III B. Tech I Semester Regular Examinations, November - 2015
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)	Explain briefly main features of Indian Road Congress.	[3M]
	b)	Write a short note on Carriageway width?	[4M]
	c)	Enumerate AADT.	[4M]
	d)	Explain briefly on Unified Soil classification system.	[3M]
	e)	Discuss about maximum wheel load	[4M]
	f)	How the excavation is done in highway construction?	[4M]

PART -B

2	a)	Discuss briefly about the objectives of highway planning.	[4M]
	b)	Write down the classification of roads by Nagpur road plan.	[8M]
	c)	What is meant by Reconnaissance?	[4M]
3	a)	Write a short note on overturning effect.	[4M]
	b)	Explain briefly the calculation of length of the transition curve.	[8M]
	c)	Derive an expression of summit curve for SSD.	[4M]
4	a)	Explain spot speed, running sped, space mean speed, time mean speed and average speed. How is spot speed studies carried out?	[8M]
	b)	Explain various types of road markings.	[8M]
5	a)	Define group index. Explain briefly group index of soil.	[4M]
	b)	Explain briefly desirable properties of road aggregates.	[12M]
6	a)	What are the variations in temperature that generally effect the pavement?	[8M]
	b)	Discuss the Westergaard's concept of temperature stresses.	[8M]
7	a)	Briefly list the method of construction of gravel road.	[6M]
	b)	Write short notes on seal coat.	[6M]
	c)	Write a descriptive note on pavement evaluation.	[4M]

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

III B. Tech I Semester Regular Examinations, November - 2015
TRANSPORTATION ENGINEERING – I
(Civil Engineering)

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

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PART –A

1	a)	Explain briefly the recommendations of Jayakar Committee.	[3M]
	b)	Explain the role of kerb.	[4M]
	c)	Discuss thirtieth highest hourly volume.	[4M]
	d)	Evaluate grain size analysis on highway materials.	[3M]
	e)	Write short notes on contact pressure.	[4M]
	f)	What are the reasons to raise grade line?	[4M]

PART -B

2	a)	What are the objectives of Highway Research Board?	[4M]
	b)	Explain briefly the classification of road pattern.	[8M]
	c)	How the map study is done? Discuss.	[4M]
3	a)	Write a short note on setting out of a transition curve.	[4M]
	b)	While aligning a highway in a built up area, it was necessary to provide a horizontal circular curve of radius 446 m. The design speed is 85 Kmph, the length of wheel base is 8m and the pavement width is 12m. Design super elevation, extra widening and length of transition curve.	[8M]
	c)	What are the factors required for overturning sight distance?	[4M]
4	a)	Discuss various traffic studies and their importance.	[8M]
	b)	What are the advantages and disadvantages of traffic signs?	[8M]
5	a)	What are the strength characteristics of soil?	[4M]
	b)	Explain briefly three different tests carried out to determine the abrasion of aggregates.	[12M]
6	a)	Explain briefly Mc Load method.	[8M]
	b)	Describe Westergaard's stress equation for wheel loads.	[8M]
7	a)	Specify the materials required for construction of WBM roads. What are the uses and limitations of this type of road?	[6M]
	b)	Write short notes on Mastic asphalt.	[6M]
	c)	Explain the principles and uses of Bankleman Beam test?	[4M]

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SET - 3

III B. Tech I Semester Regular Examinations, November - 2015
TRANSPORTATION ENGINEERING – I
(Civil 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**
*****

PART –A

1 a) Explain about central road fund. [3M]
  b) Discuss road margin with neat sketches. [4M]
  c) Write a short note on Mechanical counters in Traffic Volume Study. [4M]
  d) Describe the Mohr circle affect on unconfined compression test. [3M]
  e) How equivalent single wheel load influence the design of pavement? [4M]
  f) How settlement can be eliminated in construction of pavement? [4M]

PART -B

2 a) Discuss Bombay road plan neatly. [4M]
  b) How the preparation of master plan is done? [8M]
  c) What are the types of drawings used in preparation of highway project? [4M]

3 a) How the total reaction time of the driver is measured? [4M]
  b) Derive an expression for overtaking sight distance. [8M]
  c) While aligning a hill road with a ruling gradient of 8 percent, a horizontal curve of radius 90m is encountered. Find the compensated gradient at the curve? [4M]

4 a) What are the factors on which PCU values depend? [8M]
  b) The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour, the saturation flow values on these roads are estimated as 1850 and 1400 PCU per hour respectively. The all red time required for pedestrian crossing is 16 seconds. Design two phase traffic signal by Webster's method? [8M]

5 a) How the resistance of aggregates to weathering action is studied? [4M]
  b) What are the various tests conducted on bituminous materials? [12M]

6 a) Discuss the advantages and limitations of CBR method of design. [8M]
  b) Calculate the stresses at interior, edge and corner regions of CC pavement using Westergaard's stress equation. Use the following data: Wheel load= 5100 kg, modulus of elasticity is $3*10^5$ kg/cm^2, pavement thickness =18cm, Poisson's ratio of concrete = 0.15, modulus of subgrade reaction 6 kg/cm^3 and radius of contact area is 15cm. [8M]

7 a) Enumerate the steps in the construction of CC pavement. [6M]
  b) Write short notes on bituminous Carpet. [6M]
  c) Discuss mud portions. [4M]

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III B. Tech I Semester Regular Examinations, November - 2015
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*****

PART –A

1	a)	Explain how the National Transport policy committee connected with road development.	[3M]
	b)	What are the factors that influence Right of way?	[4M]
	c)	Write short note on manual counts in traffic volume study?	[4M]
	d)	Discuss the influence of c and Φ in triaxial test?	[3M]
	e)	What is meant by Repetition of loads?	[4M]
	f)	What are the factors considered to evaluate the foundation stability?	[4M]

PART -B

2	a)	What are the objectives of road development vision 2021?	[4M]
	b)	What are the factors affecting alignment?	[8M]
	c)	What are the steps involved in a new highway project?	[4M]
3	a)	Explain briefly about 'PIEV' theory.	[4M]
	b)	How the attainment of super elevation can be done? Describe briefly.	[8M]
	c)	Calculate the safe overturning sight distance for a design speed of 96 kmph. Assume all other data suitably.	[4M]
4	a)	Explain the level of service concept while deciding the design capacity of a road?	[8M]
	b)	Explain various measures that may be taken to prevent accidents.	[8M]
5	a)	Where do Pensky-Martens closed cup apparatus used? Explain the test procedure.	[4M]
	b)	Describe the steps involved in bituminous mix design.	[12M]
6	a)	Enumerate the various methods of flexible pavement design. Briefly indicate the basis of design in each case?	[8M]
	b)	Briefly outline IRC recommendations for determining the thickness of CC pavement.	[8M]
7	a)	What are the problems in the construction of high embankments over weak foundation soils? How are the various problems dealt with?	[6M]
	b)	Write short note on Surface dressing?	[6M]
	c)	Discuss briefly the importance of highway maintenance.	[4M]

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III B. Tech I Semester Regular Examinations, November - 2015
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**
*****

PART –A

1	a)	Define Latching and Holding currents.	[4M]
	b)	Discuss briefly about advantages of freewheeling diode.	[4M]
	c)	Discuss about line commutated inverter.	[4M]
	d)	Draw the variation of output voltage with respect to firing angle of three phase semi converter.	[4M]
	e)	Explain time ratio control of DC-DC chopper	[3M]
	f)	What are the applications of Inverters?	[3M]

PART -B

2	a)	Explain about snubber circuit and derive the condition for R_s?	[8M]
	b)	What is a MOSFET? Explain its V-I characteristics briefly. Also write its advantages over other switches.	[8M]
3	a)	Explain the operation of single phase half wave converter with RL load. Draw the output voltage waveform and derive the expression for average load voltage.	[8M]
	b)	A single phase full-wave ac voltage controller feeds a load of R=20 Ω with an input voltage of 230V, 50Hz. Firing angle for both the thyristors is 45^0. Calculate (i) rms value of output voltage. (iii) Average and rms current of thyristors.	[8M]
4	a)	Derive the expression for output voltage of single-phase full converter by considering source inductance.	[8M]
	b)	Single phase fully controlled converter is connected to a load comprised of 2ohms resistance and 0.3H inductance. The supply voltage is 230V at 50Hz. Estimate the average load voltage, average load current and input power factor for a firing angle of 20^0. Assume continuous and ripple free load current.	[8M]
5		Describe the working of three phase half controlled converter with R load for α=30° with relevant waveforms and derive the expression for average output voltage.	[16M]

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6   a)   Discuss the working of a single phase bridge type cycloconverter with RL loads and for discontinuous waveform operation with neat circuit diagram and output rms voltage and current wave form for $f_o = (1/3) f_s$.   [8M]

      b)   Explain the operation of Buck-Boost chopper with relevant waveforms and derive the expression for average output voltage.   [8M]

7   a)   With a neat circuit diagram, explain the principle of operation of a single phase half bridge inverter.   [6M]

      b)   A single PWM full bridge inverter feeds an RL load with R = 10 ohms and L =10 mH. If the source voltage is 120V, find out the total harmonic distortion in the output voltage and in load current. The width of each pulse is 120^0 and output frequency is 50Hz.   [10M]

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(Electrical and Electronics Engineering)

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3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1	a)	Draw and explain the transfer characteristics of MOSFET.	[4M]
	b)	Define firing angel.	[3M]
	c)	What is commutation angle or overlap angle?	[3M]
	d)	Draw the output voltage waveform of three phase full converter with RL load and firing angle 90^0.	[4M]
	e)	What are the applications of Cyclo converters?	[4M]
	f)	What are the advantages of PWM techniques?	[4M]

PART -B

2	a)	Discuss about switching characteristics of an SCR during turn on and off.	[8M]
	b)	Explain the diode bridge rectifier with R load and capacitive filter with neat circuit diagram and necessary waveforms.	[8M]
3	a)	Explain RC firing circuit with suitable waveforms.	[8M]
	b)	A 230V, 50Hz, one-pulse SCR controlled converter is triggered at a firing angle of 40^0 and the load current extinguishes at an angle of 210^0. Find the average output voltage and the average load current for R=5 Ω and L=2mH.	[8M]
4	a)	Describe the working of single phase half controlled converter for α= 30° with relevant waveforms and derive expression for average output voltage.	[8M]
	b)	A 1-Φ full converter bridge is connected to RLE load. The source voltage is 230V, 50Hz. The average load current of 10A is constant over the working range. For R=0.4Ω and L=2mH, compute. i) Firing angle delay for E=120V and ii) Firing angle delay for E= -120V. Indicate which source is delivered power to load in above cases.	[8M]
5	a)	Briefly explain the operation of single-phase dual converter.	[6M]
	b)	A 3-Φ fully controlled bridge converter is supplying DC-load of 400V, 60A from a 3-Φ, 50Hz, 660V (line) supply. If the thyristors have a voltage drop of 1.2V when conducting, then neglecting overlap, compute. a) Firing angle of thyristor. b) RMS value of thyristor currents. c) Mean power loss in thyristors .	[10M]

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SET - 2

6 a) Discuss the working of a single phase bridge type cycloconverter with RL loads and for continuous waveform operation with neat circuit diagram and output rms voltage and current wave form for $f_o = (1/4) f_s$. [9M]

   b) Explain the operation of Boost chopper with relevant waveforms and derive the expression for average output voltage. [7M]

7 Explain the operation of three-phase bridge inverter for 180° mode of operation with aid of relevant phase and line voltage waveforms. [16M]

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SET - 3

III B. Tech I Semester Regular Examinations, November - 2015
POWER ELECTRONICS
(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)	Draw and explain the output characteristics of IGBT.	[4M]
	b)	Draw the output voltage waveform of single phase AC voltage controller with RL load.	[4M]
	c)	Define extinction angle.	[3M]
	d)	What are the applications of dual converter.	[3M]
	e)	Explain current limit control of DC-DC chopper.	[4M]
	f)	Define amplitude modulation index.	[4M]

PART -B

2 a) Explain various turn-on methods of an SCR. [8M]

b) A thyristor operating from a peak supply voltage of 400V has the following specifications: Repetitive peak current, I_p = 200A, $(di/dt)_{max}$ = 50A/µs, $(dv/dt)_{max}$ = 200V/µs. Choosing a factor of safety 2 for I_p, $(di/dt)_{max}$ and $(dv/dt)_{max}$, design a suitable snubber circuit. The minimum value of load resistance is 10Ω? [8M]

3 a) What is UJT firing circuit and explain it with suitable waveforms? [8M]

b) A single phase half controlled bridge converter is supplied a 230V, 50Hz. Determine the average load voltage for firing angle of 60^0. If load current of 30A is continuous and constant, what is the value of load resistance? [8M]

4 a) Describe the working of single-phase fully controlled bridge converter in the Rectifying mode and inversion mode. And derive the expressions for average output voltage and rms output voltage. [8M]

b) Single phase fully controlled bridge is used for obtaining a regulated converter dc output voltage. The rms value of ac input voltage is 220V and firing angle is maintained at 30^0, so that the load current is 4A.
(a) Calculate the d.c. output voltage and active and reactive power input.
(b) Assuming load resistance remains same and if free-wheeling diode is used at the output, calculate dc output voltage. The firing angle is maintained at 30^0. [8M]

5 Explain the operation of three phase fully controlled bridge converter with RL load. Draw the voltage and current waveforms for α = 45^0. List the firing sequence of SCRs. [16M]

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6 a)   What are cycloconverters? Discuss the working of a single phase bridge type cycloconverter with R load. Sketch a neat circuit diagram and output rms voltage and current wave form for $f_o = (1/3) f_s$.   [9M]

    b)   Explain the operation of Buck chopper with relevant waveforms and derive the expression for average output voltage.   [7M]

7   What are different applications of inverters? Explain the operation of 3ph bridge inverter for 120° mode of operation with aid of relevant phase and line voltage waveforms.   [16M]

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*****

PART –A

1	a)	Define turn off time of an SCR.	[3M]
	b)	Explain the principle of line commutation.	[4M]
	c)	Discuss the significance of source inductance.	[4M]
	d)	Explain circulating and non-circulating current operation in dual converters.	[4M]
	e)	What is a cyclo converter?	[3M]
	f)	Explain briefly sine triangular PWM technique.	[4M]

PART -B

2	a)	Explain the static V-I characteristics of a thyristors and different modes of operation.	[8M]
	b)	Explain the diode bridge rectifier with R load and the output voltage waveform.	[8M]
3	a)	Explain the operation of single phase AC voltage controller with R load. Draw the necessary waveforms.	[8M]
	b)	A 230V, 1kW electric heater is fed through a single phase AC voltage controller from 230V, 50Hz Source. Find the load power for a firing angle delay of 70^0. Derive the expression used.	[8M]
4	a)	Derive the expressions for the following performance factors of single-phase fully Controlled bridge converter. (i)Input power factor (ii) Voltage ripple factor (iii) Active power input (iv) Reactive power input	[8M]
	b)	The 1- Φ semi converter circuit is connected to a 120V, 60 Hz supply. Determine the harmonic factor, distortion factor and input power factor if delay angle is $\alpha =\pi/2$.	[8M]
5		Explain the operation of three phase fully controlled bridge converter with RLE load. Draw the voltage and current waveforms for $\alpha =60^0$. List the firing sequence of SCRs.	[16M]
6	a)	For a single phase bridge type 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 $f_0 = 1/4 f_s$.	[10M]
	b)	Discuss the methods of controlling the output voltage of a chopper.	[6M]

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7　a)　With a neat circuit diagram, explain the principle of operation of a single phase full bridge inverter.　　[6M]

　　b)　A single phase full bridge inverter uses a uniform PWM with two pulses per half cycle for voltage control. Plot the distortion factor, fundamental component, and lower order harmonics against modulation.　　[10M]

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III B. Tech I Semester Regular Examinations November - 2015
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)
*****

PART –A

1 a) State the methods of increasing the thermal efficiency of a Rankine cycle. Draw the neat sketch of it.   [4M]
   b) Describe with a neat line sketch of a Benson boiler mentioning its distinguishing features.   [6M]
   c) What is the effect of friction on the flow through a steam nozzle?   [3M]
   d) Distinguish between impulse and reaction turbine.   [3M]
   e) State the assumptions made for thermal efficiency of a gas turbine plant.   [3M]
   f) Define Thrust and Proposive efficiency.   [3M]

PART -B

2   Steam at 70 bar and 450^0C is supplied to a steam turbine. After expanding to 25bar in high pressure stages, it is reheated to 420^0C at the constant pressure. Next; it is expanded in intermediate pressure stages to an appropriate minimum pressure such that part of the steam bled at this pressure heats the feed water to a temperature of 180^0C. The remaining steam expands from this pressure to a condenser pressure of 0.07bar in the low pressure stage. The isentropic efficiency of HP stage is 78.5%, while that of the intermediate and LP stage is 83% each. Determine the minimum pressure at which bleeding is necessary, the quantity of steam bled per kg of flow at the turbine inlet and the efficiency of the cycle.   [16M]

3   a) Derive an expression for maximum discharge rate of gases through the chimney for a given height of the chimney.   [8M]
    b) Calculate the height of a chimney required to produce a draught equivalent to 1.7cm of water if the flue gas temperature is 270^0C and ambient temperature is 22^0C and minimum amount of air per kg of fuel is 17kg.   [8M]

4   Steam at a pressure of 10bar and 0.9 dry discharges through a nozzle having throat area of 450mm^2. If the back pressure is 1bar. Find final velocity of the steam and cross sectional area of the nozzle at exit for maximum discharge.   [16M]

5   A single row impulse turbine develops 132.4 kW at a blade speed of 175m/sec, using 2kg of steam per sec. Steam leaves the nozzle at 400m/sec. Velocity coefficient of the blades is 0.9. Steam leaves the turbine blades axially. Determine nozzle angle, blade angles at entry and exit. Assume no shock.   [16M]

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6   A gas turbine employs a heat exchanger with a thermal ratio of 72%. The turbine operates between the pressures of 1.01bar and 4.04bar and ambient temperature is 20^0C. Isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The pressure drop on each side of the heat exchanger is0.05bar and in the combustion chamber 0.14bar. Assume combustion efficiency to be unity and calorific value of the fuel to be 41,800kJ/kg. Calculate the increase in efficiency due to heat exchanger over that for simple cycle. Take c_p=1.024kJ/kgK and γ=1.4   [16M]

7 a) State the fundamental differences between the jet propulsion and rocket propulsion.   [8M]

   b) List out the requirements of an ideal rocket propellant and give the applications of rockets.   [8M]

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III B. Tech I Semester Regular Examinations November - 2015
THERMAL ENGINEERING – II
(Mechanical Engineering)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
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3. Answer any **THREE** Questions from **Part-B**
(Use of steam tables and Mollier chart is allowed)
*****

PART –A

1 a) With the help of neat sketch explain regenerative cycle. [4M]
   b) What are the differentiating features between a water tube and a fire tube boiler? [4M]
   c) Explain the nozzles with the help of h-s diagram. [3M]
   d) Explain the functions of the blading of a reaction turbine. [4M]
   e) Obtain an expression for the effectiveness of a heat exchanger. [4M]
   f) Explain with a neat diagram closed cycle gas turbine. [3M]

PART -B

2   Superheated steam at a pressure of 10bar and 400^0C is supplied to a steam engine. [16M]
    Adiabatic expansion takes place to release point at 0.9bar and it exhausts into a
    condenser at 0.3bar. Neglecting clearance, for a steam flow rate of 1.5 kg/s determine
    the quality of steam at the end of expansion and the end of constant volume operation,
    power developed, specific steam consumption and modified Rankine cycle efficiency.

3   Calculate the power of a motor required to drive a fan which maintains a draught of [16M]
    54mm of water under the following conditions for induced draught fan and forced
    draught fan. Temperature of the flue gases leaving the boiler in each case is 240^0C,
    temperature of the air in the boiler house is 20^0C, Air supplied per kg of fuel in each
    case is 18.5 kg and Mass of coal burnt per hour is 1820 kg efficiency of the fan is 82%.

4   Dry saturated steam at a pressure of 8bar enters a convergent divergent nozzle and [16M]
    leaves it at a pressure of 1.5 bar. If the flow is isentropic and the corresponding
    expansion index is 1.135. Find the ratio of cross sectional area at exit and throat for
    maximum discharge.

5   In one stage of a reaction steam turbine, both the fixed and moving blades have inlet and [16M]
    outlet blade tip angles of 30^0 and 20^0 respectively. The mean blade speed is 80m/sec and
    the steam consumption is 22,500 kg per hour. Determine the power developed in the
    pair, if the isentropic heat drop for the pair is 23.5 per kg.

6 a) Derive the thermal efficiency of an ideal gas turbine power plant. [8M]
   b) A gas turbine plant receives air at 1 bar and 290K and compresses it to 5bar. If the [8M]
    temperature of air after compression is 1000K. Find the thermal efficiency of the
    turbine. Take γ=1.4 for air.

7 a) Derive the expressions for thermal efficiency of thrust and thrust power. [8M]
   b) Explain the principle and working of liquid propellent rocket engine with neat sketch. [8M]

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III B. Tech I Semester Regular Examinations November - 2015
THERMAL ENGINEERING – II
(Mechanical Engineering)

Time: 3 hours

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2. Answering the question in **Part-A** is compulsory
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(Use of steam tables and Mollier chart is allowed)
*****

PART –A

1 a) Derive the expression for thermal efficiency of Regenerative cycle. [4M]
 b) What is the purpose of a steam stop valve? Explain its working principle. [4M]
 c) Define the critical pressure ratio for the nozzle of the steam turbine. [4M]
 d) List out various methods to reduce rotor speed. [3M]
 e) Write briefly about the usage of gas turbines. [3M]
 f) Define thrust Augmentation. [4M]

PART -B

2 A steam power plant of 110 MW capacity is equipped with regenerative as well as [16M] reheat arrangement. The steam is supplied at 80bar and 55°C of superheat. The steam is extracted at 7bar for feed heating and remaining steam is reheated to 350°C and then expanded to 0.4bar in the LP stage. Assume indirect type of feed heaters. Determine the ratio of steam bled to steam generated, the boiler generating capacity in tones of steam per hour and the thermal efficiency of the cycle.

3 a) What is the significance of draught in boiler practice? [8M]
 b) A chimney is 28m high and the temperature of the hot gases in the chimney is 320°C. [8M] The temperature of outside air is 23°C and the furnace is supplied with 15kg of air per kg of coal burnt. Calculate draught in mm of water.

4 Estimate the mass flow rate of steam in a nozzle with the following data: inlet [16M] pressure and temperature is 10bar and 200°C; back pressure is 0.5bar; throat diameter is 12mm.

5 The air entering a steam condenser with steam is estimated at 6kg per hour. The [16M] temperature at inlet to air cooler section is 30°C and at the outlet 26°C. The vacuum in the shell is essentially constant throughout and is 721mm of Hg, while the barometer reads 758 mm of Hg. Calculate the volume of air entering the cooling section per hour, the mass of moisture contained in the air and the mass of steam condensed per hour in the cooling section.

6 A gas turbine unit receives air at 100kPa and 300K and compresses it adiabatically to [16M] 620kPa with efficiency of the compressor 88%. The fuel has a heating value of 44,180kJ/kg and the fuel/air ratio is 0.017kg fuel/kg air. The turbine internal efficiency is 90%. Calculate the compressor work, turbine work and thermal efficiency.

7 a) Explain the working difference between propeller jet, turbojet and turbo propeller. [8M]
 b) Describe the working of Rocket engine with neat sketch. [8M]

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R13

III B. Tech I Semester Regular Examinations November - 2015
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)
*****

PART –A

1 a) Mention the advantages and disadvantages of regenerative cycle.   [4M]
   b) Explain why air preheaters are used in a high pressure boiler?   [3M]
   c) What do you mean by a supersaturated flow? Explain with the help of h-s diagram.   [4M]
   d) Prove that the vacuum efficiency decreases with the increase in barometric pressure.   [4M]
   e) Distinguish between an ideal gas turbine plant and an actual gas turbine plant.   [3M]
   f) Define Thrust and Thrust power.   [4M]

PART -B

2   A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 150^oC [16M]
       expands through the high pressure turbine. It is reheated at a constant pressure of
       40bar to 550^oC and expands through the low pressure turbine to a condenser at
       0.1bar. Draw T-S and h-s diagrams and find the Quality of steam at turbine exhaust,
       cycle efficiency and steam rate in kg/kWh.

3   A coal fire boiler plant consumes 400kg of coal per hour. The boiler evaporates 3200   [16M]
       kg of water at 44.5^oC into superheated steam at a pressure of 12 bar and 274.5^oC. If
       the calorific value of fuel is 32760 kJ/kg of coal. Determine equivalent evaporation
       from and at 100^oC and the thermal efficiency of the boiler. Assume specific heat of
       superheated steam as 2.1 kJ/kg.K.

4   Steam enters a group of nozzles of a steam turbine at 12bar and 220^0C and leaves at   [16M]
       1.2bar. The steam turbine develops 220kW with a specific steam consumption of
       13.5kg/kWh. If the diameter of nozzles at throat is 7mm, calculate the number of
       nozzles.

5   At a certain pair in a reaction turbine, the steam leaves the fixed blade at a pressure of   [16M]
       3bar with a dryness fraction of 0.98 and a velocity of 130m/sec. The ratio of axial
       velocity of 130m/sec. The blades are 20mm high and discharge angle for both the
       rings is 20^0. The ratio of axial velocity of flow to the blade velocity is 0.7 at inlet and
       0.76 at exit from the moving blade. If the turbine uses 4kg of steam per second with
       5% tip leakage. Find the mean blade diameter and the power developed in the ring.

6   Determine the efficiency of a gas turbine plant fitted with a heat exchanger of 75%   [16M]
       effectiveness. The pressure ratio is 4:1 and the compression is carried out in two
       stages of equal pressure ratio with intercooling back to initial temperature of 290K.
       The maximum temperature is 925K. The turbine isentropic efficiency is 88% and
       each compressor's isentropic efficiency is 85%. For air γ=1.4 and cp=1.005kJ/kg K.

7 a) Explain the working difference between propeller jet, turbojet and turbo propeller.   [8M]
   b) Describe the working of Rocket engine with neat sketch.   [8M]

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Code No: **R31015** **R10** Set No. 1

III B.Tech I Semester Supplementary Examinations, November - 2015
STRUCTURAL ANALYSIS – II
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) What do you understand by the term horizontal thrust? Derive an equation for the same. [7M]

b) A three hinged parabolic arch of 30meter span and 6 m central rise carries a point load of 6kN at 8m horizontally from the left hand hinge. Calculate the normal thrust and shear force at the section under the load. [8M]

2 a) What are the straining actions in a two-hinged arch? [3M]

b) A two-hinged parabolic arch of 30m span and 5m central rise has a varying second moment of area, which is proportional to the secant of the slope of its neutral axis. It carries a point load of 150kN at a distance of 10m from the left end. Determine the horizontal thrust, ending moment, normal thrust and shear force under the load. [12M]

3 a) Distinguish between portal and cantilever methods. [6M]

b) Analysis the building frame subjected to horizontal force as shown in figure-1 below. use portal method. [9M]
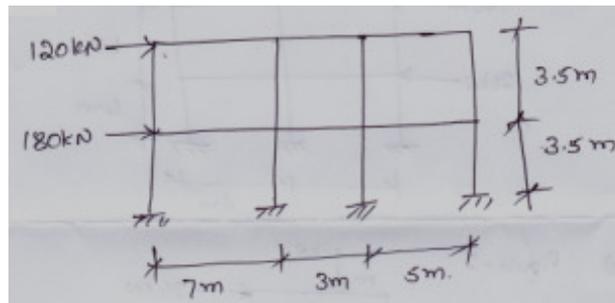
Fig.1

4 a) Derive an expression for the length of a cable. [6M]

b) A cable of uniform thickness hangs between two points 120m apart, with one end 3m above the other. The cable is loaded with a uniformly distributed load of 10kN/m and the sag of the cable, measured from the higher end is 5m. Find the horizontal thrust and maximum tension in the cable. [9M]

5 a) What do you understand by the term "distribution factor"? Discuss its importance in the method of moment distribution. [6M]

b)   A continuous beam ABCD is fixed at A and simply supported at B and C, the beam   [9M]
     CD is overhanging. The spans AB=6m, BC=5m and overhanging CD=2.5m. The
     moment of inertia of the span BC is 2l and that of AB and CD is l. The beam is
     carrying a UDL 2kN/m over the span AB, a point load of 5kN in BC at a distance of
     3m from B and a point load of 8kN at the free end. Determine the fixing moments at
     A,B and C and draw the bending moment diagram.

6   a)   Analyze the frame as shown in figure-2 below by kani's method.   [9M]
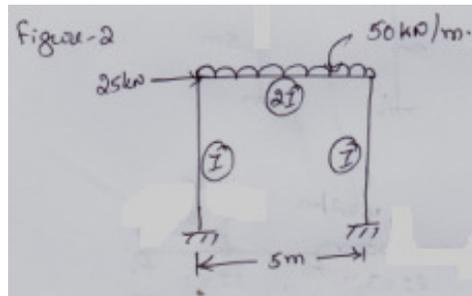
b)   Define the term "rotation factor". Discuss its importance.   [6M]

7   a)   Briefly mention the two types of matrix methods of analysis of indeterminate   [6M]
          structures
     b)   Analyze the Continuous beam shown in figure-3 using flexibility method and draw   [9M]
          bending moment diagram.
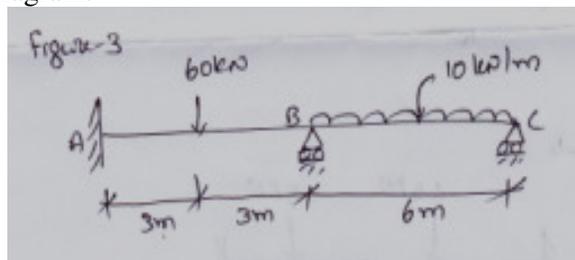
8   a)   What is the basic aim of the stiffness method?   [5M]

     b)   Analyze the continuous beam shown in figure-4 by stiffness method. Draw bending   [10M]
          moment diagram.

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2 of 2

Code No: **R31025**

R10
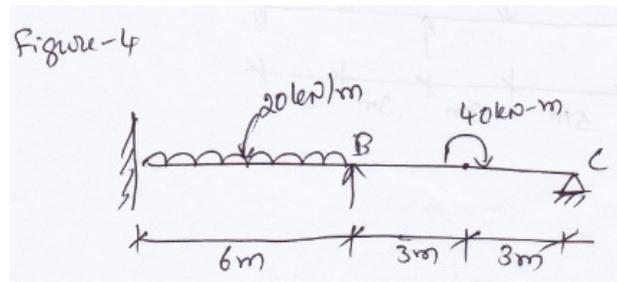
III B.Tech I Semester Supplementary Examinations, November - 2015
ELECTRICAL MACHINES-III
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 75
Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Explain the double field revolving theory for operation of single phase induction motor.

   b) A 150 W, 4-pole, 110 V, 50 Hz, single phase induction motor delivers rated output at a speed of 1425 rpm. The total copper loss at full load is 30 watt. Determine the full load slip and full load efficiency. The rotational losses are assumed to be 25 watt and neglect the stator copper loss. Also determine the copper losses caused by two fields.

2 a) Describe with neat sketch the constructional details and operation of a salient pole type alternator.
   b) A 3-phase, 16-pole alternator has a resultant air gap flux of 0.06 Wb per pole. The flux is sinusoidally distributed over the pole. The stator has 2 slots per pole per phase and 4 conductors per slot are accommodated in two layers. The coil span is 150^0 electrical. Calculate the phase and line voltage when the machine runs at 375 r.p.m.

3 a) Explain the sources of harmonics in an alternator. What are the various effects of harmonics on generated e.m.f in an alternator? Explain the methods to suppress the harmonics.

   b) Calculate the r.m.s value of the induced e.m.f per phase of a 10-pole, 3-phase, 50 Hz, alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150^0 electrical. The flux per pole has a fundamental component of 0.12 Wb and a 20% third harmonic component.

4 a) With the help of neat sketches, explain how the voltage regulation can be determined using EMF method from the O.C and S.C test results.

   b) A 220 V, 50 Hz, 6-pole star connected alternator with armature resistance of 0.06 ohm/phase gave the following data for open circuit and short circuit characteristics. Find the voltage regulation at full load current of 40 amps at a power factor of 0.8 lag by MMF method.

Field Current (A)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.8	2.2	2.6	3.0	3.4
O.C. Voltage/ph (V)	16.7	33.5	50.2	67	84.3	99.3	112	134	151	164	173.2	179
S.C Current (A)	6.6	13.2	20	26.5	32.4	40	46.3	59.0	--	--	--	--

5 a) Derive the expression for synchronizing power developed by an alternator.

   b) Two identical 3-phase alternators running in parallel supply load demand of 1500 kW at 11 kV and power factor 0.867 (lag). Each alternator supplies half the demand has a reactance (synchronous) of 50 ohms/phase and a resistance of 4 ohms/phase. The field excitation of first alternator is so adjusted that its armature current is 50 A (lag). Determine the armature current of second alternator and the generated voltage of first alternator.

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6 a) Derive the expression for the input and output power developed by synchronous motor. Also derive the maximum input and output power developed by synchronous motor.

   b) Draw the phasor diagram of synchronous motor and explain.

7 a) Why synchronous motor is not self starting? Explain the methods of starting of synchronous motor.
   b) What is meant by constant power circle for synchronous motor? Explain.

8 a) Explain about single phase AC series motor with neat diagrams.

   b) A 120 V, 60 Hz, 0.25 Hp universal motor runs at 2000 rpm and takes 0.4 A when connected to a 120 V DC source. Determine the speed, torque and power factor of the motor when it is connected to a 120 V, 60 Hz supply and is loaded to take 0.6 A (r.m.s) of current. The resistance and inductance measured at the terminals of the machine are 20 ohms and 0.25 H respectively.

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Code No: **R31035**

R10

Set No. 1

III B.Tech I Semester Supplementary Examinations, November - 2015
DESIGN OF MACHINE MEMBERS-I
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a)   What are the basic requirements of machine element?   [7]

   b)   The piston of a reciprocating compressor has a diameter of 60 mm. The maximum pressure on   [8]
        the piston face is 1.25 MN/m^2 (12.5 bar). Assuming that the gudgeon pin passing through the
        small end of the connecting rod can be safely loaded in shear up to 10 MN/m^2. Calculate the
        minimum diameter of the gudgeon pin.

2   A hot rolled 070M26 steel rod is to be subjected to a torsional load that will vary from -110 N m   [15]
       to 440 N m. Determine the required diameter of the rod using a factor of safety N = 1.75.

3   A boiler shell 240 cm in diameter is subjected to a steam pressure of 10 kg/cm^2. It has a treble   [15]
       riveted butt joint and double riveted circumferential lap joint with efficiency of 85% and 70%
       respectively. The allowable stresses may be taken as σ_t = 770 kg/cm^2, σ_{cr} = 1,200 kg/cm^2 and σ_s
       = 560 kg/cm^2.
       Resistance of rivets in double shear equals to 1.875 times that of rivets in single shear. The joint
       should be steam and water light.

4   A steel bracket is secured to the wall by means of four through bolts made of C.40 steel having   [15]
       allowable tensile stress of 800 kg/cm^2. The rotating shaft, fitted in a bearing on the bracket,
       exerts a load of 2,000 kg at a distance of 15cm from the wall. Find the required size of the bolts
       to be used.
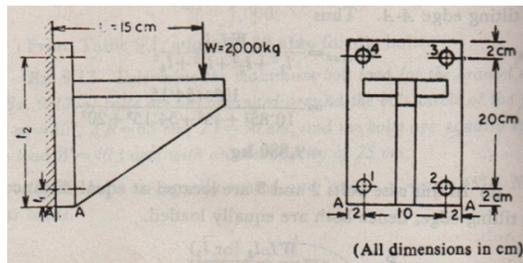
5   Describe a knuckle joint to connect two mild steel bars under a tensile load of 25 kN. The   [15]
       allowable stresses are 65 MPa in tension, 50 MPa in shear and 83 MPa in crushing.

6   Compare the torsional stiffness and strength of a solid circular section shaft with a solid   [15]
       elliptical section having a semi major axis twice the semi minor axis let both torsion members be
       made of the same material and have the same length and the same cross sectional area.

7   Design a flexible coupling with rubber bushes as flexible members, suitable to transmit 400 h.p.   [15]
       at 1450 rpm. The maximum torque may rise to 1.5 times the steady torque. The outside diameter
       of the coupling is 35 cm. Assume reasonable stresses for the parts of the coupling, make a neat
       sketch of the coupling.

8   A helical spring B is placed inside the coils of a second helical spring A, having the same   [15]
       number of coils and free length. The springs are made of the same material the composite spring
       is compressed by an axial load of 2300 N which is shared between them. The mean diameters of
       the spring A and B are 100 mm and 70 mm respectively and wire diameters are 13 mm and 8
       mm respectively. Find the load taken and the maximum stress in each spring
*****

Code No: **R31125**

R10

III B.Tech I Semester Supplementary Examinations, November - 2015
WEB TECHNOLOGIES
(Information Technology)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1	a)	What is HTML? Explain its importance in building web applications.	8
	b)	Explain ordered lists and un ordered lists with example syntax.	7
2	a)	What are different ways to apply styles to a Web page?	7
	b)	Explain importance Of CSS and how do you import style sheets in your browser for user defined view.	8
3	a)	What is the best screen size to design webpage? Explain with an example.	8
	b)	Write a program in java script to make a webpage form as dynamic report generator.	7
4	a)	Explain DHTML with an example program.	8
	b)	Write a program that uses Methods and properties of HTML DOM.	7
5	a)	What is XML? Differentiate between DTD and XML Schema.	7
	b)	What are the differences between CDATA and PCDATA?	8
6	a)	Define PHP. How do you configure wamp and xamp server?	7
	b)	Explain Identifiers in PHP with an example.	8
7	a)	What is the use of "echo" in php? How to include a file to a php page?	7
	b)	How to establish connection between wamp and MySQL?	8
8		Explain Perl. What are the advantages of programming in Perl? What factors do you take into consideration to decide whether Perl is a suitable programming language for a situation or not?	15

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