$\boxed{\text{R13}}$

$\left(\text{SET - 1}\right)$

III B. Tech II Semester Supplementary Examinations, November/December-2016
DESIGN AND DRAWING OF STEEL STRUCTURES
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B
Use of IS: 800-2007 and steel tables are allowed. For all designs adopt Limit State Method
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PART –A

1   Design an 18m long simply supported welded plate girder carrying a uniformly distributed load of 50kN/m excluding self weight and two concentrated loads of 350kN each at quarter points of the span. Assume that girder is laterally supported throughout. Draw to scale i) the cross-section, ii) the longitudinal views.   [28M]

2   Design a beam of effective span 6.0m and subjected to a bending moment of 105.3×10^6 Nmm.The compression flange is laterally unsupported throughout. Check for deflections and shear. Assume fy =250MPa. Draw to scale the cross-section, the longitudinal section and place.   [28M]

PART –B

3.   Design a splice for tension member sections 160 x 10mm and 250 x 14mm the member is subjected to a pull of 200kN. Assume fy=250N/mm^2.   [14M]

4.   a)   Explain the live load and dead loads criteria considerations in the roof trusses.   [7M]

     b)   Explain the design procedure of simple roof truss.   [7M]

5   A column section ISHB 350@ 0.674kN/m is carrying an axial load of 1000kN. It is to be supported over a column section ISHB 450 @ 0.872kN/m. Design the column splicing.   [14M]

6.   Explain the design procedure of gantry girders.   [14M]

7.   Design a slab base for a column consisting of ISHB 300 @58.8kg/m and carrying an axial load of 1000kN. Take allowable bearing pressure on concrete as 4N/mm^2.   [14M]

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III B. Tech II Semester Supplementary Examinations, November/December-2016
UTILIZATION OF ELECTRICAL ENERGY
(Electrical and Electronics Engineering)

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　Maximum Marks: 70

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

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

PART -B

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

Mounting height from the working plane =3m
Utilisation factor　　　　　　　　　　=0.65
Depreciation factor　　　　　　　　　 =1.3
The lamps are to be chosen from the following groups:

Rating in watts	75	100	150	200
Total lumens	800	1,200	2,000	2,800

Calculate the number of lamps of each type.

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

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

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

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

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

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

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Code No: RT32033　　　　　(R13)　　　　　(SET - 1)

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

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　Maximum Marks: 70

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

1	a)	What is the bearing area for a collar bearing having n collars?	[3M]
	b)	What stresses are induced in the crank shaft?	[4M]
	c)	What factors are to be considered with designing a piston?	[3M]
	d)	What are the beams of large curvature?	[4M]
	e)	How the angle of wrap influences the performance of belt drive?	[4M]
	f)	Classify the brackets, hangers and wall boxes.	[4M]

PART –B

2 　a)　Formulate the heat generated and dissipated in a journal bearing.　[4M]

　　b)　A shaft is mounted on two roller bearings, which are 350 mm apart. The shaft carries a 　[12M]
bevel gear at the middle. At a shaft speed of 900 rpm; the gear forces are: radial load =
10 kN, and thrust load = 3.5 kN. Determine the rated dynamic capacity of the bearing,
for a desired life of 10,000 hours. The service factor is 1.5, thrust factor is 0.67 and
radial load factor is 0.67.

3 　　Design an overhung crank shaft with two main bearings and a flywheel in between them 　[16M]
for an I.C. engine, single cylinder 0.25 m × 0.30 m. The flywheel weighs 27 kN. The
maximum pressure is 2.1 MPa. The torsional moment is maximum when the crank at
35° form the I.D.C, while the pressure is 1.05 MPa. Assume missing data.

4 　　Design a suitable aluminium alloy piston with two compression rings and one oil ring 　[16M]
for a petrol engine of following particulars:

Cylinder = 0.10 m	
Peak gas pressure	= 3.2 MPa
Mean effective pressure	= 0.8 MPa
Average side thrust	= 2400 N
Skirt bearing pressure	= 0.22 Mpa
Bending stress in piston crown	= 36 MPa
Crown temperature difference	= 70^{0}
Heat dissipated through crown	= 157 kJ/m^{2}s
Allowable radial pressure	= 0.04 MPa
Bending stress in rings	= 90 MPa
Heat conductivity, k	= 160 W/m^{o}C

Draw a full scale dimensioned drawing and indicate the method of reducing the thermal
expansion in the skirt of designed piston.

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5   Horizontal cross-section of a crane hook is a trapezium with parallel sides 26 mm wide   [16M]
     at the inside and 13 mm wide at the outside. The parallel sides of the trapezium for the
     horizontal section are 32 mm apart. The crane hook carries a load P of 5000 N, the line
     of load being a horizontal distance of 32 mm from the inside edge of the horizontal
     cross-section through the centre of curvature and the centre of curvature being 38 mm
     from the same edge. Find the greatest tensile and compressive stresses in the hook. Find
     the position of neutral axis. Plot the distribution of stress in the horizontal section. What
     are the stresses if curvature is neglected?

6   a)   Distinguish between the Square and ACME threads.   [4M]
     b)   The nominal diameter of a triple threaded square is 50mm, while the pitch is 8mm. It is   [12M]
           used with a collar having outer diameter of 100mm and inner diameter 65mm. The
           coefficient of friction at the thread surface as well as collar surface can be taken as 0.15.
           The screw is used to raise a load of 15kN. Using uniform wear theory for collar friction,
           calculate
           i) torque required to raise the load
           ii) torque required to lowering the load.

7   a)   What factors are to be considered while designing the levers?   [8M]
     b)   Sketch and explain the gear tooth terminology.   [8M]

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R13

III B. Tech II Semester Supplementary Examinations, November/December-2016
DIGITAL COMMUNICATIONS
(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)	Write the elements of digital communication systems.	[3M]
	b)	Write about DPSK.	[4M]
	c)	Explain probability of error using matched filter.	[4M]
	d)	Define discrete messages.	[4M]
	e)	Write the advantages of source coding.	[3M]
	f)	Define encoding.	[4M]

PART –B

2	a)	Derive the expression for signal to noise ratio of PCM system?	[12M]
	b)	Explain the advantages of digital communication systems.	[4M]
3	a)	Explain the principle of binary phase shift keying.	[8M]
	b)	Name different modulation techniques and explain which technique is good for digital modulation.	[8M]
4	a)	What is probability of error and explain its significance?	[8M]
	b)	Derive the expression for probability of error of ASK.	[8M]
5	a)	Define joint and conditional entropies. Obtain the relation between them.	[8M]
	b)	Write a short note on concept of amount of information and its properties.	[8M]
6	a)	Write short notes on the capacity of continuous channels.	[8M]
	b)	Apply Huffmann's encoding procedure to the following message ensemble and determine the average length of the encoded message. $\{X\} = \{x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9, x_{10}\}$ $P\{X\} = \{0.18,0.17,0.16,0.15,0.10,0.08,0.05,0.05,0.04,0.02\}$ The encoding alphabet is $\{D\} = \{0, 1, 2, 3\}$.	[8M]
7	a)	Give the Comparison of Error Rates in Coded and Uncoded Transmission.	[8M]
	b)	What are the advantages and disadvantages of cyclic codes? Design an encoder for the (7, 4) binary cyclic code generated by $g(x) = 1+x+x^3$ and verify its operation using the message vector (0101).	[8M]

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R13

III B. Tech II Semester Supplementary Examinations, November/December-2016
COMPUTER NETWORKS
(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)	List two advantages and disadvantages of having international standards for network, Protocols?	[4M]
	b)	Which switching method allows real-time data transfer?	[3M]
	c)	Data link protocols almost always put the CRC in a trailer, rather than in a header. Why?	[5M]
	d)	What is slotted ALOHA? Mention its advantages.	[3M]
	e)	What is the baud rate of the standard 10-Mbps Ethernet?	[3M]
	f)	Describe why HTTP is designed as a stateless protocol.	[4M]

PART -B

2	a)	Write short notes on NSFNET.	[4M]
	b)	Two networks each provide a reliable connection oriented service.One of them offers a reliable byte stream and other offers a reliable message stream. Are they identical? Justify.	[8M]
	c)	Discuss the "Bad Timing" problem of OSI reference model.	[4M]
3	a)	Compare and contrast synchronous time division multiplexing and statistical time division multiplexing.	[8M]
	b)	Explain in detail about the Virtual Circuit Networks.	[8M]
4	a)	Briefly discuss about CRC checker.	[3M]
	b)	PPP (Point to Point Protocol) is based closely on HDLC, which uses bit stuffing to prevent accidental flag bytes within the payload from causing confusion. Give reasons why PPP uses character stuffing instead.	[8M]
	c)	Draw and explain about HDLC protocol.	[5M]
5	a)	Discuss about congestion control in Virtual Circuit subnets.	[8M]
	b)	Explain in detail the working of CSMA.	[8M]
6	a)	What are common Ethernet implementations? Discuss about the MAC sub layer?	[8M]
	b)	Discuss the MAC layer functions of IEEE 802.11.	[8M]
7	a)	Discuss the protocol stack of WAP.	[8M]
	b)	Explain HTTP Transaction with an example.	[8M]

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Code No: **R32033**

R10

Set No. 1

III B.Tech II Semester Supplementary Examinations, November/December-2016
HEAT TRANSFER
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
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1	a)	Derive the one-dimensional, steady state heat conduction equation with internal heat generation by writing the energy balance for a differential equation volume element in cylindrical coordinate system.	[10M]
	b)	A constant temperature difference of 166.7^0C is maintained across the surfaces of slab of 3.05 cm thickness. Calculate the rate of heat transfer per unit area across the copper slab of thermal conductivity k=380.7 W/mK .	[5M]
2		A thin hollow stainless tube with internal diameter =7.6 mm and outer diameter =8mm is heated with a current of 250A intensity. The outer surface of the tube is insulated and all the heat evolved in the tube wall is transferred from the tube through its inner surface. The specific resistance and the thermal conductivity of steel are respectively 85 $\mu\Omega$-cm^2 and 18.6 W/mK. Calculate (a) The volumetric rate of heat liberation from the inner surface (b) The temperature drop across the wall	[15M]
3	a)	What is lumped capacity? What are the assumptions for lumped capacity analysis?	[7M]
	b)	A 2mm thick copper plate at 400^0C is suddenly dipped into water at 20^0C.Calculate the time required for the plate to reach a temperature of 40^0C taking h=93W/m^{2}K For plate ρ=8800kg/m^3,c=0.381KJ/Kg K, area=30cmx30cm,k=370W/mK.	[8M]
4		State the Buckingham's π theorem. Explain the various parameters used in forced convection. Using dimension analysis obtain an expression for Nusselt number in terms of Reynolds and Prandtl numbers.	[15M]
5	a)	Distinguish clearly between the Biot and Prandtl numbers.	[5M]
	b)	A 300mm long glass plate is hung vertically in the air at 27^0 while its temperature is maintained at 77^0C.Calculate the boundary layer thickness at the trailing edge of the plate. If a similar plate is placed in a wind tunnel and air is blown over it at a velocity of 4 m/s, find the boundary layer thickness at its trailing edge. Also determine the heat transfer coefficient, for natural and forced convection for the above mentioned data.	[10M]

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6   a)   Write a brief note on heat transfer during boiling and condensation.   [7M]

b)   A 4 cm OD, 1m long tube is to be used to condense steam at atmospheric pressure.   [8M]
     The water flows inside the tube maintaining the wall surface at 60^0C. Estimate the
     mass of condensate for the tube in
     (i) Horizontal position   and (ii) Vertical position.

7   a)   Define heat exchanger effectiveness and explain its significance.   [5M]

b)   Determine the area of one-shell pass and 2 tube pass heat exchanger to heat water   [10M]
     with a mass flow rate of 68kg/min from 35^0C to 75^0C by an oil having specific heat
     of 1.9KJ/kg K. The oil, flowing through the tubes, enters the exchanger at 110^0C
     and leaves at 75^0C.The overall heat transfer coefficient may be taken as 320
     W/m^{2}K.

8   a)   State Kirchhoff's law. Explain it briefly.   [5M]

b)   The temperature of a room is measured with a mercury-in-glass thermometer of   [10M]
     emissivity 0.94.It indicates a temperature of 27^0C when the walls are at
     25^oC.Estimate the reading error for the thermometer and the actual room
     temperature. Take the coefficient of heat transfer from the air to the surface of the
     thermometer as 5 W/m^{2}K.

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Code No: **R32043**

R10

Set No. 1

III B.Tech II Semester Supplementary Examinations, November/December-2016
DIGITAL SIGNAL PROCESSING
(Common to ECE& ECM)

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

Answer any FIVE Questions
All Questions carry equal marks
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1 a) Determine whether the following systems are stable, casual, linear and time-invariant i)   [8M]

$$T(x(n))=g(n)x(n) \qquad \text{ii) } T(x(n))=\sum_{k=n_0}^{n} x(k)$$

   b) Determine the impulse response of the following causal systems   [7M]
       i) $y(n)-2\cos\theta y(n-2)+ y(n-2)= x(n)$
       ii) $y(n)-3y(n-1)+2y(n-2)=x(n)+3x(n-1)+2x(n-2)$

2 a)   [7M]
       Find the inverse Z transform of a signal if $x(z)=\dfrac{1}{1024}\left(\dfrac{1024-z^{-10}}{1-\dfrac{1}{2}z^{-1}}\right)$

   b) Compute the DFT of the following sequence for N=8 using radix 2 DIT-FFT algorithm   [8M]
       $x(n)=\begin{cases} n \ for 0\le n\le 7 \\ 0 \ otherwise \end{cases}$

3 a) Derive the DIF FFT algorithm and draw block diagram of 4 points. Find FFT of   [8M]
       $x=[-1,2,4,-3]$ using the algorithm
   b)   [7M]
       Find the inverse DFT of $X(k)=\begin{cases} 3 \quad k=0 \\ 1 \qquad 1\le k\le 9 \end{cases}$

4 a) Realize the following filter function using the direct form-I and II realization   [8M]
       $y(n)=0.251y(n-1)+0.05y(n-2)+x(n)+-2x(n-2)$
   b) Realize the lattice form of a FIR filter given by the system function   [7M]
       $H(z)=1+2.88z^{-1}+3.4048z^{-2}+1.74z^{-3}+0.4z^{-4}$. Also verify whether the system has
   minimum phase or not?

1 of 2

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5 a) Consider a Butterworth analog prototype $H_L(s) = \dfrac{1}{1 + \dfrac{s}{\Omega_c}}$ with $\Omega_c = 1$.   [8M]

i) Find an IIR discrete time filter H(z) with the cut-off frequency $\omega_c = 0.3\pi$ using

bilinear transformation. ii) Find $H_d(0)$, $H_d(\pi)$ and $H_d\left(\dfrac{\pi}{2}\right)$

iii) For the input $x[n] = \left(\dfrac{1}{2}\right)^n u[n]$ find the output of IIR filter

b) Define the Chebyshev filters in terms of the Chebyshev polynomials. Give the [7M]
recursive formula to generate   the Chebyshev formula. Explain   the   difference
between   type I and type II Chebyshev filters.

6 a) Determine the filter coefficients h(n), which is symmetric low pass filter with linear [8M]
phase. The desired frequency response

$$H_d(w) = \begin{cases} e^{-j\left(\frac{M-1}{2}\right)\omega} & for\ 0 \le |\omega| \le \dfrac{\pi}{4} \\ 0 & otherwise \end{cases}$$ Employ rectangular window with M=7

b) Realize a FIR filter with impulse response h(n) given by $h(n) = \left(\dfrac{1}{2}\right)^n [u(n) - u(n-5)]$ [7M]

7 a) What is multirate signal processing? Explain about multirate signal processing with   [8M]
appropriate examples along with the advantages.
   b) Explain the method for sample rate conversion by a factor I/D.   [7M]

8 a) Explain about various on-chip peripherals provided on TMS320C5X processor   [8M]
   b) Explain about the barrel shifter unit of a DSP processor with a neat block diagram   [7M]

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III B.Tech II Semester Supplementary Examinations, November/December-2016
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE and IT)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
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1. a) Compare Big-oh notation and Little-oh notation. Illustrate with an example.
   b) Find Big-oh notation and Little-oh notation for $f(n) = 7n^3 + 50n^2 + 200$.

2. a) Explain in detail about Connected components and Bi connected components.
   b) How to determine spanning trees from a given tree?

3. a) Show how quick sort sorts the following sequences of keys in ascending order.
      12, 25, 35, 43, 48, 59, 77, 85, 86, 94?
   b) Discuss the time complexity of the quick sort algorithm for the above case?

4. Define minimum cost Spanning Tree. Write and explain the Prim's algorithm, applying the algorithm construct a minimal spanning tree for graph given bellow.
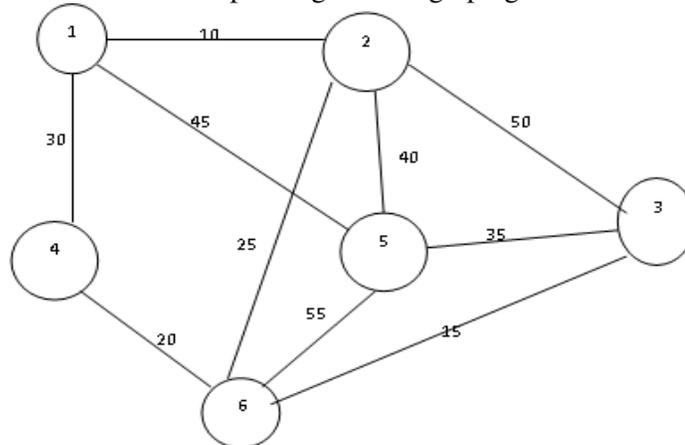
5. Discuss the dynamic programming solutions for the problems of
   (a) Reliability design and (b) Traveling salesperson.

6. a) Briefly explain 8-queen problem using backtracking. Explain its application.
   b) Draw the state space tree for m coloring when n=3 and m=3.

7. a) Explain the method of reduction to solve TSP problem using Branch and Bound.
   b) Discuss the principles of FIFO Branch and Bound.

8. a) Explain the classes of NP-Hard and NP-Complete.
   b) Discuss about deterministic and non-deterministic algorithms.

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