

**TRANSPORTATION ENGINEERING -I**

(Civil Engineering)

**Time: 3 Hours****Max Marks: 75**

Answer any FIVE Questions  
All Questions carry equal marks

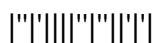
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1. (a) Briefly outline the highway development in India.  
(b) Explain the necessity and objectives of highway planning?
2. (a) Derive an expression for finding the extra widening required on horizontal curve.  
(b) The stopping sight distance required for a highway is 80m. Find the required set back distance from centre line of a circular curve of radius 300 m assuming the length of the curve is greater than the sight distance.
3. (a) What are the objectives and uses of volume study.  
(b) What are the various types of traffic accidents and explain the various measures to prevent accidents.
4. (a) How are the traffic signal times decided based on Webster's Method.  
(b) A carriage way approaching an intersection is given as 15 m. The entry and exit width at the rotary is 10 m. The traffic approaching the intersection from the four sides is given in the table. Find the capacity of the rotary using the given data.

approach	Left turn	Straight	Right turn
North	408	450	375
South	420	350	370
East	250	500	600
west	400	505	510

5. (a) What are the desirable properties of the bitumen mixes? What are the steps on bituminous mix design? Discuss briefly?  
(b) Explain the CBR and the test procedure for the laboratory and field tests. How are the results of the test obtained and interpreted?
6. The CBR Value of subgrade soil is 5 %. Calculate the total thickness of flexible pavement using design charts developed by IRC.
7. Determine the complete stresses in the pavement for a 53.38 kN dual wheel, tire pressure 517.1 kPa, center to center spacing of duals in 0.33 m.
  - (a) Calculate the warping stresses for a 3.70 m wide slab with various lengths, assuming temperature differences to be, day +2 per 25.4 mm of slab thickness to, and night - 1°C per 25.4 mm of slab thickness. Plot a curve of stress versus distance.
  - (b) Calculate the warping stress for various slab widths. Plot a curve of stress versus distance.
  - (c) Determine the loading stresses at the edge, and interior of the slab.
  - (d) Determine the maximum critical stress (load + temperature) in the concrete, in interior case.
8. (a) Compare the alternate bay and continuous bay methods construction of cement concrete roads  
(b) What are the advantages and drawbacks of cement concrete roads? Explain cement grouted and rolled concrete layers and their uses.

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 (Civil Engineering)

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1. (a) What are the factors affecting the highway alignment.  
 (b) What are the different Road Development Plans in India? Discuss them in detail.
2. (a) What are the objects of highway geometric design? List the various geometric elements to be considered in highway design.  
 (b) Calculate the stopping sight distance for a design speed of 100 kmph. Take the total reaction time 2.5 seconds and the coefficient of friction = 0.35.
3. (a) Explain briefly the various aspects investigated during parking studies. What are the uses of these studies?  
 (b) What a detailed note on road accidents and its preventive measures.
4. (a) Explain the design steps involved in Rotary intersection.  
 (b) The width of approaches for a rotary intersection is 12 m. the entry and exit width at the rotary is 10 m. Table below gives the traffic from the four approaches, traversing the inter section. Find the capacity of the rotary.

approach	Left turn	Straight	Right turn
North	400	700	300
South	350	370	420
East	200	450	550
west	350	500	520

5. (a) Discuss the desirable properties of the bitumen. Compare tar and bitumen.  
 (b) The properties of a subgrade soil are given below  
 Liquid limit = 75 %  
 Plastic limit = 55 %  
 Passing No. 200 sieve = 70 %  
 (i) Determine the group index and classify the soil by HRB soil classification system.  
 (ii) Determine the suitability of the soil as a subgrade material.
6. Find the spacing between the contraction joints for a 3.5 m slab width having a thickness of 22 cm for (a) plain concrete slab (b) R.C.C. slab. The allowable tensile stress values in concrete and steel are 0.8 and 1400 kg/cm<sup>2</sup>, coefficient of friction is 1.50.
7. Design the pavement for construction of a new two lane carriageway for design life 15 years using IRC method. The initial traffic in the year of completion in each direction is 150 CVPD and growth rate is 5%. Vehicle damage factor based on axle load survey = 2.5 std axle per commercial vehicle. Design CBR of subgrade soil=4%.
8. (a) How is soil cement base course constructed? Give details  
 (b) List out the different methods of road construction. Discuss their advantages and limitations.

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**TRANSPORTATION ENGINEERING -I**

(Civil Engineering)

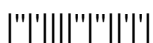
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1. (a) Explain the engineering surveys needed for a highway project and data to be collected.  
(b) What is the importance of Nagpur road plan in highway planning of our country? Explain the plan formulae and the salient features of the plan.
2. (a) Explain the ruling, maximum and exceptional gradients.  
(b) The speed of overtaking and overtaken vehicles are 90 Kmph and 45 Kmph respectively on a two way traffic road. If the time taken by the overtaking vehicle is equal to 7.5 seconds and reaction time of the driver is equal to 2 seconds, calculate the safe overtaking sight distance.
3. (a) Write in details about the traffic counting.  
(b) Write the various IRC equivalent factors of vehicles for Rural roads.
4. (a) Explain at grade intersections, the advantages and limitations.  
(b) The 15 minute counts on cross roads 1 and 2 during peak hour are observed as 178 and 142 vehicles per lane respectively approaching the intersection in the direction of heavier traffic flow. If the amber times required are 3 and 2 seconds respectively for two roads based on approach speeds, design the signal timings by trail cycle method. Assume an average time head way of 2.5 seconds during green phase.
5. Explain the plate bearing test procedure and how corrections for 'K' value may be made for a different plate size and for accounting for worst moisture conditions.
6. Estimate the thickness of cement concrete using the method suggested by Indian road congress.
 

Modulus of elasticity of concrete	= $3.0 \times 10^5 \text{ kg/cm}^2$
Modulus of rupture of concrete	= $40 \text{ kg/cm}^2$
Poisson's ratio of concrete	= 0.15
Modulus of subgrade reaction	= $6 \text{ kg/cm}^2$
Wheel load	= 5100 kg
Radius of contact pressure	= 15 cm
7. (a) Explain the CBR method of pavement design. How is this method useful to determine the thickness of the component of layers.  
(b) Design the pavement for construction of a new bypass with the following data:  
Two lane carriage way, Initial traffic in the year of completion of construction = 400 CVPD (sum of both directions) Traffic growth rate = 7.5 %, Design life = 15 years, Vehicle damage factor based on axle load survey = 2.5 standard axle per commercial vehicle, Design CBR of subgrade soil = 4%.



8. (a) Specify the materials required for construction of WBM roads. What are the uses and limitations of this type of road?
- (b) Compare the following methods of bituminous road construction
- (i) Central plant mix and road mix methods
  - (ii) Hot mix and cold mix
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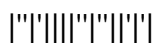
(Civil Engineering)

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1. (a) Explain obligatory points? What are the uses of map study in engineering surveys?  
(b) What are the different road network patterns? Explain them in detail with neat sketches.
2. (a) Explain the summit and valley curves and the various cases when these are formed while two different gradients meet.  
(b) The design speed of a highway is 90 Km/h. There is a horizontal curve of radius 190 m on a certain locality. Calculate the super-elevation needed to maintain this speed. If the maximum super-elevation of 0.07 is not to be exceeded, calculate the maximum allowable speed on this horizontal curve as it is not possible to increase the radius. Safe limit of transverse coefficient of friction is 0.15.
3. (a) Discuss briefly the various factors affecting the practical capacity of road.  
(b) What are the various types of traffic marking commonly used? What are the uses of each?
4. (a) What is traffic rotary? What are its advantages and limitations, in particular reference to traffic conditions in India?  
(b) The average normal flow of traffic on cross roads A and B during design period are 400 and 2250 PCU per hour. The saturation flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 sec. Design two phase traffic signal by Webster's method.
5. (a) What are the tests on aggregates for the highways and explain them clearly?  
(b) What are the various tests carried out on bitumen? Briefly mention the principle and uses of each test,
6. (a) Explain the critical wheel load locations considered in Westergaard's theory? Write the significance of each location in the analysis of load stresses?  
(b) Compute the stresses due to loading at salient locations on a cement concrete slab using Westergaard's equations from the below given data.  
Poisson's ratio of concrete = 0.15  
Pavement slab thickness = 22cm  
Modulus of elasticity of concrete  $2.77 \times 10^5 \text{ kg/cm}^2$   
Modulus of subgrade reaction =  $4.35 \text{ kg/cm}^3$   
Radius of contact of tire = 16 cm  
Wheel load = 4950 kg.



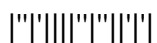
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7. (a) Explain how the sub-base thickness varies in the design of flexible pavements?  
(b) Design the pavement for construction of a new two lane carriageway for design life 15 years using IRC method. The initial traffic in the year of completion in each direction is 150 CVPD and growth rate is 5%. Vehicle damage factor based on axle load survey = 2.5 std axle per commercial vehicle. Design CBR of subgrade soil=4%.
8. (a) Write down the construction steps for water-bound macadam roads.  
(b) What are the various types of bituminous construction in use? Discuss the advantages and limitations of each.

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III B.Tech. I Semester Regular Examinations, November/December - 2012

**LINEAR & DIGITAL IC APPLICATION**

(Electrical and Electronics Engineering)

**Time: 3 Hours****Max Marks: 75**

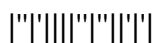
Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Describe the classification of ICs in detail.  
(b) Discuss about dc analysis of Dual input balanced output amplifier.
2. (a) List out the AC characteristics of an op-amp and discuss about them.  
(b) With neat circuit diagrams explain the techniques used for minimizing offset voltage and offset current.
3. (a) Draw a neat circuit diagram of an integrator circuit. Explain its functioning with the input-output wave forms. Derive the output voltage  $V_0$  of an integrator circuit.  
(b) Explain the principle of operation of a precision full wave rectifier with waveforms.
4. (a) Explain the operation of Schmitt trigger using 555 timer with its circuit diagram.  
(b) Draw the block diagram of a 565 PLL IC and explain its working. Derive the relation between the 'lock range' & 'capture range'.
5. (a) Explain the operation of an all pass filter with its circuit diagram. For an all pass filter, determine the phase shift  $\Phi$  between the input and output at  $f=2$  KHz. To obtain a positive phase shift ' $\Phi$ ' what modifications are necessary in the circuit.  
(b) With the help of a neat circuit diagram and waveforms, explain the operation of a dual slope ADC. What are its special features.
6. (a) Explain the terms Multiplexing & Demultiplexing.  
(b) Implement full adder circuit using,  
i) Decoder, ii) Multiplexer  
(c) Design an 8421 to gray code converter.
7. (a) Compare synchronous & Asynchronous circuits  
(b) Design a Mod-6 synchronous counter using J-K flip flops.
8. (a) Explain the functional behavior of Static RAM cell  
(b) With the help of a circuit diagram, explain the read and write operations of a dynamic RAM cell.  
(c) Differentiate between static RAM and dynamic RAM.

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III B.Tech. I Semester Regular Examinations, November/December - 2012

**LINEAR & DIGITAL IC APPLICATION**

(Electrical and Electronics Engineering)

**Time: 3 Hours****Max Marks: 75**

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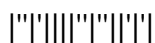
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1. (a) Explain the classification of ICs according to their method of fabrication.  
(b) Describe the AC analysis of differential amplifier to find the parameters  $A_d$ ,  $A_c$ ,  $R_i$  and  $R_o$  for dual input balanced output.
2. (a) Draw the basic block diagram of a general op-amp and explain the operation of each block.  
(b) List ideal characteristics of an op-amp and compare with that of a practical op-amp such as 741.
3. (a) Draw the circuit and explain the working of a logarithmic amplifier and derive the expression for its output.  
(b) Using a 741 op-amp design triangular /rectangular waveform generator to have a output frequency of 1 KHz, a triangular output amplitude of  $\pm 6V$  and a square wave output amplitude of approximately  $\pm 10V$ .
4. (a) Design and draw the circuit and explain the operation of a 555 Timer IC in Astable mode to get output wave form with 50% duty cycle.  
(b) Explain PLL with a block schematic and enlighten the terms: (i) free-running frequency  $f_0$ , (ii) lock range, (iii) capture range, and (iv) pull-in time, pertaining to PLL.
5. (a) Show how a band stop filter circuit can be constructed by the use of low pass and high pass filters. Sketch the expected frequency response and briefly explain.  
(b) Draw the circuit of weighted resistor DAC and derive expression for output analog voltage  $V_o$ .
6. (a) Describe the terms decoder & de-multiplexer. How can you convert a decoder into a de-multiplexer?  
(b) Design a 4 bit BCD to Excess- 3 code converter
7. Design a 4 bit universal shift register which can be used as a parallel in- parallel out register, serial in serial out register, serial in - parallel out and parallel in serial out register with a shift option to wards left or right. Explain each of the behavior with timing waveform.
8. (a) Specify the size of a ROM (number of words and numbers bits per word) that will accommodate the truth table of a BCD to seven segment decoder with an enable input.  
(b) Write a brief note on “programmable logic devices”.

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III B.Tech. I Semester Regular Examinations, November/December - 2012

**LINEAR & DIGITAL IC APPLICATION**

(Electrical and Electronics Engineering)

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1. (a) Discuss the properties of dual input unbalanced output, single ended input differential amplifier.  
(b) Write short notes on "Level Translator".
2. (a) Define and explain the following op-amp parameters.  
(i) Input offset voltage; (ii) CMRR; (iii) PSRR; (iv) Slew Rate  
(b) Explain frequency compensation techniques used in op-amps.
3. (a) Draw the circuit and discuss the working of an instrumentation amplifier? What are its important features? Derive an expression for its output.  
(b) Explain with a neat circuit diagram the working of voltage to current converter with floating load.
4. (a) Draw the circuit diagram and explain the operation of Monostable multivibrator using 555 timer with relevant waveforms. Derive the expression for the output pulse width.  
(b) Give the functional block diagram of VCO NE566 and explain its working.
5. (a) Explain the operation of R-2R-ladder type DAC. Write briefly on performance specifications of digital to analog converter.  
(b) Design a narrow bandpass filter with butterworth response for the following specifications  $f_0 = 10$  kHz,  $Q = 10$  and passband gain  $\geq 10$ .
6. (a) What is a demultiplexer? Mention the differences between DMUX and MUX. Implement the function  $f = \sum m(0, 1, 4, 5, 7)$  using 8 to 1 multiplexer.  
(b) Design a 4 bit BCD to Excess-3 code converter using Binary Parallel Adder (BPA). What is the drawback in BPA and how can it be rectified.
7. (a) Realize a master-slave JK Flip-Flop using NAND gates and explain its operation with the help of its truth table. Mention its merits over edge-triggered JK Flip-Flop.  
(b) Design a modulo-100 counter using two 74x163 binary counters?
8. (a) How does the architecture of PLA differ from PROM? Explain.  
(b) Explain with suitable diagram the internal structure of a DRAM cell.

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**LINEAR & DIGITAL IC APPLICATION**

(Electrical and Electronics Engineering)

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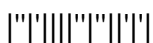
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1. (a) Briefly explain the difference between digital and linear ICs.  
(b) List different types of linear IC packages.  
(c) What is a level translator circuit? Why it is used with the cascaded differential amplifier in op-amps?
2. (a) Explain the significance of the following OPAMP parameters  
(i) CMRR (ii) PSRR and (iii) Slew rate  
What is the effect of these parameters on the performance of operational amplifier.  
(b) Draw and explain the working of an op amp with offset-voltage compensating network.
3. (a) Design a differentiator to differentiate an input signal that varies in frequency from 10Hz to about 1K Hz. Draw its output waveform if  $\sin 2\pi \times 1000t$  signal is applied.  
(b) Define the terms Upper and Lower Points of a Schmitt trigger. What is the significance of the two parameters? Explain the operation of a Schmitt trigger circuit using comparator.
4. (a) Draw the functional diagram of a 555 timer IC and explain the function of each internal block to obtain Astable multivibrator operation  
(b) What is the purpose of low pass filter in a phase locked loop? Describe different types of low pass filters used in PLL.
5. (a) Design & draw the circuit of a notch filter for  $f_N=8$  KHz and  $Q=10$ . Choose  $C=500$  pF.  
(b) Draw the schematic diagram of Successive Approximation type analog to digital converter and explain the operation.
6. (a) Explain how a 4 to 16 line decoder can be built using 2 to 4 line decoder.  
(b) Draw and explain the working of 4 bit adder – subtractor circuit
7. (a) Explain the working of JK flip-flop. What is race around condition? How is it overcome? Explain these concepts with relevant timing diagrams.  
(b) Sketch the block diagram for a Johnson (twisted-ring) counter & explain its operation. Draw the output waveform from each flip- flop of a three stage unit. By what number N does this system divide.
8. (a) How does the architecture of PLA different from PROM? Differentiate between PLA, ROM and PAL  
(b) Sketch the circuit of a 6 –MOSFET static RAM cell and explain its operation.

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Code No: R31036

R10

Set No: 1

III B.Tech. I Semester Regular Examinations, November/December - 2012

**METAL CUTTING & MACHINE TOOLS**

(Mechanical Engineering)

**Time: 3 Hours**

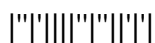
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1. (a) Explain the nomenclature of a single point cutting tool.  
(b) What are the adverse effects of the built-up edge formation?
2. Explain the working principle of a lathe. What are the operations that can be performed on lathe?
3. With the help of block diagram, explain the principle parts of a double housing planer.
4. (a) How do you specify a drilling machine?  
(b) What is a boring operation? Explain how it is performed.
5. (a) Write the advantages of carbide-tipped milling cutters.  
(b) A steel work piece is to be milled. Metal removal rate is  $30 \text{ cm}^3/\text{min}$ . Depth of cut is 5 mm and width of cut is 100 mm. Find the table speed.
6. Sketch and explain the following grinding processes: Form Grinding, Gear tooth grinding, Thread grinding and Cam grinding.
7. (a) What is an indexing jig? What are the various kinds of indexing devices commonly used?  
(b) What are the advantages and disadvantages of conical locators?
8. (a) List out the advantages of CNC systems over conventional NC systems.  
(b) What are the applications of CNC machines? Explain.

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Code No: R31036

**R10**

**Set No: 2**

III B.Tech. I Semester Regular Examinations, November/December - 2012

**METAL CUTTING & MACHINE TOOLS**

(Mechanical Engineering)

**Time: 3 Hours**

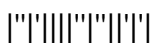
**Max Marks: 75**

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1. Describe the Merchant's force diagram and state its significance in machining.
2. Describe the following parts of a lathe in detail:
  - (a) Apron
  - (b) Cross slide
  - (c) Tool post
3. Explain the mechanism behind the working of a shaper in detail.
4. (a) What is meant by deep hole drilling? Explain.  
(b) Name a few applications of deep hole drilling.
5. (a) Sketch and Describe Drum type milling machine.  
(b) What are the machining parameters of a milling machine?
6. (a) What is meant by the grain size of an abrasive material?  
(b) What is meant by grade and structure of grinding wheel?  
(c) Define Grinding Ratio. Explain its significance.
7. Discuss the principles of design of jigs and fixtures.
8. (a) Explain the working of a NC machine tool.  
(b) What is the coordinate system used for CNC milling machine?

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Code No: R31036

**R10**

**Set No: 3**

III B.Tech. I Semester Regular Examinations, November/December - 2012

**METAL CUTTING & MACHINE TOOLS**

(Mechanical Engineering)

**Time: 3 Hours**

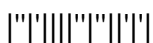
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1. Write in detail about the following:
  - (a) Discontinuous chips
  - (b) Continuous chips
  - (c) Builtup edge formation
  
2. (a) How do you specify a Lathe?  
(b) What is the role of cam design in automatic lathe operation ?
  
3. What are the different operations that can be performed on a shaper? Explain.
  
4. (a) Discuss the nomenclature of Twist Drill.  
(b) How do you calculate machining time in boring?
  
5. Describe the following operations with sketches.
  - (i) Peripheral milling and
  - (ii) Face milling
  
6. What is centerless grinding? Where is it applicable? Explain its advantages and disadvantages.
  
7. (a) What are the safety factors related to design of jigs and fixture?  
(b) On what type of work are swinging clamps used?
  
8. (a) What are the differences between CNC machines and conventional machines?  
(b) What factors do justify the need of CNC machines? Explain.

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Code No: R31036

R10

Set No: 4

III B.Tech. I Semester Regular Examinations, November/December - 2012

**METAL CUTTING & MACHINE TOOLS**

(Mechanical Engineering)

**Time: 3 Hours**

**Max Marks: 75**

Answer any FIVE Questions  
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1. (a) What is the effect of machining parameters on tool life?  
(b) What are the differences between oblique cutting and orthogonal cutting? Give a few examples for each.
2. (a) What are the different types of taper turning methods? Explain them with neat sketches.  
(b) What are the principle features of automatic lathes?
3. (a) How do you specify a planer?  
(b) How will you hold the work on planers? What are the points that must be remembered while doing this task?
4. (a) How do you classify drilling machines and explain various operations that can be performed on a drilling machine?  
(b) Explain the working of gang drilling machine with a neat sketch.
5. Write a short note on the following milling operations  
(a) Straddle milling                      (b) Gang milling                      (c) String milling
6. (a) How do you specify a grinding wheel?  
(b) What factors do you take into consideration while selecting a grinding wheel?
7. (a) Distinguish between a jig and a fixture.  
(b) Explain the principles of location and clamping.
8. (a) What are the functions of a CNC controller?  
(b) Explain the constructional features of a CNC machine.

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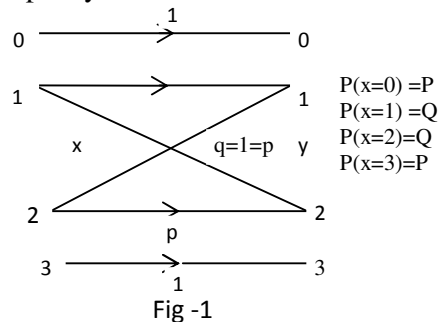
**DIGITAL COMMUNICATIONS**  
(Electronics and Communication Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions  
All Questions carry equal marks  
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1. (a) With a neat sketch explain the basic elements of a digital communication system.  
(b) List the advantages and disadvantages of PCM.
2. (a) Discuss in brief about Delta modulator and its characteristics.  
(b) Compare the overall output S/N ratio for 8-bit PCM and DM systems used for transmitting a baseband signal whose spectrum is confined from 300 to 3000 Hz. Assume that both systems operate at a bit rate of 64 Kbits/sec and use a PSK signaling scheme with  $(S_{av}/\eta f_x) = 20$  dB.
3. With a neat sketch explain the QPSK transmitter and receiver
4. (a) Calculate the error probability for QPSK.  
(b) Discuss in brief about matched filter.
5. (a) Explain Entropy and its properties.  
(b) Messages  $Q_1, \dots, Q_M$  have probabilities  $p_1, \dots, p_M$  of occurring. Write an expression for H  
If  $M=3$ , write H in terms of  $p_1$  and  $p_2$ , by using the result that  $p_1+p_2+p_3=1$ . Find  $p_1$  and  $p_2$ , for  $H=H_{max}$  by setting  $\delta H/\delta p_1=0$  and  $\delta H/\delta p_2=0$
6. (a) Explain the capacity of a Gaussian channel.  
(b) Calculate the capacity of the discrete channel shown in Fig.1. Assume  $r_s = 1$  symbol/sec

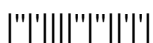


7. (a) Explain matrix description of linear block codes  
(b) The parity check bits of a (8,4) block code are generated by
 
$$c_5 = d_1 + d_2 + d_4$$

$$c_6 = d_1 + d_2 + d_3$$

$$c_7 = d_1 + d_3 + d_4$$

$$c_8 = d_2 + d_3 + d_4$$
 where  $d_1, d_2, d_3$  and  $d_4$  are the message digits.  
(i) Find the generator matrix and parity check matrix for this code  
(ii) Find the minimum weight of this code  
(iii) Find the error detecting capabilities of this code.



Code No: R31046

**R10**

**Set No: 1**

8. (a) Explain the transform domain approach to analysis of a convolutional encoder with an example.
- (b) Discuss the performance of convolutional codes

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**DIGITAL COMMUNICATIONS**  
(Electronics and Communication Engineering)

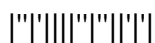
Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions  
All Questions carry equal marks  
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1. (a) List the advantages of digital communication system  
(b) Discuss in brief about quantization in PCM.
2. (a) Draw and explain the functional block diagram of a Delta modulation system.  
(b) A DM system is designed to operate at three times the nyquist rate for a signal with 3 KHz bandwidth. The quantizing step size is 250 mV  
(i) Determine the maximum amplitude of a 1 KHz input sinusoid for which the delta modulator does not show slope overload  
(ii) Determine the post filtered output SNR for the signal of part (i)
3. (a) Explain the means of generating a DPSK signal.  
(b) Briefly explain about M-ary FSK.
4. (a) Draw and explain the coherent system of signal reception.  
(b) Calculate the error probability for BFSK and BPSK.
5. (a) Explain the mutual information and its properties.  
(b) A code is composed of dots and dashes. Assume that the dash is three times as long as the dot and has one-third the probability of occurrence.  
(i) Calculate the information in a dot and that in a dash  
(ii) Calculate the average information in the dot-dash code.  
(iii) Assume that a dot lasts for 10 ms and that this same time interval is allowed between symbols. Calculate the average rate of information transmission.
6. (a) State and explain Shannon's theorem.  
(b) Plot channel capacity C versus B, with  $S/\eta = \text{constant}$  for the gaussian channel.  
(c) If the channel bandwidth  $B=5$  KHz and a message is being transmitted with  $R=10^6$  bits/sec, find  $S/\eta$  for  $R \leq C$ .
7. (a) Consider a (7,4) linear code whose generator matrix is
 
$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & : & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & : & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & : & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & : & 0 & 1 & 1 \end{bmatrix}$$
  - (i) Find all the code vectors of this code
  - (ii) Find the parity check matrix for this code
  - (iii) Find the minimum weight of this code
- (b) Explain the algebraic structure of cyclic codes
8. (a) Explain the time domain approach to analysis of a convolutional encoder with an example.  
(b) What are the advantages and disadvantages of convolutional codes?

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Code No: R31046

R10

Set No: 3

III B.Tech. I Semester Regular Examinations, November/December - 2012

**DIGITAL COMMUNICATIONS**  
(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) Explain the companding in PCM  
(b) A television (TV) signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of representation levels is 512. Calculate the following parameters.
  - (i) The code word length
  - (ii) The final bit rate
  - (ii) The transmission bandwidth, assume that  $k=2$ .
2. (a) List the advantages and disadvantages of delta modulation.  
(b) Explain about the noise in delta modulation system.
3. (a) Write a brief note on DEPSK.  
(b) Describe binary ASK, PSK and FSK schemes.
4. (a) Discuss the probability of error of the matched filter.  
(b) Explain the non-coherent detection of FSK.
5. (a) Explain the concept of amount of information.  
(b) An analog signal is bandlimited to B Hz, sampled at the nyquist rate, and the samples are quantized into 4 levels. The quantization levels  $Q_1, Q_2, Q_3$  and  $Q_4$  (messages) are assumed independent and occur with probabilities  $p_1= p_4=1/8$  and  $p_2= p_3=3/8$ . Find the information rate of the source.
6. (a) Consider five messages given by the probabilities  $1/2, 1/4, 1/8, 1/16, 1/16$ .
  - (i) Calculate H
  - (ii) Use Shannon-Fano algorithm to develop an efficient code and for that code, calculate the average number of bits/message. Compare with H  
(b) Explain about Bandwidth-S/N trade off.
7. (a) Briefly explain error detection and error correction capabilities of linear block codes.  
(b) The generator polynomial for a (15,7) cyclic code is.  
 $g(x) = 1+x^4+x^6+x^7+x^8$ 
  - (i) Find the code vector (in systematic form) for the message polynomial  
 $D(x) = x^2+x^3+x^4$   
Assume that the first and last bits of the code vector  $V(x)$  for  $D(x) = x^2+x^3+x^4$  suffer Transmission errors. Find the syndrome of  $V(x)$
8. (a) Explain the viterbi algorithm for the decoding of convolutional codes.  
(b) Write a brief note on encoder for convolutional codes.

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Code No: R31046

R10

Set No: 4

III B.Tech. I Semester Regular Examinations, November/December - 2012

**DIGITAL COMMUNICATIONS**  
(Electronics and Communication Engineering)

Time: 3 Hours

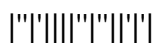
Max Marks: 75

Answer any FIVE Questions  
All Questions carry equal marks

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- (a) With a neat sketch explain the representation of the basic principle of differential PCM.  
(b) State the sampling theorem for band-limited signals of finite energy.  
(c) Write a brief note on Aliasing effect.
- (a) Compare the performance of PCM and DM systems in terms of overall signal quality and equipment complexity.  
(b) Briefly explain about Adaptive delta modulation.
- (a) Explain the generation and reception of BPSK signal.  
(b) The bit stream  $d(t)$  is to be transmitted using DPSK. If  $d(t)$  is 001010011010, determine  $b(t)$ . Show that  $b(t) b(t-T_b)$  yields the original data.
- (a) Calculate the transfer function of the Optimum filter.  
(b) Draw and explain the receiver for a binary coded signal.
- (a) Discuss in brief about Discrete messages.  
(b) One of five possible messages  $Q_1$  to  $Q_5$  having probabilities  $1/2, 1/4, 1/8, 1/16, 1/16$ , respectively, is transmitted. Calculate the average information.
- (a) A Gaussian channel has a 1-MHz bandwidth. If the signal-power-to-noise power spectral density  $S/\eta=10^5$  Hz, calculate the channel capacity  $C$  and the maximum information transfer rate  $R$   
(b) Explain about Huffman coding.
- (a) Briefly explain about BCH codes.  
(b) 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 (0 1 0 1).
- Draw the state diagram, tree diagram, and trellis diagram for  $k=3$ , rate  $1/3$  code generated by  $g_1(x) = 1+x^2$ ,  $g_2(x) = 1+x$  and  $g_3(x) = 1+x+x^2$

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Code No: R31056

R10

Set No: 1

III B.Tech. I Semester Regular Examinations, November/December - 2012

**OPERATING SYSTEMS**

(Common to Computer Science and Engineering & Information Technology)

**Time: 3 Hours**

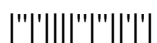
**Max Marks: 75**

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) Distinguish between the client-server and peer-to-peer models of distributed systems.  
(b) Explain briefly system calls and their types.
2. (a) What are multi-threaded models? Explain types of multi-threaded model in detail.  
(b) Explain briefly the procedure to predict the next CPU burst in the shortest-job first algorithm.
3. (a) Discuss briefly the solution for dining-philosophers problem using monitors.  
(b) A barbershop consists of a waiting room with n chairs and the barber room containing the barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber. Write a program to coordinate the barber and the customers.
4. (a) Discuss in detail the swapping technique. What is its purpose?  
(b) What is paging? What is the need for page replacement? Discuss the basic method of paging in detail.
5. (a) Explain in detail copy-on-write technique.  
(b) Consider the following page reference string: 1,2,3,4,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults would occur for the FIFO replacement algorithm for 3 frames?
6. (a) Explain the procedure for eliminating deadlocks using resource pre-emption.  
(b) How can we prevent the occurrence of deadlocks? Discuss in brief.
7. (a) Discuss in detail free space management .Also discuss about keeping track of free disk space in detail.  
(b) How protection can be provided for file system?
8. (a) Discuss briefly the general overview of the physical structure of secondary and tertiary storage devices.  
(b) Explain in detail the two ways of disk storage in which the computers access.

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Code No: R31056

R10

Set No: 2

III B.Tech. I Semester Regular Examinations, November/December - 2012

**OPERATING SYSTEMS**

(Common to Computer Science and Engineering & Information Technology)

**Time: 3 Hours**

**Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Define the essential properties of the following types of operating system:
  - (i) Batch
  - (ii) Real Time
  - (iii) Time sharing
  - (iv) Clustered(b) In a multiprogramming and time sharing environment several users share the system simultaneously. This situation can result in various security problems. Discuss these problems.
2. (a) The benefits of multithreaded programming can be broken down into four major categories. Explain briefly each of these categories.  
(b) What are the scheduling algorithms? Discuss briefly about the priority scheduling algorithm and the round-robin scheduling algorithm.
3. (a) Describe in detail about the critical-section problem? What are the requirements to be satisfied for its solution.  
(b) What are the classic problems of synchronization? Discuss briefly about the bounded-buffer problem?
4. (a) What is fragmentation? Explain in detail about the internal and external Fragmentation.  
(b) Why are segmentation and paging sometimes combined into one scheme?
5. (a) Discuss briefly about global versus local allocation of frames.  
(b) Consider LRU, FIFO, Optimal page replacement algorithms. Rank these algorithms from bad to perfect according to their page fault rate. Separate those algorithms which suffer from Belady's anomaly from those which do not.
6. (a) Explain in detail the banker's algorithm.  
(b) Explain about deadlock characterization in detail.



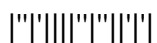
**Code No: R31056**

**R10**

**Set No: 2**

7. (a) Explain in detail about the file attributes ,file operations and about the structure of a file system?  
(b) What problems could occur if a system allowed a file system to be mounted simultaneously at more than one location?
  
8. (a) Discuss in detail about variety of techniques to improve the efficiency and performance of secondary storage.  
(b) Explain in detail about swap space management.

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III B.Tech. I Semester Regular Examinations, November/December - 2012

**OPERATING SYSTEMS**

(Common to Computer Science and Engineering &amp; Information Technology)

**Time: 3 Hours****Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) What is an operating system? Explain briefly the operating systems role in the overall computer system.  
(b) Under what circumstances would a user be better off using a time sharing system rather than a PC or single-user workstation?
2. (a) Define process and explain with a neat diagram about process states and process control block. Discuss briefly system calls.  
(b) Discuss in detail schedulers. Describe the difference between different types of scheduling.
3. (a) Discuss briefly the procedure for implementing a monitor using semaphores.  
(b) Explain briefly about the following instructions:
  - i. TestAndSet()
  - ii. Swap()
4. (a) What is paging? Discuss in detail about basic method in paging. Discuss briefly about the common techniques for structuring the page table.  
(b) Consider the following segment table:

<u>Segment</u>	<u>Base</u>	<u>Length</u>
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

- i. 0, 430
  - ii. 1, 10
  - iii. 3, 400
  - iv. 4, 112
5. (a) What is demand paging ? Discuss in detail the steps in handling a page fault .Explain about performance of demand paging in detail.  
(b) What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem.



6. (a) Consider a system with five processes  $P_0$  through  $P_4$  and three resource types A,B,C. Resource type A has 10 instances ,resource type B has 5 instances and resource type C has 7 instances . Suppose that, at time  $T_0$  the following snapshot of the system has been taken

	<u>Allocation</u>			<u>Max</u>			<u>Available</u>		
	A	B	C	A	B	C	A	B	C
$P_0$	0	1	0	7	5	3	3	3	2
$P_1$	2	0	0	3	2	2			
$P_2$	3	0	2	9	0	2			
$P_3$	2	1	1	2	2	2			
$P_4$	0	0	2	4	3	3			

Find whether this system is safe or not .Also find sequence that satisfies safety requirement.

- (b) What is the optimistic assumption made in deadlock-detection algorithm? How could this assumption be violated?
7. (a) Explain the directory implementation of a file system in detail.  
 (b) What are the allocation methods of a file system? Explain briefly the indexed and linked allocation.
8. (a) Elucidate disk structure in detail. Explain about disk scheduling in detail.  
 (b) What is disk scheduling? Explain in detail about FCFS and SSTF scheduling.

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III B.Tech. I Semester Regular Examinations, November/December - 2012

**OPERATING SYSTEMS**

(Common to Computer Science and Engineering &amp; Information Technology)

**Time: 3 Hours****Max Marks: 75**

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) How are network computers different from traditional personal computers?  
Describe some usage scenarios in which it is advantageous to use network computers.  
(b) Explain briefly about the services and functions provided by the operating system.
2. (a) Explain in detail round robin scheduling algorithm .With an example show how a smaller time quantum increases context switches.  
(b) Describe the differences between short-term, medium-term and long-term scheduling.
3. (a) Describe about semaphores and their usage and implementation.  
(b) Explain about Peterson's solution to the critical section problem.
4. (a) Discuss briefly memory mapping and protection.  
(b) What is segmentation? Describe in detail about general method with hardware implementation of segmentation.
5. (a) Discuss briefly about virtual memory management.  
(b) Explain in detail copy-on-write technique.

6. (a) Consider the following snapshot of the system

	<u>Allocation</u>				<u>Max</u>				<u>Available</u>			
	A	B	C	D	A	B	C	D	A	B	C	D
P <sub>0</sub>	0	0	1	2	0	0	1	2	1	5	2	0
P <sub>1</sub>	1	0	0	0	1	7	5	0				
P <sub>2</sub>	1	3	5	4	2	3	5	6				
P <sub>3</sub>	0	6	3	2	0	6	5	2				
P <sub>4</sub>	0	0	1	4	0	6	5	6				

Find whether this system is safe or not .Also find sequence that satisfies safety requirement.

- (b) What are the four conditions that hold simultaneously in a system for the deadlock situation to arise?
7. (a) Describe briefly the procedure of protecting files in the system.  
(b) Explain in detail about the free space management in file system.
8. (a) None of the disk-scheduling disciplines, except FCFS, is truly fair(Starvation may occur).
  - i) Explain why this assertion is true.
  - ii) Describe a way to modify algorithm such as SCAN to ensure fairness.
- (b) Describe about disk attachment in detail.

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**LINEAR SYSTEMS ANALYSIS**  
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. Write the state equations for the following network as shown in figure 1 using following methods
  - (a) Equivalent source method
  - (b) Network topological method

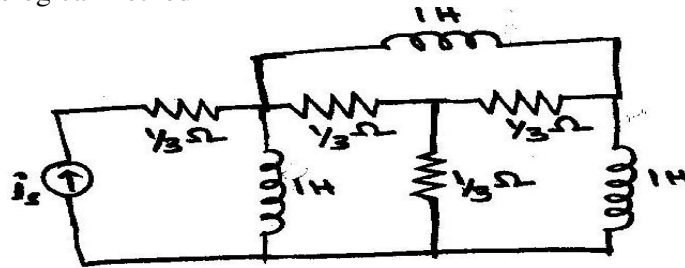


Figure 1

2. a) Express Fourier series of any periodic function in exponential form.  
b) Evaluate the Fourier transform of the following special functions.
  - i) Step function ii) Signum function
3. A series R-L circuit with  $R=10$  ohms and  $L=5$ H contains a current
 
$$i(t) = 10 \sin 1000t + 5 \sin 3000t + 3 \sin 5000t$$
 Find the effective applied voltage and the average power.
4. a) Find the response of the network shown in Figure 2 when the input voltage is
  - i) unit impulse ii)  $e^{-2t}u(t)$

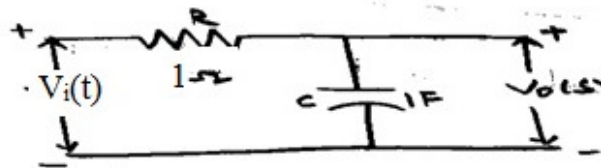


Figure 2

- b) Find the convolution integral when  $f_1(t) = e^{-at}$  and  $f_2(t)=t$ .
5. a) Explain about the strum's test for positive real functions.  
b) Test the following polynomials for the Hurwitz property.
  - i)  $S^4+S^2+S$  ii)  $S^3+4S^2+5S+2$

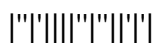


6. a) Realize the network with the following driving point impedance function using Foster form - I.

$$Z(s) = \frac{S + 2}{S(2S + 5)}$$

- b) Explain the procedure by which the impedance function can be synthesized using Cauer form I.
7. a) What is aliasing effect? How it can be avoided? Explain in detail.  
b) Derive the relationship between auto correctional function and power spectral density function.
8. a) Determine the z- transform, including the region of convergence, for each of the following sequences:  
(i)  $(1/2)^n u(n)$       (ii)  $n^2 u(n)$   
b) What are the different methods of evaluating inverse z- transform? Explain any one method.

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**LINEAR SYSTEMS ANALYSIS**  
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) Obtain the state equations for the network shown in Figure. 1 where  $i_1(t)$  and  $i_2(t)$  are loop currents.

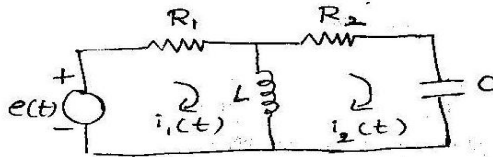


Figure 1

- b) Explain about various methods for solving the state equations of a network.
2. a) Define Fourier's transform. How does Fourier transform differ from  
i) Fourier integral and ii) Laplace transform  
b) Find the Fourier series expansion of the periodic rectangular wave as shown in Figure.2 below.

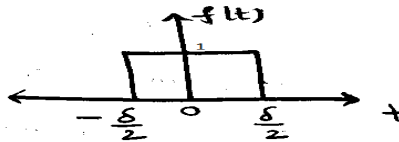


Figure. 2

3. Determine the expression for current in an impedance of  $R=16\Omega$ ,  $L=0.0318$  with applied emf  $e(t)=200 \sin 314t+40 \sin (942t+30^\circ) +10$  Volts, calculate also the rms value of voltage and current as well as the power factor of the circuit.
4. a) State and prove the shifting theorem.  
b) At  $t=0$ , a unit pulse of width  $a$  is applied to the series RL network of figure 3. Obtain an expression for the current  $i(t)$

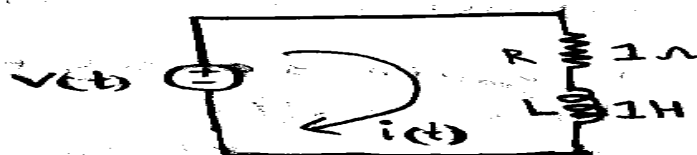
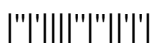


Figure 3

5. a) Clearly explain with examples the Sturm's test to check positive real functions.  
b) Test the following polynomials for the Hurwitz property.  
i)  $S^4+S^2+S+1$       ii)  $S^3+4S^2+2S+3$



6. An impedance function is given by  $Z(s) = \frac{(s^2 + 3)(s^2 + 1)}{s(s^2 + 2)(s^2 + 5)}$

Determine the nature of the function. Synthesize the network if possible by

- (a) Cauer Form I and
  - (b) Cauer Form II.
7. a) Discuss the effects of under sampling of a signal.  
b) What is correlation? List the properties of correlation function.
8. a) Find the z-transform and the ROC of the signal  $x(n) = -b^n u(-n-1)$   
b) Differentiate Laplace, Fourier, and z-transforms.

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**LINEAR SYSTEMS ANALYSIS**  
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) Explain the concept of state, state variables and state model with the help of examples?  
b) Evaluate the complete state response of the system characterized by  $A = \begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$   $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$   
with initial state vector  $X(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$
2. a) What is the significance of Fourier series? Give the condition which must be satisfied by a non-periodic function  $f(t)$  so that its Fourier series may contain only sine wave.  
b) State and explain Parseval's theorem.
3. A series RLC circuit with  $R=25\Omega$ ,  $L=1\text{H}$  and  $C=10\mu\text{F}$  is energized with a source  $V(t)=15 \sin 100t + 20 \sin 200t + 5 \sin 300t$ . Determine the effective value of current and the average power consumed by the circuit.
4. a) At  $t=0$ , a unit pulse of width  $a$  is applied to the series RL net work of Figure 1. Obtain an expression for the current  $i(t)$

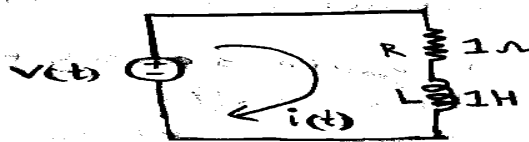
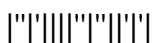


Figure 1

- b) Find the convolution integral when  $f_1(t) = e^{-at}$  and  $f_2(t)=t$ .
5. a) State and explain the necessary and sufficient conditions for a driving point function to be positive real function.  
b) Test whether the following polynomials are Hurwitz.  
i)  $S^3+3S^2+2$                       ii)  $S^6+3S^5+8S^4+15S^2+12S+4$
6. Using the Foster form II, synthesize the following functions.  
(a)  $Z(S) = \frac{s(s^2 + 4)(s^2 + 6)}{(s^2 + 3)(s^2 + 5)}$       (b)  $Z(S) = \frac{s(s^2 + 2)(s^2 + 7)}{(s^2 + 3)(s^2 + 5)}$



Code No: V3107

**R07**

**Set No: 3**

7.
  - a) State and prove the sampling theorem for band limited signal.
  - b) A waveform consists of a single pulse extending from  $t = -1$  to  $t = 1$  sec and has amplitude 5V. Find autocorrelation function and energy spectral density.
  
8.
  - a) Find the z-transform and the ROC of the signal  $x(n) = n^3 u(n)$
  - b) State and prove the following properties of the z- Transform.
    - (a) Linearity
    - (b) Time Shifting
    - (c) Scaling in the z-domain

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**LINEAR SYSTEMS ANALYSIS**  
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. The network shown in the Figure 1 has two state equations. Obtain the state equation of the network in terms of the current through the inductor ( $I_L$ ) and the voltage across the capacitor.

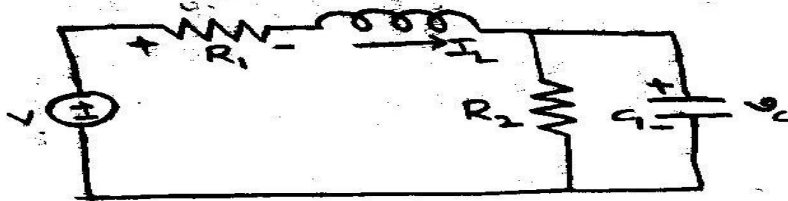


Figure 1

2. a) Show that for an even periodic function, the coefficients of the exponential Fourier series are real. Also show that for an odd periodic function, the coefficients are imaginary.  
b) Find the Fourier transform of following  
i)  $\sin \omega_0 t$       ii)  $\cos \omega_0 t$
3. a) Find the average power in a resistance  $R=10\Omega$ , if the current in Fourier – series form is  $i(t)=10 \sin \omega t+5 \sin 3\omega t+2 \sin 5\omega t$  Amps.  
b) Determine the Fourier transform and sketch the amplitude and phase response of the exponential voltage function given by  

$$f(t) = E e^{-t/a} \quad t \geq 0$$

$$= 0, \quad t \leq 0.$$
4. a) Find the convolution integral when  $f_1(t) = e^{-at}$  and  $f_2(t)=t^3$ .  
b) At  $t=0$ , a unit pulse of width  $a$  is applied to the series RL network of Figure 2. Obtain an expression for the current  $i(t)$

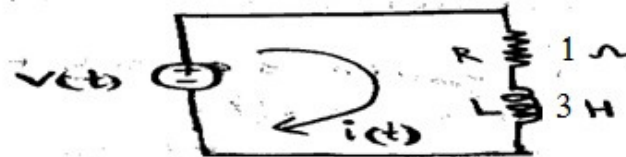


Figure 2

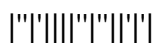
5. a) What do you understand by a positive real function? Enumerate its important properties and state the significance of such a function in network synthesis.  
b) Test whether the polynomial  $P(s) = S^5+S^3+S$  is Hurwitz or not.





6. Explain the procedure by which the impedance function can be synthesized using Foster form I.  
b) Using the Foster form I, synthesize the function
- a)  $Z(s) = \frac{s(s^2 + 9)}{(s^2 + 5)(s^2 + 13)}$
7. a) State and prove the properties of autocorrelation function of energy signals.  
b) Explain in detail about sampling and Aliasing.
8. a) Discuss the properties of Z – Transform.  
b) Determine the z- transform , including the region of convergence, for each of the following sequences :
- (i)  $(1/2)^n u(n)$       (ii)  $n^2 u(n)$

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**HEAT TRANSFER**

(Common to Mechanical Engineering and Auto Mobile Engineering)

**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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- (a) Explain the concept of thermal resistance. Obtain an expression for thermal resistance due to conduction in a hollow cylinder of inner and outer radii  $r_i$  and  $r_o$  respectively.

(b) A 1.5 kW resistance heater wire with thermal conductivity  $K = 20 \text{ W/m}^0\text{C}$ , a diameter of 5 mm. and length of 70 cm. is used to boil water. If the outer surface temperature of the resistance wire is  $110^0\text{C}$ , determine at the centre of the wire.
- (a) A furnace wall is made of 14 cm. thick inside layer of fire brick ( $K = 1.2 \text{ W/m}^0\text{C}$ ), 8 cm. Thick middle layer of insulating brick ( $K = 0.15 \text{ W/m}^0\text{C}$ ) and 12 cm thick outside layer of red brick ( $K = 0.85 \text{ W/m}^0\text{C}$ ). The furnace operates at  $870^0\text{C}$  and it is anticipated that the outside of this composite wall can be maintained at  $40^0\text{C}$  by circulation of air. Assuming the close bonding of layer at their interfaces, find the rate of heat loss from the furnace and the wall interface temperature. The wall measures 5 m x 2 m.

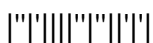
(b) derive an expression for critical radius of insulation for a hollow cylinder.
- (a) A 10 cm diameter cylindrical bar heated in the furnace to a temperature of  $200^0\text{C}$  is allowed to cool in an environment with convection coefficient of  $150 \text{ W/m}^2 \text{ K}$  and temperature of  $40^0\text{C}$  determine the (i) the time required to cool the centre of the bar to  $50^0\text{C}$  ; (ii) Temperature of the surface at this instant. For the material of the bar,  $K = 50 \text{ W/mK}$  and thermal diffusivity  $2 \times 10^{-5} \text{ m}^2/\text{sec}$ .

(b) The Biot number during a heat transfer between a sphere and its surroundings is found to be 0.02. Would you prefer lumped system analysis or transient temperature charts when determining the centre temperature of the sphere? Why?
- (a) Emissivity of two large parallel plates maintained at  $800^0\text{C}$  and  $300^0\text{C}$  are 0.5 and 0.6 respectively. Find the percentage reduction in heat transfer when a polished aluminum radiation shield of emissivity 0.05 is placed between them.

(b) Define Lambert's cosine law, configuration factor, emissivity and emissive power.
- (a) State Buckingham  $\pi$  - theorem. Why this theorem is considered superior to Rayleigh's method for dimensional analysis?

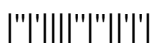
(b) the variables controlling the motion of a floating body through water are the drag force  $F$ , the speed  $V$ , the length  $L$ , the density  $\rho$  and dynamic viscosity  $\mu$  of water and acceleration due to gravity  $g$ , derive an expression for  $F$  by dimensional analysis.
- (a) Air at 2 atm. And  $200^0\text{C}$  is heated as it flows through a tube of diameter 2.54 cm at a velocity of 10 m/sec. Calculate the heat transfer per unit length of the tube if a constant heat flux condition is maintained at the wall and the wall temperature is  $20^0\text{C}$  above the air temperature all along the length of the tube.

(b) Define bulk temperature of a fluid with respect to the internal flow through a tube.



7. (a) What is LMTD of a heat exchanger? Draw the variation of fluid temperatures along the heat exchanger in parallel and counter flow heat exchanger.  
(b) A counter flow heat exchanger is used to cool 2000 kg/hr of oil ( $C_p = 2.5 \text{ kJ/kgK}$ ) from  $105^\circ\text{C}$  to  $30^\circ\text{C}$  by use of water entering at  $15^\circ\text{C}$ . If the overall heat transfer coefficient is  $1.5 \text{ kW/m}^2 \text{ K}$ , estimate the flow rate of water, the surface area required and the effectiveness of heat exchanger. Presume that the exit temperature water is not to exceed  $80^\circ\text{C}$ . Use NTU method.
8. (a) Distinguish between the mechanism of film wise condensation and drop wise condensation. Which type has the highest transfer coefficient and why?  
(b) Dry saturated steam at  $120^\circ\text{C}$  saturation temperature condenses on a vertical plate 100 mm height and 50 mm wide having uniform surface temperatures of  $100^\circ\text{C}$ . Estimate the average condensation heat transfer coefficient, heat transfer rate to the plate and rate of steam condensation.

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**HEAT TRANSFER**

(Common to Mechanical Engineering and Auto Mobile Engineering)

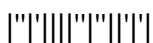
**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

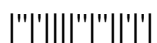
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1. (a) Calculate the conduction shape factors for edges and corners.  
(b) One meter long Nichrome wire of resistivity  $1 \mu\Omega\text{m}$  is to dissipate 10 KW heat in the surrounding fluid which is at  $80^{\circ}\text{C}$ . Find the diameter of the wire if the maximum operating temperature of the wire is  $1000^{\circ}\text{C}$ .  $K$  for wire is  $60\text{W/mK}$  and  $h = 1 \text{KW/m}^2\text{K}$ .
2. (a) Derive an equation for heat transfer through an infinite fin.  
(b) One end of a long rod 35 mm in diameter is inserted in to a furnace with the other end projecting in the outside air. After the steady state is reached temperature of the rod is measured at two points 180 mm apart and found to be  $180^{\circ}\text{C}$  and  $145^{\circ}\text{C}$ . If the ambient air is  $25^{\circ}\text{C}$  and  $h$  is  $65 \text{W/m}^2\text{K}$ , calculate the thermal conductivity of the rod.
3. (a) Explain the significance of a time constant of the thermo couple.  
(b) A long cylindrical bar ( $K = 17.4 \text{W/mK}$ ;  $\alpha = 0.019 \text{m}^2/\text{hr}$ ) of radius 80 mm comes out of oven at  $830^{\circ}\text{C}$  throughout and is cooled by quenching it in a large bath of  $40^{\circ}\text{C}$  coolant. If  $h = 180\text{W/m}^2\text{K}$ , calculate the time taken by the shaft center to reach  $120^{\circ}\text{C}$ , the surface temperature of the shaft when its centre temperature is  $120^{\circ}\text{C}$  and the temperature gradient at the outside surface at the same instant of time.
4. (a) Obtain the relation for forced convection heat transfer using Buckingham  $\pi$ -theorem.  
(b) A horizontal cylinder of 180mm diameter and 1.5m long is maintained at  $100^{\circ}\text{C}$  in an environment of  $20^{\circ}\text{C}$ . Calculate the heat loss by free convection from surface of the cylinder.
5. (a) Derive an equation for the Reynold's analogy in forced convection heat transfer.  
(b) Compare the heat transfer coefficients under the following conditions (Assume flow is turbulent).  
(i) Two fold increase in the diameter of the tube; the flow velocity is maintained constant by a change in the rate of liquid flow.  
(ii) Two fold increase in the flow velocity by varying the mass flow rate.
6. (a) Obtain the equation for reduction in heat transfer by introducing the radiation shield.  
(b) Liquid Oxygen (boiling temperature =  $-182^{\circ}\text{C}$ ) is to be stored in spherical container of 30cm diameter. The system is insulated by an evacuated space between inner space and surrounding 45cm inner diameter concentric sphere. For both spheres emissivity = 0.03 and temperature of the outer sphere is  $30^{\circ}\text{C}$ . Estimate the rate of heat flow by radiation to the oxygen in the container.



7. (a) Obtain the relation for heat transfer coefficient in case of condensation on a flat vertical plate.  
(b). steam at 1 bar enters the shell of a surface condenser in which the water flows through a bundle of tubes 25mm diameter at the rate of 0.05Kg/sec, the inlet and outlet temperatures of water are 15<sup>0</sup>C and 70<sup>0</sup>C respectively. Condensation taking place over the tubes if U is 230W/m<sup>2</sup> K. Using NTU method, calculate the effectiveness of the heat exchanger, length of the tube and rate of condensation.
8. Answer any four of the following:  
(a)Thermometer well concept to measure temperature.  
(b)Effectiveness and efficiency of a fin  
(c)Lamberts cosine law  
(d)Variable thermal conductivity  
(e)Fick's law.

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**HEAT TRANSFER**

(Common to Mechanical Engineering and Auto Mobile Engineering)

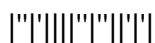
**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) Define the terms: White body and colored body.  
(b) Differentiate between specular and diffuse radiations.  
(c) Obtain the relation between emissive power and Intensity of radiation.
2. (a) Explain the mechanism, of heat conduction in metals and insulators and also mention some of the situations where poor conductivity of air helps to restrict the heat transmission by conduction.  
(b) Derive the equation for over all heat transfer coefficient based on outer radius for the hollow sphere with two layers of insulation.
3. (a) Explain the Buckingham's  $\pi$  – theorem for dimensional analysis. How is it applied to free convection problems?  
(b) What do you understand by the hydrodynamic and thermal boundary layers. Illustrate with reference to flow over a flat heated plate.
4. (a). The surface of human body may be approximated by a vertical cylinder 0.3 m in diameter and 2m in height. Assuming the surface temperature to be  $30^{\circ}\text{C}$ , determine the heat loss from a human body in a quiescent atmosphere of air at  $20^{\circ}\text{C}$ . Use the appropriate correlation.  
(b). what is the significance of dimensionless number in natural convection heat transfer? Explain.
5. (a) Write the advantages of NTU method over LMTD method.  
(b) Oil ( $C_p = 3.6 \text{ kJ/kg.K}$ ) at  $100^{\circ}\text{C}$  flows at the rate of 30,000 kg/hr and enters in to a parallel flow heat exchanger. The cooling water enters the heat exchangers at  $10^{\circ}\text{C}$  at the rate of 50,000 kg/hr. Heat transfer area is  $10\text{m}^2$  and  $U = 1 \text{ kW/m}^2\text{K}$ . Calculate the outlet temperatures of oil and maximum possible outlet temperature of water.
6. A solid rod of radius R generates heat at a constant rate of  $q_o \text{ W/m}^3$ , while the outer surface of the rod is maintained at constant temperature  $T_2$ . Develop an expression for one dimensional radial steady state temperature distribution and the heat flux. Hence determine the centre temperature and the heat flux at the outer surface for radius when  $R = 1\text{cm}$ ,  $q_o = 2 \times 10^8 \text{ W/m}^3$ ,  $K = \text{W/m K}$  and  $T_2 = 100^{\circ}\text{C}$ .
7. (a) An iron beam of rectangular cross-section of size 300mm x 200 mm is used in the construction of a building. Initially, the beam is at a uniform temperature of  $30^{\circ}\text{C}$ . Due to an accidental fire, the beam suddenly exposed to hot gasses at  $730^{\circ}\text{C}$ , with a convection heat transfer coefficient of  $100 \text{ W/m}^2 \text{ K}$ . determine the time required for the center plane of the beam to reach a temperature of  $310^{\circ}\text{C}$ . (Take thermal conductivity of the beam  $k = 73 \text{ W/m K}$  and thermal diffusivity of the beam  $\alpha = 2.034 \times 10^{-5} \text{ m}^2/\text{s}$ ; use Heisler chart)



8. (a) Steam at  $100^{\circ}\text{C}$  is being condensed on the outer surface of a horizontal tube of 3 m length and 50 mm outer diameter, while the tube surface of a horizontal at  $90^{\circ}\text{C}$ . Determine the average heat transfer coefficient and the total rate of condensation over the tube surface.
- (b) Explain about heat transfer in boiling. Why the heat transfer coefficients are very high. Explain.

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**HEAT TRANSFER**

(Common to Mechanical Engineering and Auto Mobile Engineering)

**Time: 3 Hours**

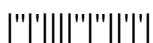
**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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1. A furnace wall is made of 2 successive layers of insulating materials one of foamed fire clay ( $k = 0.279 + 0.000273T$ ) w/m  $^{\circ}C$  and red brick ( $k = 0.7 \text{ W/m}^{\circ}C$ ). The wall temperature inside the furnace wall is 1373 K and outside wall temperature is 323 K. If the thickness of insulating material being 12.5 cm of foam clay and 50 cm of red brick. Calculate the amount of heat lost from  $100\text{m}^2$  of furnace wall. Also calculate the temperature at interface layer.
2. (a) Derive an equation for temperature distribution in a hollow sphere.  
(b) Hot gas at a constant temperature of  $400^{\circ}C$  is contained in a spherical shell (2000mm ID, 50mm thick) made of steel. Mineral wool insulation ( $k = 0.06 \text{ W/mK}$ ) of thickness 100mm is wrapped all around it. Calculate the steady rate at which heat will flow out if the outside air is at a temperature of  $30^{\circ}C$ . HT Coefficient on the inner surface of the steel shell and on the outer surface of the insulation is  $15\text{W/m}^2 \text{ K}$ .
3. (a) How the local and average convection coefficients for flow past a flat plate are related? Derive the relationship.  
(b). Water at  $75^{\circ}C$  flows through a 0.005 m diameter tube with a velocity of 1m/s. If the tube wall temperature is  $25^{\circ}C$ , make calculations for the heat transfer coefficient. Use the correlation,  

$$St = 0.023 Re^{0.2} Pr^{-0.667}$$
 The thermo –physical properties of water are:  
 Thermal conductivity is  $0.647 \text{ W/mK}$  Viscosity is  $1.977 \text{ kg/hm}$   
 Density is  $1000 \text{ kg/m}^3$  specific heat  $4.187 \text{ kJ/kgK}$
4. (a) Give examples for liquid metals. What are their applications in heat transfer?  
(b) In a condenser, water flow through 100 thin walled circular tubes (inner diameter 22.5 mm and length 5m). The mass flow rate of water is 65 kg/s. water enters at a temperature of  $22^{\circ}C$  and leaves at  $28^{\circ}C$ . Predict the heat transfer coefficient associated with the water flow. Properties of water at bulk temperature are as follows: Specific gravity: 1.0; Thermal conductivity:  $0.6054 \text{ W/mK}$   
Specific heat:  $4.178 \text{ KJ/KgK}$ ; Viscosity:  $0.893 \times 10^{-3} \text{ NS/m}^2$
5. (a) Explain about nucleate boiling forces acting on a bubble.  
(b) Explain about Heat Transfer in boiling with the help of Flux plot.
6. (a) State and prove Kirchhoff's law of radiation.  
(b) What restrictive conditions are inherent in the derivation of Kirchhoff's law?  
(c) Obtain the relation for the Configuration Factor Reciprocity.





7. A solution is to be concentrated from 10% to 5% solids in a single effect evaporator. Steam is available at 2 bar absolute. The vapour space inside the evaporator is at 100 mm Hg vacuum. The feed rate to the evaporator is 25,000 kg/hr. overall heat transfer coefficient is 2840 W/m<sup>2</sup>K. Specific heat of solution is 3700 J/Kg°C. Calculate the area of heating surface required if the feed is at 50°C. Latent heat of vaporization at steam temperature = 2197 kJ/kg, at temperature in vapour space = 2375 kJ/kg. Specific whose feed solution in 3.77 kJ/kg k.
8. Write short notes on the following
- (a) Effect of Radiation Shields.
  - (b) Buckingham phi theorem and its limitations along with advantages.
  - (c) Derive the equation for LMTD for Parallel flow Heat Exchanger.
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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DIGITAL COMMUNICATIONS**  
(Electronics and Communication Engineering)

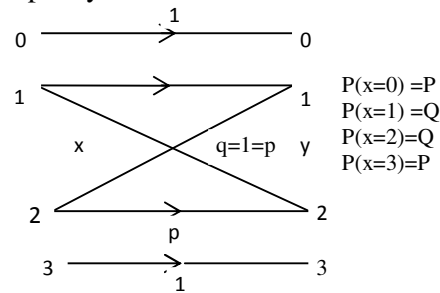
Time: 3 Hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) With a neat sketch explain the basic elements of a digital communication system.  
(b) List the advantages and disadvantages of PCM.
2. (a) Discuss in brief about Delta modulator and its characteristics.  
(b) Compare the overall output S/N ratio for 8-bit PCM and DM systems used for transmitting a baseband signal whose spectrum is confined from 300 to 3000 Hz. Assume that both systems operate at a bit rate of 64 Kbits/sec and use a PSK signaling scheme with  $(S_{av}/\eta f_x) = 20$  dB.
3. With a neat sketch explain the QPSK transmitter and receiver
4. (a) Calculate the error probability for QPSK.  
(b) Discuss in brief about matched filter.
5. (a) Explain Entropy and its properties.  
(b) Messages  $Q_1, \dots, Q_M$  have probabilities  $p_1, \dots, p_M$  of occurring. Write an expression for H  
If  $M=3$ , write H in terms of  $p_1$  and  $p_2$ , by using the result that  $p_1+p_2+p_3=1$ . Find  $p_1$  and  $p_2$ , for  $H=H_{max}$  by setting  $\delta H/\delta p_1=0$  and  $\delta H/\delta p_2=0$
6. (a) Explain the capacity of a Gaussian channel.  
(b) Calculate the capacity of the discrete channel shown in Fig.1. Assume  $r_s = 1$  symbol/sec

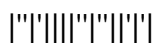


7. (a) Explain matrix description of linear block codes  
(b) The parity check bits of a (8,4) block code are generated by
 
$$c_5 = d_1 + d_2 + d_4$$

$$c_6 = d_1 + d_2 + d_3$$

$$c_7 = d_1 + d_3 + d_4$$

$$c_8 = d_2 + d_3 + d_4$$
 where  $d_1, d_2, d_3$  and  $d_4$  are the message digits.  
(i) Find the generator matrix and parity check matrix for this code  
(ii) Find the minimum weight of this code  
(iii) Find the error detecting capabilities of this code.



Code No: V3122

**R07**

**Set No: 1**

8. (a) Explain the transform domain approach to analysis of a convolutional encoder with an example.  
(b) Discuss the performance of convolutional codes

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III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DIGITAL COMMUNICATIONS**

(Electronics and Communication Engineering)

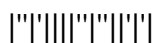
**Time: 3 Hours****Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) List the advantages of digital communication system  
(b) Discuss in brief about quantization in PCM.
2. (a) Draw and explain the functional block diagram of a Delta modulation system.  
(b) A DM system is designed to operate at three times the nyquist rate for a signal with 3 KHz bandwidth. The quantizing step size is 250 mV  
(i) Determine the maximum amplitude of a 1 KHz input sinusoid for which the delta modulator does not show slope overload  
(ii) Determine the post filtered output SNR for the signal of part (i)
3. (a) Explain the means of generating a DPSK signal.  
(b) Briefly explain about M-ary FSK.
4. (a) Draw and explain the coherent system of signal reception.  
(b) Calculate the error probability for BFSK and BPSK.
5. (a) Explain the mutual information and its properties.  
(b) A code is composed of dots and dashes. Assume that the dash is three times as long as the dot and has one-third the probability of occurrence.  
(i) Calculate the information in a dot and that in a dash  
(ii) Calculate the average information in the dot-dash code.  
(iii) Assume that a dot lasts for 10 ms and that this same time interval is allowed between symbols. Calculate the average rate of information transmission.
6. (a) State and explain Shannon's theorem.  
(b) Plot channel capacity C versus B, with  $S/\eta = \text{constant}$  for the gaussian channel.  
(c) If the channel bandwidth  $B=5$  KHz and a message is being transmitted with  $R=10^6$  bits/sec, find  $S/\eta$  for  $R \leq C$ .
7. (a) Consider a (7,4) linear code whose generator matrix is
 
$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & : & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & : & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & : & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & : & 0 & 1 & 1 \end{bmatrix}$$
  - (i) Find all the code vectors of this code
  - (ii) Find the parity check matrix for this code
  - (iii) Find the minimum weight of this code
- (b) Explain the algebraic structure of cyclic codes
8. (a) Explain the time domain approach to analysis of a convolutional encoder with an example.  
(b) What are the advantages and disadvantages of convolutional codes?

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Code No: V3122

R07

Set No: 3

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DIGITAL COMMUNICATIONS**  
(Electronics and Communication Engineering)

Time: 3 Hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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- (a) Explain the companding in PCM

(b) A television (TV) signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of representation levels is 512. Calculate the following parameters.

  - The code word length
  - The final bit rate
  - The transmission bandwidth, assume that  $k=2$ .
- (a) List the advantages and disadvantages of delta modulation.

(b) Explain about the noise in delta modulation system.
- (a) Write a brief note on DEPSK.

(b) Describe binary ASK, PSK and FSK schemes.
- (a) Discuss the probability of error of the matched filter.

(b) Explain the non-coherent detection of FSK.
- (a) Explain the concept of amount of information.

(b) An analog signal is bandlimited to B Hz, sampled at the nyquist rate, and the samples are quantized into 4 levels. The quantization levels  $Q_1, Q_2, Q_3$  and  $Q_4$  (messages) are assumed independent and occur with probabilities  $p_1= p_4=1/8$  and  $p_2= p_3=3/8$ . Find the information rate of the source.
- (a) Consider five messages given by the probabilities  $1/2, 1/4, 1/8, 1/16, 1/16$ .

  - Calculate H
  - Use Shannon-Fano algorithm to develop an efficient code and for that code, calculate the average number of bits/message. Compare with H

(b) Explain about Bandwidth-S/N trade off.
- (a) Briefly explain error detection and error correction capabilities of linear block codes.

(b) The generator polynomial for a (15,7) cyclic code is.

$$g(x) = 1 + x^4 + x^6 + x^7 + x^8$$

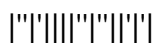
(i) Find the code vector (in systematic form) for the message polynomial

$$D(x) = x^2 + x^3 + x^4$$

Assume that the first and last bits of the code vector  $V(x)$  for  $D(x) = x^2 + x^3 + x^4$  suffer Transmission errors. Find the syndrome of  $V(x)$
- (a) Explain the viterbi algorithm for the decoding of convolutional codes.

(b) Write a brief note on encoder for convolutional codes.

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Code No: V3122

R07

Set No: 4

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DIGITAL COMMUNICATIONS**  
(Electronics and Communication Engineering)

**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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- (a) With a neat sketch explain the representation of the basic principle of differential PCM.

(b) State the sampling theorem for band-limited signals of finite energy.

(c) Write a brief note on Aliasing effect.
- (a) Compare the performance of PCM and DM systems in terms of overall signal quality and equipment complexity.

(b) Briefly explain about Adaptive delta modulation.
- (a) Explain the generation and reception of BPSK signal.

(b) The bit stream  $d(t)$  is to be transmitted using DPSK. If  $d(t)$  is 001010011010, determine  $b(t)$ . Show that  $b(t) b(t-T_b)$  yields the original data.
- (a) Calculate the transfer function of the Optimum filter.

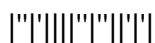
(b) Draw and explain the receiver for a binary coded signal.
- (a) Discuss in brief about Discrete messages.

(b) One of five possible messages  $Q_1$  to  $Q_5$  having probabilities  $1/2, 1/4, 1/8, 1/16, 1/16$ , respectively, is transmitted. Calculate the average information.
- (a) A Gaussian channel has a 1-MHz bandwidth. If the signal-power-to-noise power spectral density  $S/\eta=10^5$  Hz, calculate the channel capacity  $C$  and the maximum information transfer rate  $R$

(b) Explain about Huffman coding.
- (a) Briefly explain about BCH codes.

(b) 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 (0 1 0 1).
- Draw the state diagram, tree diagram, and trellis diagram for  $k=3$ , rate  $1/3$  code generated by  $g_1(x) = 1+x^2$ ,  $g_2(x) = 1+x$  and  $g_3(x) = 1+x+x^2$

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Code No: V3123

R07

Set No: 1

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DESIGN AND ANALYSIS OF ALGORITHMS**

(Computer Science and Engineering)

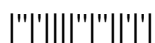
**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks  
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1. (a) Explain the asymptotic notations used in algorithm analysis.  
(b) What is probabilistic analysis? Explain with an example.
2. (a) Explain the UNION algorithm with weighting rule.  
(b) What is spanning tree? Explain the Prim's algorithm with an example.
3. (a) Sort the following values in the ascending order using quick sort algorithm.  
20, 30, 80, 50, 40, 70, 60, 90, 10  
(b) Explain Strassen's matrix multiplication.
4. (a) Can we solve 0/1 knapsack problem with greedy method? Describe it with an example.  
(b) What is job sequencing with deadlines problem? Let  $n=5$ ,  $(p_1, p_2, \dots, p_5) = (10, 3, 33, 11, 40)$  and  $(d_1, d_2, \dots, d_5) = (3, 1, 1, 2, 2)$ . Find the optimal solution using greedy algorithm.
5. (a) What is reliability design problem? Give its recurrence relation.  
(b) What do you mean by forward and backward approach of problem solving in dynamic Programming?
6. (a) Write an algorithm of m-coloring problem.  
(b) Describe the 4-queens problem using backtracking.
7. (a) Explain the principles of the following:  
i) FIFO branch and Bound ii) LC Branch and Bound  
(b) Draw the portion of the state space tree generated by LCBB for the knapsack instances:  $n=5$ ,  $(P_1, P_2, \dots, P_5) = (12, 10, 5, 9, 3)$ ,  $(w_1, w_2, \dots, w_5) = (3, 5, 2, 5, 3)$  and  $M = 12$ .
8. (a) Explain the satisfiability problem and write the algorithm for the same.  
(b) Explain the classes of NP-Hard and NP-Complete.

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Code No: V3123

R07

Set No: 2

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DESIGN AND ANALYSIS OF ALGORITHMS**

(Computer Science and Engineering)

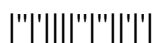
**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks  
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1. (a) What is meant by time complexity? What is its need? Explain different time complexity notations. Give examples one for each.
2. (a) Explain the FIND algorithm with collapsing rule.  
  
(b) What is spanning tree? Explain the Kruskal's algorithm with an example.
3. (a) What is binary search? How it can be implemented by divide and conquer strategy? Explain with example.  
(b) What is the divide and conquer strategy? Give its recurrence relation.
4. (a) Write and explain the control abstraction for divide and conquer.  
(b) Draw a simple, connected, weighted graph with 8 vertices and 16 edges, each with unique edge weight. Apply Prim's algorithm to get minimum-cost spanning tree. Show all the stages.
5. (a) Find the minimum number of operations required for the following chain matrix multiplication using dynamic programming.  
 $A(20,30) * B(30,10) * C(10,5) * D(5,15)$ .  
(b) Solve the following 0/1 Knapsack problem using dynamic programming  
 $m=8, n=3, (w_1, w_2, w_3) = (3, 6, 6), (p_1, p_2, p_3) = (2, 3, 4)$
6. (a) Draw and explain the portion of the tree for 4-queens problem that is generated during backtracking.  
(b) Write a recursive backtracking algorithm for sum of subsets problem.
7. (a) Explain the principles of LIFO Branch and Bound.  
(b) What do you mean by bounding? Explain how these bounds are useful in branch and bound methods.
8. (a) Describe the cook's theorem.  
(b) Explain the strategy to prove that a problem is NP hard.

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Code No: V3123

R07

Set No: 3

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DESIGN AND ANALYSIS OF ALGORITHMS**

(Computer Science and Engineering)

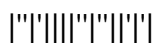
**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks  
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1. (a) What is amortized analysis? Explain with example.  
(b) What is big “oh” notation? Show that if  $f(n) = a_m n^m + \dots + a_1 n + a_0$  then  $f(n) = O(n^m)$ .
2. (a) What is weighting rule for Union(i,j)? How it improves the performance of union operation? Explain with example.  
(b) What is biconnected graph? How to determine biconnected components of graph?
3. (a) Explain the way divide and conquer works for quick sort with example.  
(b) Apply merge sort and show the file after each splitting and then merging for the following input:  
50, 10, 25, 30, 15, 70, 35, 55
4. (a) What is a knapsack problem? Find an optimal solution to the knapsack instance  $n=7, m=18, (p_1, p_2, \dots, p_7) = (15, 5, 6, 7, 16, 10, 1)$ , and  $(w_1, w_2, \dots, w_7) = (7, 4, 8, 2, 1, 4, 1)$ .  
(b) Describe the general method for greedy strategy.
5. (a) What is traveling sales person problem? How can it be solved using dynamic programming approach?  
(b) Describe the all pairs shortest path problem with suitable example.
6. (a) Write the control abstraction of backtracking.  
(b) What is Hamiltonian cycle? Describe a backtracking algorithm that finds all the Hamiltonian cycles in a graph.
7. (a) Explain the following  
(i) Control abstractions for LC – search (ii) Bounding  
(b) Illustrate LCBB solution to solve the knapsack problem.
8. (a) What are deterministic and non-deterministic algorithms? Distinguish between them.  
(b) Differentiate between NP-complete and NP-Hard.

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Code No: V3123

R07

Set No: 4

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DESIGN AND ANALYSIS OF ALGORITHMS**

(Computer Science and Engineering)

**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Define Theta notation. Explain the terms involved in it. Give an example.  
(b) What is meant by asymptotic notation? Why it is used? Explain.
2. (a) Take a simple graph with 8 nodes and 16 edges. Apply Prim's algorithm to find spanning tree for the graph.  
(b) Explain the representations of disjoint set union with example.
3. (a) Apply divide and conquer strategy to the following input values for searching 112 and -14 by showing the values of low, mid, high for each search.  
-15, -6, 0, 7, 9, 23, 54, 82, 101, 112, 125, 131, 142, 151  
(b) Describe the way to compute the product of two  $n \times n$  matrices ( $n = 2^k$ ) using divide and conquer strategy.
4. (a) What is minimum-cost spanning tree problem? How can it be solved by greedy method?  
(b) Describe the job sequencing with deadlines problem with example.
5. (a) What is 0/1 Knapsack problem? Define merging and purging rules of 0/1 Knapsack problem.  
(b) State the principle of optimality and describe how it can be used in dynamic programming to get optimal solution.
6. (a) Describe the 8-queens problem.  
(b) Explain the general backtracking process using recursion.
7. (a) Differentiate between Dynamic Knapsack and Branch and Bound Knapsack problem.  
(b) Draw the portion of the state space tree generated by FIFOBB for the knapsack instances:  $n=5$ ,  $(P_1, P_2, \dots, P_5) = (12, 10, 5, 9, 3)$ ,  $(w_1, w_2, \dots, w_5) = (3, 5, 2, 5, 3)$  and  $M = 12$ .
8. (a) Explain the classes of P and NP.  
(b) Distinguish between deterministic and non-deterministic algorithms.

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Code No: V3146

**R07**

**Set No: 1**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DISTRIBUTED DATA BASE**

(Information Technology)

**Time: 3 Hours**

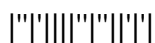
**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) Distinguish between distributed database and centralized database.  
b) Explain about the reference architecture of distributed database.
2. Explain about the algebra of qualified relations.
3. a) Discuss about the problems in query optimization.  
b) What is optimization graph? How is it better than operator tree model? Explain.
4. Explain the 2-phase commitment protocol. Also discuss the merits and drawbacks of the same.
5. a) Explain the distributed deadlock prevention mechanism.  
b) Explain how validation is done using only transaction timestamps.
6. a) What is cold restart? Explain.  
b) Explain the process of determining the consistent view of networks.
7. a) Explain the transaction management in object DBMSs.  
b) Explain about cache consistency object management.
8. a) What is database integration? Explain.  
b) Briefly explain PUSH based technologies.

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Code No: V3146

**R07**

**Set No: 2**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DISTRIBUTED DATA BASE**

(Information Technology)

**Time: 3 Hours**

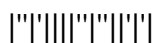
**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) Explain about the reference architecture of distributed database.  
b) Discuss about the integrity constraints in distributed databases.
2. Explain the equivalence transformations for the relation algebra with suitable examples.
3. a) List out the objectives of query optimization.  
b) Give the estimating profile of the results of selection and projection algebraic operations.
4. Explain about the architectural aspects of distributed transactions.
5. a) Explain the concepts of serializability in distributed and centralized databases.  
b) How are deadlocks detected using centralized or hierarchical controllers?
6. a) What are the problems that arise during the design of reliable distributed database systems? Explain.  
b) Discuss the process of detection and resolution of inconsistency.
7. a) What is object migration? Explain.  
b) Explain the object query processing in brief.
8. a) Explain about query processing layers in distributed multi DBMSs.  
b) How is multi database recovered? Explain.

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Code No: V3146

**R07**

**Set No: 3**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DISTRIBUTED DATA BASE**

(Information Technology)

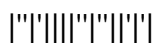
**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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1. Explain the different types of data fragmentations with appropriate examples.
2. a) What is operator graph? Explain how common subexpressions are determined.  
b) How is distributed grouping function evaluated? Explain.
3. a) What is the effect of commuting joins and unions? Explain.  
b) How are reducers used to reduce relations? Explain.
4. a) What are communication failures in distributed databases? Explain.  
b) How is concurrency control based on locking in distributed database systems performed? Explain.
5. a) Explain about the timestamps in a distributed databases.  
b) Explain the distributed deadlock detection mechanism.
6. a) What is cold restart? Explain.  
b) Discuss the process of detection and resolution of inconsistency.
7. a) Explain the client/server architecture.  
b) Discuss about query processing issues.
8. a) What is database interoperability? Explain.  
b) How is multi database concurrency control performed? Explain.



Code No: V3146

**R07**

**Set No: 4**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

**DISTRIBUTED DATA BASE**

(Information Technology)

**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) What are the principles of distributed databases? Explain.  
b) Discuss about the integrity constraints in distributed databases.
2. a) What is operator tree of a query? Explain  
b) How is simplification of joins between horizontally fragmented relations is performed? Explain.
3. Give the estimating profile of the results of group-by, union, join, and semi join algebraic operations.
4. a) Discuss the goals of transaction management.  
b) How is recovery of distributed transaction performed? Explain.
5. Discuss about various optimistic methods for distributed concurrency control.
6. What are non blocking commitment protocols? Explain any one in detail.
7. a) What is pointer swizzling? Explain.  
b) Explain object query processing.
8. a) Discuss scheme translations and data base integration.  
b) What is database interoperability? Explain

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