acceleration required to run the service if the speed time curve is approximated by a trapezoidal curve.	[8M]

7 a) Derive the expressions for the tractive effort exerted by road wheel in terms of wheel diameter, motor torque, gear ratio and efficiency of transmission of power through gears. [8M]

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 0.8 kmphps up a gradient of 1 in 100.Estimate the adhesive weight and hence the number of diving axles the locomotive must have if the permissible axle loading is 20 tonnes per axle assuming rotational inertia to be 4% for the coaches and 15% for the locomotive. Maximum coefficient of adhesion is 0.2 and the tractive resistance is 5 kg/tonne. [8M]

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Code No: RT32023 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, November/December-2016

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Maximum Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Explain various characteristics to be considered for selection of electric drive.	[4M]
	b)	Explain about dielectric heating.	[4M]
	c)	List out the properties of heating element.	[4M]
	d)	What is the difference between plastic welding &fusion welding?	[3M]
	e)	Define (i) waste light factor (ii) depreciation factor (iii) coefficient of utilization.	[3M]
	f)	Define (i) Average speed, (ii) crest speed, (iii) scheduled speed.	[4M]

PART -B

2	a)	Explain in detail the general consideration in selecting motor power ratings.	[8M]
	b)	A motor fitted with a fly wheel that supplies a load of torque 500m for 33 sec. during no load period the fly wheel regains its original speed. The motor torque is required to be limited to 400n-m. The no load speed of the motor is 800 rpm and its full load slip is 10% determine the moment of inertia of the fly wheel.	[8M]
3	a)	Explain the principal of dielectric heating also write advantages and its applications.	[8M]
	b)	Explain in detail about resistance and arc welding.	[8M]
4	a)	State and explain laws of illumination.	[4M]
	b)	Define i) candle power ii) luminous intensity iii) illumination iv) luminous efficiency.	[4M]
	c)	Two similar lamps having uniform intensity of 500 candle power in all directions below the horizontal are mounted at a height of 4 meters. What must be the maximum spacing between the lamps so that the illumination on the ground midway between the lamps shall be at least one half the illuminations directly under the lamps?	[8M]
5	a)	Describe the construction and working principal of (i) sodium vapour lamp (ii) mercury vapour lamp.	[10M]
	b)	A hall measuring 20mx50m is to be illuminated by suitable lamps to give an average illumination of 45 lux. The following data may be used : Mounting height from the working plane =3m Utilisation factor =0.65 Depreciation factor =1.3 The lamps are to be chosen from the following groups: Rating in watts 75 100 150 200 Total lumens 800 1,200 2,000 2,800 Calculate the number of lamps of each type.	[6M]

6 a) From the simplified speed- time curve, determine the maximum speed, when the actual time of run, values of acceleration, retardation and the distance between stops are given. [5M]

b) An electric train is to have acceleration and breaking retardation of 0.8 Km/h/s and 3.2 Km/h/s respectively. If the ratio of maximum to average speed is 1.3 and time for stops 26 seconds, find schedule speed for a run of 1.5 km. Assume simplified trapezoidal speed-time curve. [8M]

c) List out the factors effecting scheduled speed. [3M]

7 a) Derives the expression for the tractive effort for train on a level track. [4M]

b) Define(i) dead weight (ii) accelerating weight (iii) adhesive weight. [8M]

c) 400 tonne goods train is to be hauled by a locomotive up a gradient of 2% with an acceleration of 1 km/h/s, coefficient of adhesion is 20%, track resistance 40N/tonnes and effective rotating masses 10% of the dead weight. Find the weight of locomotive and the number of axis, if the axle load is not to increase beyond 22 tones. [4M]

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Code No: RT32023 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, November - 2017
UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A**is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	List the advantages and disadvantages of electric drive over other drives.	[4M]
	b)	Give some applications of induction heating.	[4M]
	c)	Define Illumination?	[3M]
	d)	What are the advantages of coiled coil filament gas filled lamp?	[4M]
	e)	What are the disadvantages of diesel electric traction?	[4M]
	f)	Define Dead weight, Accelerating weight, Adhesive weight.	[3M]

PART -B

2	a)	Discuss the terms ‘continuous’, ‘intermittent’ and ‘variable’ loads with examples.	[4M]
	b)	What is meant by load equalization? Derive the expression for instantaneous motor torque, M.O.I of the fly wheel and the motor slip. State any assumptions made.	[8M]
	c)	DC compound motor is selected for the operation of a lift. The operating cycle is repeated continuously throughout the day. Load going up for 1 minute: 7.5hp, loading period at the top 2 minutes: 5hp, load going down 1 minute: 60 hp, loading period at the bottom 3 minutes: 5hp. Select the smallest size of the motor suitable for the above load cycle	[4M]
3	a)	Describe with neat sketches various methods of electric resistance welding. Give its merits and demerits with respect to arc welding.	[3M]
	b)	With a neat sketch explain the working principle of core type and coreless type induction furnace.	[8M]
	c)	A slab of insulating material 150 cm2 in area and 1cm thick is to be heated by dielectric heating. The power required is 400 W at 30 MHz. Material has relative permittivity of 5 and p.f. of 0.05. Absolute permittivity is 8.854×10-12 F/m. Determine the necessary voltage.	[5M]
4	a)	Discuss inverse square law & cosine law of Illumination.	[8M]
	b)	Explain how will you measure the candle power of a source of light?	[8M]

5 a) Explain the construction and working of a mercury vapor lamp. [8M]

b) A hall 30 m long and 15 m wide with a ceiling height of 5 metres is to be provided with a general illumination of 120 lumens/m2. Taking a coefficient of utilization of 0.5 and depreciation factor of 1.42, determine the number of fluorescent tubes required, their spacing, mounting height and total wattage. Taking luminous efficiency of florescent tube as 40 lumens/watt for 80 w tube [8M]

6 a) Discuss the main features of various train services. What type of train services corresponds to trapezoidal and quadrilateral speed time curves? [8M]

b) A train has a schedule speed of 40 kmph between two stops which are 4 km apart. Determine the crest speed over the run if duration of stops is 60 sec and acceleration and retardation are both equal to 2 kmphps. Assume trapezoidal speed time curve. [4M]

c) Discuss why a D.C series motor is ideally suited for traction services. [4M]

7 a) Show that if the speed-time curves are similar, Specific Energy Consumption are equal. [8M]

b) An electric train has an average speed of 42 km/h on a level track between stops 1.4 km apart. It is accelerated at 1.7 km/h/s and is braked at 3.3 km/h/s. Assuming tractive resistance as 50 N/t. allowing 10% for rotational inertia, and efficiency to motors 85%. Estimate the specific energy consumption. [8M]

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Code No: RT32023 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, November - 2018

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	List out types of electric drives with brief explanation of each.	[3M]
	b)	List out modes of transfer of heat with relevant expressions.	[4M]
	c)	Explain the terms MSCP and MHCP	[4M]
	d)	List out the drawbacks of metal filament lamps.	[4M]
	e)	Explain the term Specific Energy Consumption	[4M]
	f)	Define percentage gradient in railways, and what for it is used.	[3M]

PART -B

2	a)	Explain about the different speed torque characteristics of different machines and give their utility in selection for Industrial loads.	[8M]
	b)	List out and explain various speed control methods of 3-phase Induction motors.	[8M]
3	a)	Discuss about the properties of heating elements. Explain about any two types of induction furnaces.	[6M]
	b)	Explain about metal arc welding, submerged arc welding methods with necessary illustrations.	[6M]
	c)	Compare DC and AC welding sets.	[4M]
4	a)	Explain about the following factors used in illumination i. Space-height ratio ii. Utilization factor iii. Maintenance factor iv. Depreciation factor	[8M]
	b)	Explain the procedure to determine the mean spherical candle power from the vertical polar curve.	[8M]
5	a)	State stroboscopic effect. Explain the working of fluorescent tube with neat connection diagram incorporating glow type starter.	[8M]
	b)	Discuss the different interior lighting schemes for controlling distribution of the light emitted by lamps.	[8M]
6	a)	Explain about the following vehicles w.r.t electric traction i) Tramways ii) Trolley buses iii) Diesel traction	[6M]
	b)	Demonstrate the procedure to study the performance of a service at different schedule speeds using simple geometric shaped curves with necessary derivation.	[10M]
7	a)	Deduce the necessary expression to calculate total tractive effort required to run a train on track.	[10M]
	b)	List out and explain the principles of energy efficient motors.	[6M]

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Code No: RT32023 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, November- 2019

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A (22 Marks)

1	a)	List out types of electric loads based on torque.	[3M]
	b)	List out various welding processes used in general engineering.	[4M]
	c)	Define Lux, Lumen, and Luminous intensity.	[4M]
	d)	List out the important features of a fluorescent lamp.	[4M]
	e)	List out advantages and disadvantages of electric drives used in traction.	[4M]
	f)	Define the terms: Dead weight, Adhesive weight and Accelerating weight.	[3M]

PART –B (48 Marks)

2	a)	Write the necessity of starting equipment for a motor. Explain about various starting characteristics of DC motors and Induction motors.	[8M]
	b)	Deduce the necessary expression for the temperature rise of an electric machine.	[8M]
3	a)	List out the advantages and explain about the applications of dielectric heating.	[6M]
	b)	Discuss about the criteria to select frequency for heating processes.	[4M]
	c)	Explain about seam welding and projection welding methods.	[6M]
4	a)	Show that the amount of light falls on an area is inversely proportional to the square of the distance from source. And also explain about Lambert's cosine law.	[8M]
	b)	Classify and explain about the sources of light based on principle of operation.	[8M]
5	a)	Distinguish the tungsten filament and fluorescent tubes.	[6M]
	b)	Explain the step by step procedure to calculate the amount of flood lighting.	[6M]
	c)	Explain the working principle of LED lighting.	[4M]
6	a)	Define coefficient of adhesion as the ratio of tractive effort and derive the necessary expression with related illustrations.	[6M]
	b)	Explain the reasons for having greater coefficient of adhesion in electric traction when compared to steam traction.	[4M]
	c)	An electric train scheduled at a speed of 55 kmph (including a station stop of 40 sec) has a maximum speed of 80 kmph. If the train accelerates at 2.0 kmph/sec, determine the value of retardation when the distance between stops is 5 km.	[6M]
7	a)	Explain about the factors affecting energy consumption in propelling the train.	[8M]
	b)	Explain the effect of varying acceleration and braking retardation in traction.	[8M]

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