Code No: RT31015 **R13** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
TRANSPORTATION ENGINEERING – I
(Civil 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 classification of roads	[4M]
	b)	What is the meaning of highway geometric design?	[3M]
	c)	How is the presentation of traffic volume data done?	[4M]
	d)	Write the formula of Group Index and explain the various terms in it	[4M]
	e)	What are the critical load stresses as per Westergaard on a rigid pavement	[3M]
	f)	On what factors does the selection of base and surface course depend upon	[4M]

PART -B

2	a)	Explain about the four most important recommendations made by the Jayakar committee	[8M]
	b)	Write a note on the road patterns	[8M]
3	a)	Explain the elements of highway geometric design	[10M]
	b)	For a highway with design speed of 100kmph, determine the safe OSD (assume acceleration as 0.50 m/s^2, and reaction time =2.0s)	[6M]
4	a)	Write a note on the common methods of on-street parking?	[10M]
	b)	What are the functions of traffic signs?	[6M]
5	a)	What are the desirable properties of soil as a highway material?	[10M]
	b)	During aggregate crushing test on road aggregates, the weight of crushed aggregates retained on 2.36mm sieve is 400g. The original weight of aggregates is 500g. Determine the aggregate crushing value? During Los Angeles abrasion test on similar aggregates, the weight of powdered aggregates passing 1.70mm sieve is 1000g. The original weight of aggregates is 5kg. Determine the abrasion value?	[6M]
6	a)	Elaborate on the factors to be considered when designing pavements	[10M]
	b)	What is the radius of relative stiffness for a 20cm thick slab with E = 3x 10^5 kg/cm^2 and Poisson's ratio = 0.15, resting on a subgrade having modulus of $5kg/cm^3$?	[6M]
7	a)	How is the surface condition of flexible and rigid pavements evaluated? What are the categories of overlay combinations?	[10M]
	b)	On what factors does the selection of the base and surface course of the pavement depend upon?	[6M]

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Code No: RT31015 **R13** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
TRANSPORTATION ENGINEERING – I
(Civil 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 characteristics of an ideal alignment [4M]
b) What are the factors affecting friction or skid resistance [4M]
c) What are the methods of collecting O&D data [4M]
d) List the names of any three tests to be carried on an aggregate sample [3M]
e) What type of stresses are produced in a rigid pavement due to temperature [3M]
f) Differentiate between sheet asphalt and mastic asphalt [4M]

PART -B

2 a) Explain about the five main objectives of highway planning [10M]
b) Write the salient features of Nagpur Road Plan [6M]

3 a) Why is it not desirable to provide a very steep cross slope on pavements [8M]
b) Find the minimum sight distance to avoid head-on collision of two cars approaching at 90kmph and 60kmph. Given t=2.5s, f=0.70 and brake efficiency of 50% in either case. [8M]

4 a) Write a note on types of traffic signs? [8M]
b) Explain about types of road markings? [8M]

5 a) Elaborate on the factors on which the strength characteristics of soil depend upon? [8M]
b) In the Marshall method of mix design, the coarse aggregates, fine aggregates, filler and bitumen, having respective specific gravities of 2.62, 2.72, 2.70 and 1.02, are mixed in the ratio of 55, 34.6, 4.8 and 5.6 percent, respectively. The volume of one Marshall mould is 475cc and its weight is 1100g. Assuming absorption of bitumen by aggregates is zero; determine the percentage voids in mineral aggregates. [8M]

6 a) Write a note on the functions of various components of a pavement and their methods of evaluation [10M]
b) A subgrade soil sample was tested using standard CBR apparatus and the observations are given below. [6M]

Load (kg)	Penetration (mm)
60.5	2.5
80.5	5.0

Assuming that the load-penetration curve is convex throughout, what is the CBR value of the sample?

7 a) Explain about the various steps for the construction of an earthen road? [8M]
b) Explain about the maintenance works of bitumen surfacing? [8M]

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Code No: RT31015 **R13** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
TRANSPORTATION ENGINEERING – I
(Civil 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**
Please provide graph sheets to the candidates

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PART –A

1 a) What are the factors affecting the highway alignment [4M]
b) Mention different types of kerbs [3M]
c) What are Condition Diagram and Collision Diagrams [4M]
d) What are the desirable properties of bitumen [4M]
e) Write the formula to determine the cumulative standard axles for design of a flexible pavement, and explain the terms in the formula [3M]
f) What are the two basic reasons to which failure of a flexible pavement subgrade may be attributed to [4M]

PART -B

2 a) The Nagpur Road Plan classified roads in India based on location and function. Into how many categories were the road classified and elaborate on any two categories. [6M]
b) Explain about the basic requirements of an ideal alignment [10M]

3 a) Write a note on the important surface characteristics of the pavement. [10M]
b) Calculate the SSD for V =50kmph for (**a**) two-way traffic on a two lane road (**b**) Two-way traffic on single lane road. Assume reaction time =2s. [6M]

4 a) What are the advantages of traffic signals? [6M]
b) A pre-timed four phase signal has normal flow rates for the first three phases as 200, 187 and 210 veh/hr with saturation flow rates of 1800 veh/hr/lane for all phases. The lost time is given as 4 seconds for each phase. If the cycle length is 60 seconds. Using Webster's method, determine the effective green time of 4^{th} phase? [10M]

5 a) Briefly explain about the laboratory CBR test [10M]
b) The load penetration data from a California Bearing Ratio (CBR) test is provided in the following table. Indicate whether any correction is required for the calculated CBR value. Find the CBR value of the soil from the data provided. [6M]

Penetration (mm)	0	0.5	1.0	1.5	2.0	2.5
Load in (kgf)	0	4	13	29	40	50
Penetration (mm)	3.0	4.0	5.0	7.5	10	12.5
Load in (kgf)	58	70	78	93	103	112

Area of the plunger is 19.60cm^2.
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6 a) Elaborate on the various approaches of flexible pavement design [10M]

b) Calculate the spacing between contraction joints for a two lane 250mm thick concrete road having 3.5m wide slab. Unit weight of concrete = 24kN/m^3. Ultimate stress in tension = 0.16MPa. Coefficients of friction at interface = 1.5, and the factor of safety = 2. Also calculate the spacing between expansion joints, if the increase in temperature is 20^0C, the expansion joint gap is 24mm and the thermal coefficient = 10 x 10^{-6} per ^{0}C. [6M]

7 a) Explain the construction procedure of an water bound macadam road [8M]

b) Explain about typical flexible pavement failures? [8M]

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Code No: RT31015 **R13** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
TRANSPORTATION ENGINEERING – I
(Civil 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) Write the important highlights of highway development in India. [4M]
b) Define off-tracking and write the formula for extra widening and write the meanings of the terms in the formula. [3M]
c) List the types of Intersections. [3M]
d) Define the terms modulus of Subgrade Reaction and California Bearing Ratio . [4M]
e) What are the functions of the various layers of a flexible pavement? [4M]
f) The various methods of pavement evaluation are broadly classified into two groups. What are they? [4M]

PART -B

2 a) Planning surveys consist of four studies. What are they? Explain about any one study [6M]
b) List the various factors which control the highway alignment. Explain about any two of them [10M]

3 a) What are the reasons for providing a median? What are the types of traffic separators [8M]
b) A vehicle moving at 65kmph on an ascending gradient of a highway has to come to stop position to avoid collision with a stationary object. The ratio of lag to brake distance is 6:5. Considering total reaction time of the driver as 2.5 seconds and the coefficient of longitudinal friction as 0.35, determine the value of ascending gradient. [8M]

4 a) With neat diagrams explain about condition and collision diagrams? [8M]
b) A roundabout is provided with an average entry width of 8.4m, width of weaving section is 14m, and length of the weaving section between channelizing islands as 35m. the crossing traffic and total traffic on the weaving section are 1000 PCU per hour and 2000 PCU per hour respectively. Determine the practical capacity of the roundabout? [8M]

5 a) Briefly explain the Los Angeles abrasion test procedure [10M]
b) In the Marshall method of mix design, the coarse aggregates, fine aggregates, filler and bitumen, having respective specific gravities of 2.62, 2.72, 2.70 and 1.02, are mixed in the ratio of 55, 34.6, 4.8 and 5.6 percent, respectively. What is the theoretical specific gravity of the mix [6M]
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6 a) Write a note on radius of relative stiffness, equivalent radius of resisting section and Westergaard's concept of temperature stresses in concrete pavement. [10M]

b) For a 25cm thick cement concrete pavement, analysis of stresses gives the following values : [6M]

Wheel load stress due to comer loading = 30 kg/cm^2
Wheel load stress due to edge loading = 32 kg/cm^2
Warping stress at corner region during summer = 9 kg/cm^2
Warping stress at corner region during winter = 7 kg/cm^2
Warping stress at edge region during summer = 8 kg/cm^2
Warping stress at edge region during winter = 6 kg/cm^2
Frictional stress during summer = 5 kg/cm^2
Frictional stress during winter = 4 kg/cm^2
What is the most critical stress value for this pavement?

7 a) Write notes on prime coat, tack coat, seal coat and the main functions of a seal coat? [8M]

b) What are the general causes of pavement failures? [8M]

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Code No: RT31025 **R13** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October- 2016
POWER ELECTRONICS
(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 conditions under which a transistor operates as a switch? [3M]
b) List the applications of phase controlled rectifiers. [4M]
c) Explain the effect of freewheeling diode on the performance of phase controlled rectifier. [3M]
d) Define displacement factor, distortion factor, power factor and THD. [4M]
e) Explain the use of TRC for controlling the output voltage in choppers. [4M]
f) Explain the principle of operation of an inverter. [4M]

PART -B

2 a) Briefly explain the V-I characteristics of an IGBT. [8M]
b) Explain the dynamic characteristics of SCR. [8M]

3 a) Discuss the principle of phase control in single-phase full-wave ac voltage controller. Derive the expression for the rms value of its output voltage. [8M]
b) A single phase full wave ac voltage controller controls load power. The input is 230 V, 50 Hz. The load circuit consists of R= 3 Ω and ω_L = 4Ω.Determine [8M]
(i) The control range of firing angle
(ii) Maximum value of RMS load current
(iii) Maximum power
(iv) Power factor

4 Discuss the effect of source-inductance on the performance of a single phase fully controlled converter, indicating clearly the conduction of various thyristors during one cycle. Derive an expression for its output voltage in terms of V_m, α and μ [16M]

5 a) Sketch output wave form for a 3-phase semi converter for a firing angle delay of 75^0. Indicate the conduction of various elements and discuss whether freewheeling diode comes in to place on the assumption of continuous load current. Hence obtain an expression for an average output voltage. [8M]
b) A 3-Phase full convertor is connected to a RLE load. The source voltage is 3-phase, 230V, 50 Hz and the load current is 10A. For R=0.5Ω and L=2H, determine (**a**) firing angle for *E* = 134V and (**b**) firing angle advance for *E* = -134V. [8M]

6 For a single phase mid-point Cyclo-converter, explain the operation of the circuit when fed to R-load with the help of neat circuit diagram and relevant output waveforms for $\alpha = 30^0$ and $\alpha = 120^0$ for $f_0 = 1/4\ f_s$. [16M]

7 Discuss the principle of working of a three phase bridge inverter with an appropriate circuit diagram .Draw phase and line voltage waveforms on the assumption that, each thyristor conducts for 120^0 and the resistive load is star connected. [16M]

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Code No: RT31025 **R13** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October- 2016
POWER ELECTRONICS
(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) Compare power MOSFETS with BJTs? [3M]
b) Explain briefly any thyristor turn-off method. [4M]
c) Explain the effect of source inductance on the performance of phase controlled rectifier. [3M]
d) List the conditions required for line commutated inverter operation of a three phase fully controlled converter. [4M]
e) What is Cyclo-Converter? List some industrial applications of it. [4M]
f) Define frequency and amplitude modulation? [4M]

PART –B

2 a) Explain the transfer and output characteristics of MOSFETs. [8M]
b) Explain the basic operator of a SCR. [8M]

3 A 1- ϕ ,230V, 50HZ source connected to an anti parallel connected thyristor circuit; controlling power to the following loads, when $\alpha = 90^0$. Calculate output voltage, output current and load power factor for [16M]
(**a**) R=10 OHMS; L=0 H R=10 OHMS; L=60mH.

4 a) Explain the working of single-phase fully controlled bridge converter in the following two modes (**i**) Rectifying mode (**ii**) Inversion mode [10M]
b) A single phase 230 V,1 kW heater is connected across a single phase, 230 V, 50Hz supply through an SCR. For the firing angle of 45^0 and 90^0, find the power absorbed by heater element. [6M]

5 Describe the effect of source inductance on the performance of a 3-phase full converter with the help of phase voltage wave forms. Derive an expression for average output voltage in terms of supply voltage, source inductance load current. [16M]

6 a) Describe the operation of a Boost converter and derive its output voltage equation. [8M]

b) For the ideal type A-chopper circuit, following conditions are given, E_{dc} = 220V, chopping frequency, = 500 Hz, duty cycle δ=0.3 and R = 1 ohm, L= 3 mH and E_b = 23V. Compute the following quantities (i) Average output current (ii) maximum and minimum values of steady state output current [8M]

7 Discuss the principle of working of a three phase bridge inverter with an appropriate circuit diagram. Draw voltage and current waveforms on the assumption that, each thyristor conducts for 180^0 and the resistive load is star connected. [16M]

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Code No: RT31025 **R13** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October- 2016
POWER ELECTRONICS
(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) Define latching and holding currents as applicable to SCR. [3M]
b) Explain with the help of a neat circuit diagram, the use of pulse- transformer in triggering circuits. [4M]
c) Explain the operation of a single phase half –wave converter feeding on R-load. [4M]
d) List the differences between circulating and non- circulating current modes of operation of dual converters. [4M]
e) List the advantages and disadvantages of boost chopper. [3M]
f) What is pulse width modulation? List the various PWM techniques. [4M]

PART -B

2 a) Describe the different modes of operation of a thyristor with the help of its Static I-V characteristics. [9M]
b) Following are the specifications of a thyristor operating from a peak supply of 500 V. Repetitive peak current I_p = 250 A
$(di/dt)_{max}$ = 60A/μs , $(dVa/dt)_{max}$ = 200V/μs .Take a safety factor of 2 for the three specifications mentioned above. Design a suitable Snubber circuit if the min. load resistance is 20 Ω. Take ξ = 0.65 [7M]

3 a) A single phase full wave ac voltage controller feeds a load of R= 20 Ω, with an input voltage of 230 V, 50 Hz. Firing angle for both the thyristors is 45^0.Calculate
(**i**) rms value of output voltage (**ii**) load power and input pf
(**iii**) average and rms current of thyristors [8M]
b) Describe the operation of single phase half-wave converter feeding on RL load with the help of voltage and current waveforms. Also, derive the expressions for the average value of output voltage. [8M]

4 a) A Single Phase semi converter with freewheeling diode across the load is operated from a 120-V,60-Hz supply. The load current with an average value of I_a is continuous with negligible ripple content. If the firing angle is Π/3,Calculate (a) the harmonic factor of input current (ii) displacement factor (iii) the input power factor [10M]
b) A single phase fully controlled bridge converter is supplied at 230V, 50Hz, with source inductance of 2mH. When the converter is operating at a firing angle of 45^0 with ripple free load current of 10A, determine also the load voltage. Neglect resistance voltage drop. [6M]
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5 a) Sketch output wave form for a 3-phase full converter for a firing angle delay of 45^0. Indicate the conduction of various elements and discuss whether freewheeling diode comes in to place on the assumption of continuous load current. Hence obtain an expression for an average output voltage. [8M]

b) A three phase dual converter operating in circulating current mode has the following details. Source voltage is 3-phase 220 V, 60 Hz and the load resistance is R=10Ω.The circulating inductance is 5mH and the delay angles are $\alpha_1 = 60^0$ and $\alpha_2 = 120^0$. Calculate the peak circulating current and peak current of the converters. [8M]

6 a) What is a DC-OC converter? Describe the working of Boost converter with relevant wave forms. Derive the expression for output voltage. [8M]

b) A dc battery is to be charged from a constant dc source of 220 V. The dc battery is to be charged from its internal emf of 90 V to 122 V. The battery has internal resistance of 1Ω.With a constant charging current of 10A compute the range of duty cycle. [8M]

7 a) What is the different pulse width modulation techniques used for inverters? [8M]

b) Explain unipolar switching scheme operation for a PWR inverter? [8M]

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Code No: RT31025 **R13** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, October- 2016
POWER ELECTRONICS
(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) Describe the significance of di/dt and dv/dt in SCRs. [3M]
b) Explain the principle of line commutation. [4M]
c) Explain the effect of battery load on the performance of single phase fully controlled bridge converter. [3M]
d) What are the advantages of 6-pulse converter over 2-pulse converter? [4M]
e) What are the control strategies for the regulation of output voltage in ac voltage controller? [3M]
f) Explain the operation of single-phase inverter. [4M]

PART -B

2 a) For a single phase half wave rectifier feeding a resistive load R, find the values of rectifier efficiency, form factor, voltage ripple factor, transformer utilization factor and crest factor when $\alpha = 0^0$. [10M]
b) Explain briefly different turn on methods used for SCR. [6M]

3 a) Define the term power factor. Derive its expression for single phase voltage controller feeding a resistive load circuit. [7M]
b) A resistive load of 10 Ω is connected through a half-wave SCR circuits to 220v, 50Hz, single- phase source. Calculate the power delivered to load for a firing angle of 60^0.Find also the value of input power factor. [9M]

4 A Single phase full converter delivers a constant load current I_o. Express its source current in Fourier series and derive expressions for the following performance parameters. (**i**) Displacement factor (**ii**) Power factor (**iii**) THD (**iv**) Current distortion factor [16M]

5 a) Explain the operation of a three phase dual converter in the non circulating current mode with the help of relevant waveforms. Derive the expression for the average output voltage. [10M]
b) A three phase fully controlled bridge converter is fed from a 3-phase 400 V, 50Hz mains. For firing angle of 60^0, output current is 25 A and output voltage is 250 V. Calculate the load resistance, source inductance and angle of overlap. [6M]
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6 a) Discuss the working of a single phase bridge type cyclo converter with RL load for continuous conduction operation with relevant output waveforms and circuit diagram for $f_0 = (1/4) f_s$. [8M]

b) Explain the principle of operation of a Back- Boost converter. [8M]

7 a) Explain the working of a single-phase half bridge inverter. Discuss how the output power in single-phase full bridge inverter becomes four times the power handled by a single phase half-bridge inverter. [8M]

b) Describe briefly and compare the various methods employed for the control of output voltage of inverters. [8M]

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Code No: RT31035

R13

SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
THERMAL ENGINEERING – II
(Mechanical 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**
(Use of steam tables and Mollier chart is allowed)

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PART –A

1	a)	Define Heating value for a fuel	[3M]
	b)	What are the major differences between mountings and accessories? Give three examples of each.	[4M]
	c)	What are the effects of friction on the flow through a steam nozzle? Explain with the help of $h-s$ diagram.	[4M]
	d)	What are the sources of air leakages into a condenser? Briefly state the effects of air leakage on the performance of a condenser.	[4M]
	e)	Inter-cooling does not improve the thermal efficiency of the plant always. Mention the reasons and explain when it is preferable.	[4M]
	f)	Give the fundamental differences between jet propulsion and rocket propulsion.	[3M]

PART –B

2	a)	Discuss the advantages of reheating the steam in high pressure steam plants.	[6M]
	b)	In a single regenerative heater system, the steam is supplied to the turbine at a rate of 68000 kg/hr and 15420 kg of steam is blowed per hour at 10 bar and the remaining is passed to the condenser. Determine the enthalpy of steam at entry of regenerative heater and entry condition at the entry of the condenser.	[10M]
3	a)	What do you understand by feed check valve? Explain the working of a feed check valve with a neat sketch.	[8M]
	b)	A chimney of 24 m height is used to produce a natural draught when flue gas temperature is 300^{o}C and ambient temperature is 25^{o}C. The air supplied is 20 kg/kg of fuel burned. Find (i) theoretical draught produced in mm of water (ii) velocity of the hot gases passing through the chimney if 50% of theoretical draught is lost in friction.	[8M]
4	a)	Steam at 15 bar and 300^{o}C expanded in a nozzle till its pressure falls to 1 bar. If the 12% of isentropic heat drop is lost in friction; find out the mass of steam passing through the nozzle of exit diameter = 1.5 cm. Neglect initial velocity of the steam.	[7M]
	b)	The following data relate to a compound impulse turbine having two rows of moving blades and one row of fixed blades in between them. Steam velocity coming out of nozzle = 450 m/sec., Nozzle angle = 15^{o} , Moving blades tipdischarge angles = 30^{o}, Fixed blade discharge angle = 20^{o} , Friction loss in each blade rows = 10% of the relative velocity. Find the blade velocity, blade efficiency and specific steam consumption for the turbine.	[9M]

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5 a) Describe with neat sketches the different forms of a surface condenser used in steam power plants. List the factors which are responsible for the loss of efficiency in a surface condenser. [7M]

b) 300 kg/min of steam (2 bar, 0.98 dry) flows through a given stage of reaction turbine. The exit angle of fixed blades as well as moving blades is 20^0 and 3.68 kW of power is developed. If the rotor speed is 360 rpm and the tip leakage is 5 percent, calculate the mean drum diameter and the blade height. The axial flow velocity is 0.8 times the blade velocity. [9M]

6 a) Explain the effect of regeneration, inter cooling, and reheating on the performance of Gas turbine plant. [7M]

b) In an open cycle constant pressure gas turbine, air enters the compressor at 1 bar and 300 K. The pressure of air after the compression is 4 bar. The isentropic efficiencies of compressor and turbine are 78% and 85% respectively. The air-fuel ratio is 80: 1. Calculate the power developed and thermal efficiency of the cycle if the flow rate of air is 2.5 kg / sec. Take C_p = 1.005 kJ / kg-K ;γ = 1.4 for air and C_p = 1.14 kJ / kg-K ; γ = 1.33 for gases. R = 0.287 kJ/kg-K. Calorific Value of fuel = 42,000 kJ/kg. [9M]

7 A simple-turbojet unit operates with a turbine inlet temperature of 1100 K, a pressure ratio is 4:1 and air mass flow of 22.7 kg/sec under design conditions. The flowing component efficiencies may be assumed: [16M]

Isentropic compressor efficiency … 0.85
Isentropic turbine efficiency … 0.90
Propelling nozzle efficiency … 0.95
Transmission efficiency … 0.99
Combustion Chamber pressure loss … 0.21 bar

Calculate the design thrust and specific fuel consumption when the unit is stationary at sea-level where the ambient conditions may be taken as 1.013 bar and 288 K.

C_{pa} = 1.0035, γ_{air}= 1.4
C_{pg} = 1.147, γ_{gas}= 1.33
Lower Calorific value of the fuel = 43125 kJ / kg-K.

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Code No: RT31035 **R13** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
THERMAL ENGINEERING – II
(Mechanical 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**
(Use of steam tables and Mollier chart is allowed)

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PART –A

1 a) Explain the differences between Enthalpy of Combustion and Enthalpy of Reaction? [4M]
b) Discuss the merits and demerits of forced draught over natural draught. [4M]
c) What do you understand by the term "Critical Pressure" as applied to steam nozzles? [3M]
d) Define the term "vacuum efficiency" as applied to a condenser. [4M]
e) Reheating always improves specific work output but may not improve thermal efficiency of the plant. Discuss. [4M]
f) What do you understand by Thrust Augmentation? [3M]

PART -B

2 a) Discuss briefly the advantages of a regenerative feed heating in steam power cycle. [6M]
b) Steam at 50 bar and having an enthalpy of 3100 kJ/kg is supplied to a turbine and comes out at 0.10 bar and enthalpy of 2100 kJ/kg. A feed heating is done by extracting the steam at 3.2 bar with an enthalpy of 2500 kJ/kg. The condensate from condenser with an enthalpy of 125 kJ/kg is fed into the feed heater of direct mixing type. The quantity of bled steam is 11200 kg/hr. Find the power developed by the turbine. Neglect pump work. [10M]

3 a) What are the advantages of preheating the air? Draw a neat diagram of tubular air-preheater and explain its working. [7M]
b) A chimney of 16 m high is used for discharging maximum exhaust gases. (i) Find the draught produced by the chimney in mm of water. (ii) If the maximum temperature of the gases available is 350^{o}C, find the mass of air supplied per kg of fuel if the discharge mass is maximum. The atmospheric temperature = 20^{o}C. [9M]

4 a) Dry-saturated steam at 11 bar is passed through a convergent-divergent nozzle and exit pressure is 2 bar. If the flow is isentropic, find exit velocity of the steam and ratio of cross-section at exit to throat. Take index of isentropic expansion of steam = 1.135. [8M]
b) In a single stage impulse turbine the blade angles are equal and the nozzle angle is 20^{o}C. The velocity coefficient for the blade is 0.83. Find the maximum blade efficiency possible. If the actual blade efficiency is 90% of maximum blade efficiency, find the possible ratio of blade speed to steam speed. [8M]
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5 a) Derive the theoretical formula for finding the minimum quantity of cooling water required to be circulated through the condenser per minute. [7M]

b) 250 kg/min of steam (3 bar, 0.97 dry) flows through a given stage of reaction turbine. The exit angle of fixed blades as well as moving blades is 20^0 and 3. 76 kW of power is developed. If the rotor speed is 380 rpm and the tip leakage is 5 percent, calculate the mean drum diameter and the blade height. The axial flow velocity is 0.8 times the blade velocity. [9M]

6 a) The thermodynamic efficiency of a simple gas turbine decreases with decreasing load. Discuss. What different arrangements are used to improve the part load efficiency of the plant? [6M]

b) Air enters at 1 bar and 15^oC into the compressor of a constant pressure open cycle gas turbine plant and leaves the compressor at 6 bar. Using the following data: Temperature of the gases entering the turbine = 700^oC, Pressure loss in the combustion chamber = 0.1 bar, compressor efficiency, η_c = 80%, turbine efficiency, η_t = 80%; combustion efficiency,η_{com} = 90%, Take γ = 1.4 and C_p = 1 kJ/kg-K for air and gases.Find (**i**) the quantity of air circulation in the system if the plant develops 940 kW, (**ii**) Heat supplied per kg of air circulation and (**iii**) The thermal efficiency of the cycle.Neglect the mass of fuel. [10M]

7 A turbojet engine inducts 45 kg of air per second and propels an aircraft with a uniform flight speed of 880 km /h. The isentropic enthalpy change for nozzle is 188.37 kJ / kg and its velocity co-efficient is 0.96. The fuel-air ratio is 0.012, the combustion efficiency is 0.95 and the lower heating value of the fuel is 44,000 kJ/kg. Calculate: (**i**) The thermal efficiency of the engine, (**ii**) the fuel-flow-rate in kg/h and Thrust Specific Fuel Consumption(TSFC) (**iii**) The propulsion power in kW, (**iv**) the thrust power, (**v**) the propulsive efficiency and (**vi**) the overall efficiency. [16M]

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Code No: RT31035 **R13** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
THERMAL ENGINEERING – II
(Mechanical 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**
(Use of steam tables and Mollier chart is allowed)

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PART –A

1 a) Discuss the factors on which adiabatic flame temperature depends? [4M]
b) List the merits of mechanical draught over natural draught. [4M]
c) Explain the effects of supersaturated expansion upon the discharge of nozzle as compared with expansion in thermal equilibrium. [4M]
d) State the usual sources of inefficiency in condensers in which a high vacuum is required at the exhaust end of a steam turbine. [3M]
e) What are the basic requirements of a combustion chamber used in Gas Turbine Plant? [4M]
f) List out the factors which are to be considered for the comparison of different types of rockets? [3M]

PART –B

2 a) Draw $T-s$ diagram of Rankine cycle using dry-saturated steam and develop the equation for the Rankine cycle efficiency. [6M]
b) In a two stage regeneration system, steam at 26 bar and 400^{o}C is supplied at a rate of 127 x 10^{3} kg/hr. The extractions are 10400 kg/hr at 2.9 bar and 8700 kg/hr at 0.6 bar. The condenser pressure is 5 cm of Hg. Actual feed water temperature is 125^{o}C. Find out the percentages of extracted steam at both points and thermal efficiency of the system. The power output from the plant is 25 MW. [10M]

3 a) What is the purpose of a fusible plug? Explain its working. Indicate its usual location for Cochran, Lancashire, Locomotive and Babcock and Wilcox boilers. [7M]
b) A chimney of 32 m height has produced a draught of 1.6 cm of water when hot gas temperature is 300^{o}C and ambient temperature is 27^{o}C. The coal used contains 81% carbon, 5% moisture and remaining is ash. Neglecting losses, find the % excess air supplied. Assume complete combustion of carbon in the fuel. [9M]

4 a) Dry saturated steam at 15 bar entering into the nozzle comes out at 2 bar and 0.96 dry. (**i**) Find out the exit velocity of the steam neglecting entry velocity. (**ii**) If 10% of heat drop is lost in friction, find out the % reduction in exit velocity. [6M]
b) Steam from nozzle enters into a single stage impulse turbine at 300 m/s absolute velocity. The nozzle angle = 25^{o}. The blade rotor mean diameter is 100 cm and rotating at a speed of 2000 rpm. Find the blade angles if the axial thrust is zero. Find the power developed when the steam flow rate is 600 kg/min. Take blade velocity coefficient = 0.9. [10M]
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5 a) A surface condenser is designed to handle 10000 kg of steam per hour. The steam enters at 0.08 bar abs. and 0.9 dryness and the condensate leaves at the corresponding saturation temperature. The pressure is constant throughout the condenser. Estimate the cooling water flow per hour, If the cooling water temperature rise is limited to 10^0C. [9M]

b) Define the term Degree of Reaction used in Reaction Turbines. Prove that moving and fixed blades should have the same shape for 50% reaction. [7M]

6 a) What are the effects of the following factors on the specific output and thermal efficiency of the open cycle gas turbine at different pressure ratios? (**i**) Compressor inlet temperature, (**ii**) Isentropic efficiency of the compressor, (**iii**) Turbine inlet temperature, and (**iv**) Turbine isentropic efficiency. [8M]

b) In a gas turbine plant, the compressor takes air at 15^oC and compresses with pressure ratio of 4 wit isentropic η = 82%. Then the air is heated in the heat exchanger using 75% of the available heat with exhaust gases and then heated in combustion chamber to 600^oC. Isentropic η of turbine = 70%. Taking the properties of air and gases same, find work developed per kg of air flow and thermal efficiency of the cycle. [8M]

7 The following data pertains to a turbo-jet system flying at 95.00 m height with a speed of 800 km/hr and propulsive η = 55%. Taking the following data: ρ (density of air at 9500 m height) = 0.17 kg/m^3, Drag on the plane = 6.1 kN, Calorific value of fuel used = 46 MJ/kg.Find out the following: (**i**) Absolute velocity of the jet, (**ii**) Mass of air compressed/min, (**iii**) Diameter of the jet, (**iv**) Power output of the turbine unitand (**v**) air- fuel ratio used. [16M]

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Code No: RT31035 **R13** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
THERMAL ENGINEERING – II
(Mechanical 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**
(Use of steam tables and Mollier chart is allowed)

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PART –A

1 a) Explain under what conditions the adiabatic flame temperature attains its maximum value? [4M]
b) What are the limitations of chimney draught? [4M]
c) Explain the phenomenon of supersaturated expansion of steam in nozzle and sketch the process on $h-s$ diagram. [4M]
d) Discuss the merits and demerits of surface condensers over jet condensers. [3M]
e) What are the desirable properties of the fluid suitable for closed cycle Gas Turbine operation? [4M]
f) List out the desirable properties required for liquid propellant rockets. [3M]

PART –B

2 a) Show that the thermal efficiency of a regenerative cycle is always higher than that of a straight Rankine cycle regardless of where the steam is tapped off. [7M]
b) In a reheat cycle, steam at 165 bar and 600^{o}C is supplied to the turbine. The steam at 18.5 barduring the expansion is withdrawn and reheated to 490^{o}C. Then the expansion is further carried out to condenser pressure of 0.03 bar. (**i**) Determine the thermal efficiency and (**ii**) Steam flow rate if the output from the turbine is 60 MW. Assume all ideal processes. [9M]

3 a) Distinguish between water-tube and fire-tube boilers and state under what circumstances each type would be desirable. [7M]
b) In a chimney draught, the draught produced is 19 mm of water when the gas temperature is 290^{o}C and ambient temperature is 20^{o}C. Find out the mass of flue gases passing through the chimney when the air supplied is 22 kg per kg of fuel. Neglect the losses and take diameter of the chimney = 1.8 m. [9M]

4 a) Dry saturated steam at a pressure of 8 bars absolute enters a convergent-divergent nozzle and leaves at 1.5 bars absolute. If the flow is isentropic and corresponding expansion index is 1.135, find the ratio of cross-sectional area at exit and throat for maximum discharge. [8M]
b) A single-row impulse turbine develops 132.5 kW at a blade speed of 175 m/s when the steam flow rate is 120 kg/min. Steam leaves the nozzle at 400 m/s. Take blades velocity coefficient = 0.9 and assume that the steam leaves the turbine blades axially. Find out the nozzle angle, blade angles. Assume there is no shock. [8M]
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5 a) The following observations were recorded during a test on a steam condenser: Barometer reading = 76.5 cm of Hg, Condenser vacuum = 71 cm of Hg, Mean condenser temperature = 35°C, Temperature of hot well = 28°C, Condensate collected = 2000 kg/hr, Quantity of cooling water circulated = 60,000 kg/hr, Temperature of cooling water at inlet and outlet = 8°C and 24°C. Determine (**i**) the vacuum, corrected to standard barometer reading, (**ii**) the vacuum efficiency of condenser, (**iii**) the under-cooling of the condensate, (**iv**) condenser efficiency, (**v**) quality of steam entering the condenser, and (**vi**) mass of air present per m^3 of condenser volume and per kg of uncondensed steam. [9M]

b) In a Parson reaction turbine, the angles of receiving tips are 35^0 and of discharging tips, 20^0. The blade speed is 100 m/s. Calculate the tangential force, power developed, diagram efficiency and axial thrust of the turbine, if it steam consumption is 1 kg/min. [7M]

6 a) What problems are encountered in the design of gas turbine combustion chambers? Draw a neat sketch of a combustion chamber used for an open-cycle plant and name the parts. [6M]

b) In a open cycle gas turbine plant, air enters at 1 bar 20°C and compressed to 5 bar. Taking the following data, Max. temp in the cycle = 680°C, $\eta_{compressor}$ = 85%, $\eta_{turbine}$= 80%, $\eta_{combustion}$= 85%. Pressure loss in combustion chamber = 0.1 bar. Take C_p = 1.02 kJ/kg°C and ɣ = 1.4 for air and gas. Find (a) Air circulation if power developed by the plant is 1065 kW (b) Thermal η of the cycle. Neglect the mass of fuel. [10M]

7 In a jet propulsion unit, air is taken in a rotary compressor at 1.01 bar and 15°C and compressed to 4.04 bar with anisentropic efficiency = 82%. The air coming out from the compressor is heated to 750°C and passed through a turbine which drives power just sufficient to run the compressor with isentropic efficiency = 78%. The gases coming out from the turbineis passed through a nozzle to a pressure of 1.01 bar with an isentropic efficiency = 88%. Neglecting the mass of fuel and assuming R and ɣ are same for both air and gases, find out (**i**) Power required to drive the compressor, (**ii**) air-fuel ratio taking Calorific Value of fuel = 42 MJ/kg, (**iii**) The pressure of gases leaving the turbine and (**iv**) Thrust per kg of air per second. [16M]

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Code No: RT31045 **R13** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
ANTENNAS AND WAVE PROPAGATION
(Electronics and Communication 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)	Define the terms radiation intensity and directivity.	[4M]
	b)	Compare the different types of wire antenna.	[4M]
	c)	Given a linear broadside uniform array of isotropic elements, (N=∞) with a separation of λ/4 (d= λ/4) between the elements. Find the directivity of an array.	[3M]
	d)	What are the advantages of Microstrip antennas?	[3M]
	e)	Describe the cassegrain method of feeding a parabolic reflector.	[4M]
	f)	Define the terms MUF and Skip Distance	[4M]

PART -B

2	a)	Explain the current distribution on a thin-wire antenna.	[10M]
	b)	For an infinitesimal dipole excited by a constant RF current I, determine radiation intensity U, maximum value of U and directivity.	[6M]
3	a)	Explain the concept of Retarded Potentials.	[10M]
	b)	A thin dipole is λ/15 long. If it has loss resistances of 1.5Ω, calculate its directivity and gain	[6M]
4	a)	With a neat sketch explain the operation of Yagi-Uda array.	[8M]
	b)	Deduce an expression for the radiation pattern of an end-fire array with N vertical dipoles.	[8M]
5	a)	Find the directivity of 10 turn helix antenna having pitch angle 10^0, circumference C equal to λ.	[4M]
	b)	Explain the radiation mechanism of microstrip antenna.	[8M]
	c)	Describe the different types of microstrip antennas	[4M]
6	a)	Briefly explain about Flat Sheet Reflectors.	[10M]
	b)	A paraboloid reflector of circular cross-sectional area 8000 sq.cm is uniformly excited at 5GHz. Calculate the HPBW and the gain.	[6M]
7	a)	Explain in detail about Ground wave propagation.	[10M]
	b)	A television transmitter antenna has a height of 169 metres and the receiving antenna has a height of 16 metres. What is the maximum distance through which the TV signal could be received by space propagation? What is the radio horizon in this case.	[6M]

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Code No: RT31045 **R13** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
ANTENNAS AND WAVE PROPAGATION
(Electronics and Communication 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) Define the terms beam efficiency and half-power beam width of an antenna. [4M]
b) Find the radiation resistance of a 20 turn, 1m diameter small loop antenna operating at 10 MHz. If the loss resistance of 1-turn loop is 1Ω, find its radiation efficiency? [3M]
c) Discuss the characteristics of folded dipoles. [4M]
d) Describe the significance of Helical antennas. [4M]
e) List the features of Lens antennas. [3M]
f) Write a brief note on Radio Horizon. [4M]

PART -B

2 a) Explain the radiation mechanism in a single wire. [6M]
b) The radiation intensity of an antenna is given by $U(\theta) = \cos^4\theta$; $(0 \leq \theta \leq 90^0, 0 \leq \varphi \leq 360^0)$. Find the half-power beam width (HPBW). [4M]
c) Discuss the different field regions of an antenna. [6M]

3 a) Derive an expression for the radiation resistance of a short electric dipole element. [8M]
b) What is meant by the effective area of an antenna? How is it related to the gain? [4M]
c) Calculate the radiation resistance of a single-turn small circular loop having mean radius of $\lambda/20$ and radiating in free space. [4M]

4 a) Explain in detail about Broadside and End-fire arrays. [12M]
b) A broadside array operating at 100 cm wavelength consists of four half wave dipoles spaced 50 cm. Each element carries radio frequency current in the same phase and magnitude 0.5 Amp. Calculate the radiated power. [4M]

5 a) Describe the construction and operation of helical antenna under normal mode [8M]
b) Explain the features and radiation properties of rectangular patch antennas. [8M]

6 a) Briefly explain about Corner Reflectors. [10M]
b) The diameter of a parabolic reflector is 2m. For operation at 6 GHz, find the beam width between first nulls and the gain [6M]

7 a) Explain the following terms: (**i**) Critical frequency (**ii**) MUF (**iii**) Skip Distance (**iv**) Virtual height [12M]
b) Find the range of LOS system when the receive and transmit antenna heights are 10m and 100m respectively. Take the effective earth's radius into consideration [4M]

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Code No: RT31045 **R13** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
ANTENNAS AND WAVE PROPAGATION
(Electronics and Communication 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 that contribute to the efficiency of antenna?	[3M]
	b)	Find the radiation resistance and directivity of long wire resonant antenna of length l=λ?	[4M]
	c)	Describe the concept of Scanning Arrays.	[4M]
	d)	Give the comparison between axial mode and normal mode of helical antenna.	[3M]
	e)	Write a brief note on Zoning.	[4M]
	f)	List the characteristics of Sky wave propagation.	[4M]

PART -B

2	a)	Explain the radiation mechanism in dipole.	[6M]
	b)	An antenna has a radiation resistance of 72 Ω, a loss resistance of 8Ω and a power gain of 12 dB. Determine the antenna efficiency	[4M]
	c)	Explain the isotropic, directional and omnidirectional patterns.	[6M]
3	a)	A half-wave dipole antenna is radiating 1KW and has a gain of 2.15dBi. Find the input power to the isotropic antenna which will radiate same field strength of the dipole	[8M]
	b)	Explain the concept of short magnetic dipole	[8M]
4	a)	Explain in detail about Binomial arrays.	[10M]
	b)	Discuss the radiation pattern of a linear array of the three isotropic sources spaced λ/2 apart. The excitation of the sources is in-phase and have amplitude ratio 1:2:1.	[6M]
5	a)	Describe the construction and operation of helical antenna under axial mode.	[8M]
	b)	Explain the radiation mechanism in travelling wave radiator.	[8M]
6	a)	Explain the important design parameters of parabolic reflector antenna	[10M]
	b)	Give the comparison between horn antenna and paraboloidal reflector antenna.	[6M]
7	a)	A HF radio link has to be established between two points at a distance of 2500 Km on earth's surface considering the ionospheric height to be 200 Km and its critical frequency 5 MHz. Calculate the MUF for the given path.	[6M]
	b)	Explain in detail about sky wave propagation.	[10M]

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Code No: RT31045 **R13** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
ANTENNAS AND WAVE PROPAGATION
(Electronics and Communication 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)	Define the terms gain and resolution of an antenna.	[4M]
	b)	Give the comparison of far fields of small loop and short dipole.	[3M]
	c)	Explain the principle of Pattern multiplication.	[4M]
	d)	What are the limitations of Microstrip antennas?	[3M]
	e)	Write a brief note on F/D ratio.	[4M]
	f)	Explain the mechanism of reflection and refraction.	[4M]

PART -B

2	a)	Briefly explain about principal pattern.	[6M]
	b)	A lossless antenna has input impedance of 73Ω. It is fed by a 50 Ω transmission line If the radiation power pattern of the antenna is given by $U=4 \sin^3\theta$, find the maximum absolute gain of the antenna and its overall efficiency .	[8M]
	c)	Give the classification of polarization	[2M]
3	a)	Derive expressions for the components of the radiated field of a short dipole element.	[8M]
	b)	The mean radius of a small circular loop of constant current is λ/10. Find the physical area of the loop	[4M]
	c)	Explain how a loop antenna is used for determining the field strength in a medium.	[4M]
4	a)	For a 6-element Yagi array for operation of 500 MHz with a folded dipole, find the length of reflector element and driven element.	[4M]
	b)	For an N-element uniform linear array, derive an expression for the array factor.	[6M]
	c)	Write a brief note on Parasitic elements.	[6M]
5	a)	Explain the design considerations for monofilar helical antennas in different modes.	[10M]
	b)	Discuss the basic properties of helical antennas.	[6M]
6	a)	Find the BWFN and power gain of a 2m paraboloid reflector operating at 6000 MHz.	[4M]
	b)	Describe the directivity and gain measurements of an antenna.	[12M]
7	a)	What is the critical frequency for reflection at vertical incidence, if the maximum value of electron density is 1.24×10^6 per cm^3.	[6M]
	b)	Explain in detail about Tropospheric wave propagation..	[10M]

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Code No: RT31055 **R13** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016

OPERATING SYSTEMS

(Common to CSE and IT)

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)	Describe the typical elements of the process control block.	[3M]
	b)	Define System Call? List out any four Process Control System Calls.	[4M]
	c)	Distinguish between counting and binary semaphores.	[4M]
	d)	What is the purpose of paging the page tables?	[4M]
	e)	Discuss the Safe, unsafe, and deadlock state spaces.	[3M]
	f)	What is a File? Describe the attributes of a file.	[4M]

PART -B

2	a)	Explain the Time-shared operating system.	[4M]
	b)	Discuss the Simple Operating System Structure. Describe the layers of the Kernel.	[8M]
	c)	Explain the difference between micro-kernel and macro-kernel.	[4M]
3	a)	Compare and contrast thread and process.	[3M]
	b)	Define Process. Explain various steps involved in change of a process state with process state neat transition diagram.	[8M]
	c)	Discuss Multithreading Models with neat diagrams.	[5M]
4	a)	What is a Critical Section? Discuss the solution of the Critical Section problem.	[8M]
	b)	Explain in detail Readers and Writers Problem of Synchronization.	[8M]
5	a)	Discuss the procedure for handling the page fault in demand paging.	[8M]
	b)	Illustrate the page-replacement algorithms i) FIFO ii) Optimal Page Replacement use the reference string 7, 0,1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2,1, 2, 0, 1, 7, 0,1 for a memory with three frames.	[8M]
6	a)	How to Recover From Deadlock situations? Discuss in detail.	[8M]
	b)	Explain deadlock avoidance process using Resource-Allocation-Graph.	[8M]
7	a)	Write short notes on: i) FCFS and ii) SSTF Disk Scheduling schemes.	[8M]
	b)	Discuss the Indexed File allocation method with an example.	[8M]

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Code No: RT31055 **R13** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
OPERATING SYSTEMS
(Common to CSE and IT)

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)	Draw MS-DOS Operating System structure.	[3M]
	b)	Describe different attributes of the process.	[4M]
	c)	Define Busy Waiting? How to overcome busy waiting using Semaphore operations.	[4M]
	d)	Why segmentation and paging are sometimes combined into one scheme?	[4M]
	e)	Discuss the usage of wait-for graph scheme.	[3M]
	f)	Explain the information associated with an open file.	[4M]

PART -B

2	a)	Discuss UNIX Operating system structure.	[4M]
	b)	Explain different categories of System calls with suitable examples.	[8M]
	c)	Define Multitasking. Discuss the Timeshared operating System.	[4M]
3	a)	Differences between preemptive scheduling and non preemptive Scheduling.	[3M]
	b)	What is IPC? Explain in detail the inter process communication models	[8M]
	c)	Describe the differences among short-term, medium-term, and long term Schedulers.	[5M]
4	a)	What is Peterson's Solution? Discuss the Critical Section problem using Peterson's Solution.	[8M]
	b)	Explain in detail Synchronization implementation in Linux.	[8M]
5	a)	What is demand paging? Discuss the hardware support required to support demand paging.	[8M]
	b)	Illustrate the page-replacement algorithms i) LRU ii) LRU-Approximation Page Replacement use the reference string 7, 0,1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2,1, 2, 0, 1, 7, 0,1 for a memory with three frames.	[8M]
6	a)	Discuss deadlock avoidance using banker's algorithm with suitable example.	[8M]
	b)	Explain Deadlock Detection scheme for Several Instances of a resource Type.	[8M]
7	a)	Explain various file access methods with suitable examples.	[8M]
	b)	Discuss the Schematic view of a virtual file system with neat sketch.	[8M]

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Code No: RT31055 **R13** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
OPERATING SYSTEMS
(Common to CSE and IT)

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 Operating-System Services?	[3M]
	b)	Describe the benefits of multithreaded programming.	[4M]
	c)	Describe disadvantages of the semaphore.	[4M]
	d)	Explain why sharing a reentrant module is easier, when segmentation is used than when pure paging is used.	[4M]
	e)	Describe the Methods for Handling Deadlocks.	[3M]
	f)	Discuss UNIX File System Mounting.	[4M]

PART -B

2	a)	Explain the overview of an Operating system with neat sketch.	[4M]
	b)	Describe essential properties of Real Time and Network operating Systems	[8M]
	c)	Explain models of distributed systems.	[4M]
3	a)	What is a Scheduler? Describe different CPU Schedulers.	[5M]
	b)	Define starvation. Which of the scheduling algorithms result in starvation? Explain.	[6M]
	c)	Describe the actions taken by a kernel to context-switch between processes	[5M]
4	a)	Define atomic instruction. Explain with an example.	[4M]
	b)	Explain wait and signal semaphore operations without busy waiting.	[4M]
	c)	Give a solution for second Readers-Writers problem.	[8M]
5	a)	Explain implementation of virtual memory through Demand Paging.	[8M]
	b)	Discuss the Hierarchical Paging structure.	[8M]
6	a)	Discuss deadlock avoidance using Resource-Allocation-Graph Algorithm.	[8M]
	b)	Explain Deadlock detection algorithm with an example.	[8M]
7	a)	Explain different operations on File.	[8M]
	b)	Write short notes on :**i**) Contiguous and **ii**) Linked File allocation methods	[8M]

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Code No: RT31055 **R13** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016

OPERATING SYSTEMS

(Common to CSE and IT)

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)	Describe the Operating-System Operations.	[3M]
	b)	Define Cooperating process? What is the environment need in Cooperating processes?	[4M]
	c)	What is a Monitor? Give the schematic view of the basic monitor.	[4M]
	d)	Write short note on demand paging.	[4M]
	e)	What is the usage of Resource-Allocation Graph?	[4M]
	f)	Define the terms seek time & rotational latency.	[3M]

PART -B

2	a)	What is an Operating system? Describe the Operating-System Functions.	[4M]
	b)	Explain briefly Layered Operating system structure with neat sketch	[8M]
	c)	Differentiate protection and security.	[4M]
3	a)	Explain Inter Process Communication models in detail.	[8M]
	b)	What are the differences between user-level threads and kernel-level threads?	[4M]
	c)	Explain allocation and de allocation of resources when a process is created & terminated respectively in UNIX.	[4M]
4	a)	Give a solution to Readers-Writers problem using Monitors.	[8M]
	b)	Define semaphore? Explain the usage and implementation of semaphores.	[8M]
5	a)	What is the cause of thrashing? How does the system detect thrashing? How to eliminate this problem?	[8M]
	b)	What is Paging? Discuss the Paging model of logical and physical memory.	[8M]
6	a)	What is a deadlock? Consider the deadlock situation that could occur in the dining philosopher's problem when the philosophers obtain the chopsticks one at a time. Discuss how the four necessary conditions for deadlock indeed hold in this setting. What are the solutions for this problem?	[8M]
	b)	Explain recovery from deadlock after detection.	[8M]
7	a)	Discuss various types of disk storage attachments.	[8M]
	b)	Explain File Free Space management approaches.	[8M]

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Code No: **R31025** **R10** **Set No. 1**

III B.Tech I Semester Supplementary Examinations, October/November - 2016

ELECTRICAL MACHINES-III

(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 operation of shaded pole induction motor with diagram.

b) A 125 W, 4-pole, 110 V, 50 Hz, single phase induction motor delivers rated output at a slip of 6%. The total copper loss at full load is 25 Watts. Calculate the full load efficiency and rotor copper loss caused by backward field. Rotational losses may be assumed to be 25 Watts. Neglect the stator copper loss.

2 a) What are the advantages of short-pitching? Derive an expression for distribution factor pitch factor.

b) A 3-phase, 8-pole, 750 rpm star connected alternator has 72 slots on the armature. Each slot has 12 conductors and winding is short chorded by 2 slots. Find the induced e.m.f between the lines, given the flux per pole is 0.06 Wb.

3 a) Explain the load characteristics of an alternator.

b) A 16 pole, 3-phase star connected alternator has 144 slots. The coils are short pitched by one slot. The flux per pole is $\Phi = 100 \sin \theta + 30 \sin 3\theta + 20 \sin 5\theta$. Find the harmonics as percentage of phase voltage and line voltage.

4 a) Explain the two reaction theory applicable to salient pole synchronous machine.

b) A 3-phase, star connected, 1000 kVA, 11 kV, alternator has rated current of 52.5 A. The AC resistance of the winding per phase is 0.45 ohms. The test results are given below:
OC test: Field current=12.5 A; Voltage between the lines=422 V.
SC test: Field current=12.5 A; Line current=52.5 A.
Determine the full load voltage regulation of the alternator at a power factor of (i) 0.8 leading (ii) 0.8 lagging.

5 a) Explain the procedure to determine the sub-transient, transient and steady state reactance of an alternator.

b) Two alternators are working in parallel to supply the following loads: (**i**) lighting load of 500 kW (**ii**) 1000 kW at 0.9 p.f lag (**iii**) 500 kW at 0.9 p.f lead (**iv**) 800 kW at 0.8 p.f lag. One alternator is supplying 1500 kW at 0.95 p.f lag. Determine the load and power factor on the other machine.

6 a) Explain the construction and operating principle of synchronous motor.
b) A 2 kV, 3-phase synchronous motor has an effective resistance and synchronous reactance of 0.2 ohms and 2.2 ohms respectively. The input is 800 kW at normal voltage and the generated line e.m.f is 2.5 kV. Calculate the line current and power factor.

7 a) Explain the characteristics of synchronous induction motor.
b) Show that the locus of power of a synchronous machine is circle? Give the co-ordinates of the power circle.

8 a) Describe the construction and principle of working of a universal motor and mention its applications.
b) Explain about permanent magnet D.C motor with neat diagrams and give its applications.

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Code No: **R31035** **R10** **Set No. 1**

III B.Tech I Semester Supplementary Examinations, October/November - 2016
DESIGN OF MACHINE MEMBERS-I
(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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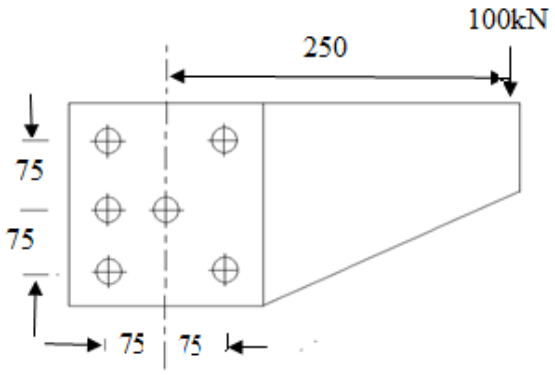
1 A bolt is subjected to an axial pull of 10kN and a transverse shear force of 5kN. The yield strength of the bolt material is 300 MPa. Considering a factor of safety of 2.5., determine the diameter of the bolt using i) maximum normal stress theory ii) maximum shear stress theory iii) maximum principal strain theory. Take Poisson's ratio as 0.25.

2 Determine the diameter of the circular rod made of ductile material with a fatigue strength (complete stress reversal), σ_e=265 MPa and tensile yield strength of 350MPa. The member is subjected to a varying axial load from W_{min}= -300x10^3N to W_{max}=700x10^3N and has a stress concentration factor=1.8. Use factor of safety as 2.0.

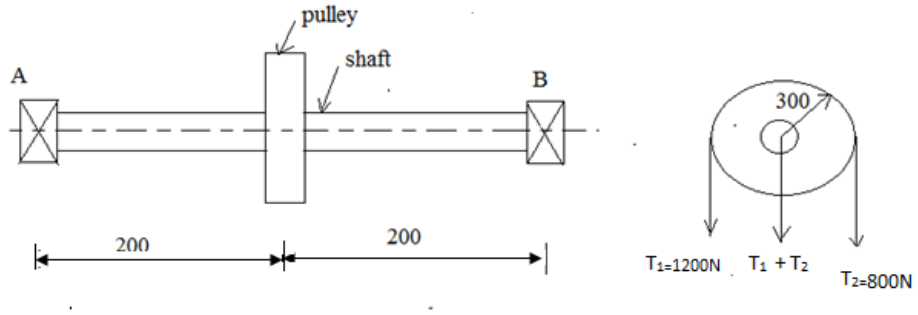
3 A Bracket is riveted to a column by 6 rivetes of equal size as shown in figure below. It carries a load of 100kN at a distance of 250mm from the column. If the maximum shear stress in the rivet is limited to 63Mpa, find the diameter of the rivet.



4 a) What is meant by bolt of uniform strength? Explain.
b) Explain the various types of stresses induced in a bolt due to initial tightening of the nut.

5 Design a cotter joint to connect two mild steel rods for a pull of 30kN. The maximum permissible stresses are 55MPa in tension; 40 MPa in shear and 70MPa in crushing. Draw a neat sketch of the joint designed.

6 Figure below shows a shaft from a hand-operated machine. The frictional torque in the journal bearings at A and B is 15N-m each. Find the diameter (d) of the shaft (on which the pulley is mounted) using maximum distortion energy criterion. The shaft material is 40C8 steel for which the yield stress in tension is 380 MPa and the factor of safety is 1.5 (all dimensions are in mm).



7 Design a muff coupling to connect two shafts transmitting 40kW at 120rpm. The permissible shear and crushing stresses for the shaft and key material (mild steel) are 30MPa and 80MPa respectively. The material of muff is cast iron with permissible shear stress of 15MPa. Assume that the maximum torque transmitted is 25% greater than the mean torque

8 A helical compression spring made of oil tempered carbon steel is subjected to a load which varies from 400 N to 1000 N. The spring index is 6 and the design factor of safety is 1.25 if the yield stress in shear is 770 MPa and endurance stress in shear is 350MPa find i) the size of the spring wire ii) diameter of the spring iii) number of turns of the spring iv) free length of the spring. The compression of the spring at the maximum load is 30 mm. The modulus of the rigidity for a spring material may be taken as 80 kN/mm^2.

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Code No: **R31045** **R10** **Set No. 1**

III B.Tech I Semester Supplementary Examinations, October/November - 2016

ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1	a)	Define effective length. Prove that the effective length of the transmitting and receiving antennas are equal.	[8M]
	b)	Evaluate the effective length of a half wave dipole and a quarter wave monopole. Hence calculate their directivity using appropriate radiation resistances.	[7M]
2	a)	Define the terms electrostatic field, induction field, and radiation field of an antenna and bring out their significance.	[8M]
	b)	Sketch and compare radiation patterns of horizontal half wave dipole with those of vertical half wave dipole.	[7M]
3	a)	A linear broad side array consists of four equal elements in phase point sources with $\lambda/3$ spacing. Calculate and field pattern. Also find the directivity and beam width.	[8M]
	b)	Distinguish between ordinary EFA and BSA with increased directivity and compare them.	[7M]
4	a)	Explain the need and the configuration of a Folded Dipole Antenna. Sketch its radiation pattern and compare its characteristics with those of simple $\lambda/2$dipole.	[8M]
	b)	List out the design relations associated with a Rhombic Antenna. What are its applications?	[7M]
5	a)	Design Yagi Uda antenna of six elements to provide a gain of 12dB if the operating frequency is 400MHz.	[8M]
	b)	Explain with suitable sketches perpendicular mode of radiation in helical antenna.	[7M]
6		Describe the methods for measuring the below parameters for an antenna with a neat block diagram: **a**) Gain **b**) HPBW	[15M]
7	a)	Write short notes on "Ground wave propagation".	[7M]
	b)	In case of ionosphere, explain D, E & F layers.	[8M]
8	a)	Discuss the phenomenon and effect of the reflection of radio waves by earth's surface.	[7M]
	b)	Explain the principle of operation of terrestrial line of sight of communication.	[8M]

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Code No: **R31055** **R10** **Set No. 1**

III B.Tech I Semester Supplementary Examinations, October/November - 2016

MICRO PROCESSORS AND MULTICORE SYSTEMS
(Computer Science and Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1	a)	Explain why segmentation is required and discuss about implementation of segmentation in 8086.	[8M]
	b)	What is addressing mode? Explain different type of addressing modes in 8086 with examples.	[7M]
2	a)	Determine whether the following instructions are valid or not. If valid, explain their operation & flags affected, if not, mention the reason. i) XLAT AL **ii**) MOV BX,[DX] **iii**) NOT 34h **iv**) AAD **v**) TEST OPRI, OPR2 **vi**) JNGE label.	[8M]
	b)	Briefly explain the format of jump instructions.	[7M]
3	a)	Write an ALP in 8086 to divide a 32-bit number by a 16-bit numbers.	[8M]
	b)	Differentiate between procedures and macros giving relevant examples.	[7M]
4	a)	What are assembler directives? What are their uses? List out and discuss different assembler directives of 8086 micro processor.	[10M]
	b)	Write an ALP to convert a 3- digit BCD number to binary number.	[5M]
5	a)	What is interrupt vector table? Draw and explain interrupt vector table for 8086 vector table?	[8M]
	b)	Write difference between hardware and software interrupts of 8086 processor.	[7M]
6	a)	Write an ALP to transfer 10 words of data using REP MOV SW instruction from source location to destination location. What is the role of SI, DI registers & DF bit?	[8M]
	b)	Write an ALP to find sum of even & odd numbers in a given array of N numbers.	[7M]
7		What are the main features of 80386 microprocessor? Explain in detail the real mode and protected mode operations of 80386 microprocessor.	[15M]
8	a)	What is meant by superscalar execution? Explain.	[8M]
	b)	What do you mean by branch prediction? How does it enhance the speed of execution? Explain the use of branch target buffer in branch prediction?	[7M]

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