Subject Code:BEC42 Roll No. 2016022018

B. Tech.
ODD SEMESTER
MINOR TEST 2017 - 2018

Subject DIGITAL SIGNAL PROCESSING

Time: 2 Hrs. **Max. Marks: 30**

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

(a). Explain the concept of Digital Signal Processing with block diagram. Write the advantages of digital signal processing (DSP) over analog signal processing. 4

(b). Obtain the direct form I and direct form II for the following system: 3

$$y(n)=\frac{3}{4}y(n-1)-\frac{1}{8}y(n-2)+x(n)+\frac{1}{3}x(n-1)$$

(c). Use the backward difference for the derivatives to convert the analog low pass filter with system function 3

$$H(s)=\frac{1}{s+3}$$ to digital low pass filter $s=\frac{1-z^{-1}}{T}$

(d) What is the limitation of Impulse Invariant method and by which method it is overcome? 3

Q.2 Attempt any Three parts of the following. Q. 2(a) is compulsory.

(a). Draw the direct form structures of the following system functions: 4

$$H(z)=1+2.88z^{-1}+3.404z^{-2}+1.74z^{-3}+0.4z^{-4}$$

(b). Consider an LTI system described by the difference equation: 3

$$y(n)=\frac{1}{2}y(n-1)+\frac{1}{4}y(n-2)+x(n)+x(n-1)$$

i) Determine the impulse response, h (n), of the system.
ii) Determine cascade structure of the system.
iii) Determine the system is stable or not.

(c). Draw the parallel realization for the following system function: 3

$$H(z)=\frac{1+\frac{1}{4}z^{-1}}{\left(1+\frac{1}{2}z^{-1}\right)\left(1+\frac{1}{2}z^{-1}+\frac{1}{4}z^{-2}\right)}$$

(d) Realize the IIR filter 3

$$H(z)=\frac{5z^3+3z^2+4z+2}{z(2z^2+3z+1)}$$ using ladder structure.

Q.3 Attempt any Three parts of the following. Q. 3(a) is compulsory.

(a). What is meant by frequency warping? What is the cause of this effect? 4

(b). Using bilinear transformation obtain H(z) if 3

$s = \frac{2}{T}\left(\frac{z-1}{z+1}\right)$

$H(s) = \frac{1}{(s+1)^2}$ and T=0.1s.

(c). Describe Butterworth filters. Comment on the pass band and stop band characteristics of Butterworth filters. 3

(d) Convert the analog filter into a digital filter whose system function is 3

$$H(s) = \frac{s+0.2}{(s+0.2)^2+16}$$

Use the impulse invariant technique. Assume T=1s

BEC-42

Roll No. 2 0 1 6 0 2 2 0 1 8

B. Tech
ODD SEMESTER
MAJOR EXAMINATION 2017 - 2018

DIGITAL SIGNAL PROCESSING

Time: 3 Hrs. **Max. Marks: 50**

Note: Attempt all questions. Each question carry equal marks.

1. **Attempt any four parts of the following:** **$(4\times 2.5 = 10)$**

(a) Obtain the ladder structure for $H(z) = \frac{1}{z^{-3}+2z^{-2}+2z^{-1}+1}$.

(b) Compare direct form I and direct form II realisations of IIR systems. What are the drawbacks of direct form realisation of IIR systems?

(c) Draw the cascade and parallel realisation structures for the system described by the system function

$$H(z) = \frac{5\left(1-\frac{1}{4}z^{-1}\right)\left(1-\frac{2}{3}z^{-1}\right)(1+2z^{-1})}{\left(1-\frac{3}{4}z^{-1}\right)\left(1-\frac{1}{8}z^{-1}\right)\left[1-\left(\frac{1}{2}+j\frac{1}{2}\right)z^{-1}\right]\left[1-\left(\frac{1}{2}-j\frac{1}{2}\right)z^{-1}\right]}$$

(d) Define the Chebyshev filters. Explain the difference between type I and type II Chebyshev filters.

(e) The system transfer function of analog filter is given by

$$H(s) = \frac{s+0.1}{(s+0.1)^2+16}$$

Obtain the system transfer function of digital filter using bi linear transformation which is resonant at $w=\frac{\pi}{2}$.

(f) Compare between Impulse Invariance Method and Bilinear Transformation Method.

2. **Attempt any two parts of the following:** **$(2\times 5 = 10)$**

(a) Explain the procedure for designing an FIR filter using the Kaiser window.

(b) The length of an FIR filter is 13.If the filter has a linear phase , show that

$$\sum_{n=0}^{\frac{M-1}{2}} h(n)\sin\omega(\tau-n) = 0$$

(c) Explain the Fourier series method of designing an FIR fliter.

3. **Attempt any two parts of the following:** **$(2\times 5 = 10)$**

(a) Obtain a general expression for the frequency response of linear phase FIR filters.

(b) Write short notes on

i) Rectangular Windows
ii) Bartlett Windows
iii) Hanning Windows
iv) Hamming Windows
v) Blackman Windows

(c) The following transfer function characterises an FIR filter (M=11). Determine the magnitude response and show that the phase and group delays are constant

$$H(z)=\sum_{n=0}^{M-1} h(n)z^{-n}$$

4. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) Explain any four of the following properties of DFT

i) Periodicity
ii) Circular Time Shift
iii) Linearity
iv) Shifting Property
v) Convolution Theorem

(b) Given the two sequence of length 4 as under

x(n)= {0, 1, 2, 3}

h(n)= {2, 1, 1, 2}

Compute the circular convolution.

(c) Given x(n)={0,1,2,3,4,5,6,7}, find X(k) using DIT FFT algorithm.

5. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) Explain the relationship of Fourier Series Coefficients of a periodic sequence with DFT.

(b) Find the DFT and IDFT of X(k)={1,2,3,4}

(c) Draw the flow graph of an 8-point DIF FFT and explain.

MBA-02 | Roll No. 2 0 1 6 0 2 2 0 1 8

B.Tech. – V Sem. CE/CSE/ECE/EE/ME
ODD SEMESTER
MINOR TEST 2017-2018
Engineering and Managerial Economics

Max. Time: 02 hrs **Max. Marks: 30**

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

a) To resolve the three basic economic problems of what, how and for whom to produce, what are the areas of micro and macro economics that a manager should be familiar with? (4)

b) How are microeconomics and macroeconomics related to the managerial economics? Analyze. (3)

c) Law of demand is qualitative statement while elasticity of demand is quantitative statement. Explain (3)

d) What is price elasticity of demand? How can it be useful in firm's strategy formulation for raising its sales? (3)

Q.2 Attempt any Three parts of the following. Q. 2(a) is compulsory.

a) What is the role of decision sciences in managerial decision making? Explain the various types of business decisions that managers have to make. (4)

b) What is the difference between microeconomics and macroeconomics? What are the three main goals of macroeconomics? (3)

c) Define nature and scope of managerial economics. How is managerial economics linked with pure economics? (3)

d) How does a firm make use of the managerial economics to (3)

(a) Decide on the price of the product.

(b) Estimate the demand for the product.

Q.3 Attempt any Three parts of the following. Q. 3(a) is compulsory

a) What is supply? What are the factors which influence the supply? Analyze the supply function and the supply curve. **(4)**

b) A soft drink firm developed a soft variety of the cola drink and wanted to know the consumer response to the product. It tested the product in Delhi market area. It was a resounding success, 90 % consumers preferred to its hard variety. The company got encouraged and launched it nationwide. Within a month it realized that the product has been rejected in the market and the soft variety had to be withdrawn. Where did the firm go wrong? **(3)**

c) What is time-series data? What are possible sources of variation in time-series data? Why does time series analysis deal primarily with trend and seasonal variation rather than with cyclical and irregular or random variations? **(3)**

d) Derive the demand schedule and curve based on the law of demand. What are the factors affecting demand for a commodity. **(3)**

MBA 02

Roll No. 2 0 1 6 0 2 2 0 1 8

B. Tech.
(SEM V) ODD SEMESTER
MAJOR EXAMINATION 2017 - 2018

Subject Name:Engineering and Managerial Economics

Time: 3 Hrs. **Max. Marks: 50**

Note: Attempt all questions. Each question carry equal marks.

1. Attempt any four parts of the following: **(4× 2.5 = 10)**

(a) What are the crucial business decisions that a firm has to make? How can a firm apply the managerial economics in making these decisions? Discuss.
(b) Describe the application of tools, techniques and concepts of managerial economics in our engineering career.
(c) Explain the nature of business decision making problem. Explain the meaning of business strategy in this context. What criteria does manager of a business firm often follow in choosing a strategy?
(d) State the law of demand. What are the factors which determine market demand for a commodity?
(e) Explain the concept of income elasticity of demand. Explain the importance of income elasticity of demand for a business firm, especially in designing marketing strategies?
(f) Why is demand forecasting essential? What is the Delhi method? What is the use of this method in demand forecasting?

2. Attempt any two parts of the following: **(2×5 = 10)**

(a) Distinguish between short-run and long-run production functions. Explain the law of increasing returns to scale.
(b) Define cost function. Explain the concept of total fixed cost, total variable costs and total costs.
(c) What is opportunity cost? Give some examples of opportunity cost. How are these costs relevant for managerial decisions?

3. Attempt any two parts of the following: **(2×5 = 10)**

(a) Define marginal cost. How is it related to marginal product of a factor? As output is increased, marginal cost first falls and then beyond a certain point it rises. How would you explain it?
(b) What are the three stages of production function? Why does it not make any economic sense to produce in stage 1 or stage 3?
(c) What do you understand by theory of profit? Explain any two theories of profit.

4. Attempt any two parts of the following: **(2×5 = 10)**

(a) What is meant by business cycles? What are the different phases of a business cycle? How is private business affected during the different phases?
(b) What are the characteristic of perfect competition? Why is a firm under perfect competition a price-taker and not a price-maker?
(c) "The monopolist produces a larger output at a lower price and earns larger profits in the long run than it does in the short run". Comment.

5. Attempt any two parts of the following: **(2×5 = 10)**

(a) Which are the three approaches for calculating the GDP? Discuss.
(b) Discuss the concept of Inflation and Deflation. How do they effect the level of economic activity?
(c) Discuss the characteristics of oligopoly? What are the causes of oligopoly?

Subject Code: BCS-26 **Roll No.** 2016022018

B. Tech.
ODD SEMESTER
MINOR TEST 2017 - 2018

Subject Name: Principles of Operating Systems

Time: 2 Hrs. **Max. Marks: 20**

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

(a). Consider the data given in following table- 4

Partition size (KB)	2KB		4KB		20KB	10KB		
Job sizes (KB)	2KB	10KB	3KB	7KB	6KB	8KB	20KB	4KB
Burst Time	3	8	2	1	5	1	8	6

Assume that all jobs arrive at the same time in above order and processed by CPU in FIFO manner. Determine when the job of size 20KB get the memory and be completed in case of best fit, worst fit and first fit allocation techniques.

(b). What are the various goals of designer while developing an operating system. Explain in detail. 2

(c). Consider the following segment table- 2

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

Determine which of the following addresses are valid and What are the physical addresses for them?

(a) 0,430 (b) 1,10 (c) 2,500 (d) 2, 105 (e) 3,400 (f) 4,112 (g) 1, 20

(d) What is paging? Explain the various types of page table. 2

Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.

(a). Consider the following page reference string- 4

2,6,3,6,4,6,5,6,4,6,2,6,3,6,4,6,5,6

How many page fault would occur, if following page replacement algorithm uses 4 frames and initially all frames are empty.

a. Least Recently Used Page replacement algorithm
b. FIFO Page replacement algorithm
c. Optimal Page replacement algorithm

(b). Explain the following terms in brief- 2

a. Process and Program
b. Process Control Block
c. Process State
d. Context Switching

(c). For each of the following decimal virtual addresses, compute the virtual page number and offset for a 4KB and 8KB pages- 2

a. 20000 b. 32768
c. 60000 d. 18956

Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.

(a). Attempt the following questions- 4

I. A computer whose processes have 1024 pages in their address space keeps its page table in memory. The overload required for reading a word from the page table is 5ns. To reduce this overhead, the computer has TLB, which holds 32 (virtual page, physical page frame) pairs, and can do a lookup in 1ns. What hit rate is needed to reduce the mean overhead to 2ns.

$h(1)+(1-h)5 = 2$

II. Consider a system with Logical Address space 32 bits, Physical address space 64MB. The memory is byte addressable and page table entry size is 2bytes. What is the approximate size of page table?

2^{23}

(b). What is privileged instruction? Explain in detail. Which of the following instructions are privileged? Give the reason for each. 2

a. Read Device register for a given device.
b. Disable all interrupts.
c. Issue a trap instruction
d. Change processor mode from kernel to user.
e. Updating entries of page table.
f. Read the clock
g. Clear memory
h. Set value of timer

(c). You are given the following data about a virtual memory system- 2

a. The TLB can hold 1024 entries and can be accessed in 1ns
b. A page table entry can be found in 100ns
c. The average page replacement time is 6ms

If page references are handled by the TLB 99% of the time, and only 0.01% lead to a page fault, what is the effective address-translation time?

$0.0099 \quad 0.99X + 0.01X$

$0.99X + (1-0.99)X0.0099(1+100) + (1-0.99)(1-0.0099)$

$0.99X1 + (0.01)(0.99)(1+100)\,0.0001(6\times10^{6}) + (0.01)(0.01)(1+100+6)$

BCA-26

Roll No. 2 0 1 6 0 2 2 0 1 8

B. Tech.
ODD SEMESTER
MAJOR EXAMINATION 2017 - 2018

PRINCIPLES OF OPERATING SYSTEMS

Time: 3 Hrs. **Max. Marks: 50**

Note: Attempt all questions. Each question carries equal marks.

1. Attempt any four parts of the following: **(4× 2.5 = 10)**

(a) Consider a demand-paging system with the following time-measured utilization:

- CPU utilization: 20%
- Paging disk: 97.7%
- Other I/O devices: 5%

What is the status of system? Explain which of the following will improve CPU utilization-

i. Install a faster CPU
ii. Get a bigger paging disk
iii. Increase the degree of multiprogramming
iv. Decrease the degree of multiprogramming
v. Install more main memory
vi. Install a faster hard disk or multiple controllers with multiple hard disks
vii. Add prepaging to the page fetch algorithm
viii. Increase the page size

(b) What is demand paging? If an instruction takes 2 nsec and a page fault takes an additional n nsec, give a formula for the effective instruction time if page fault occurs every k instructions.

(c) Consider the following two-dimensional array:

int X [64] [64];

Suppose that a system has four-page frames and each frame is 128 words (an integer occupies one word). Programs that manipulate the X array fit into exactly one page and always occupy page 0. The data are swapped in and out of the other three frames. The X array is stored in row-major order (i.e., X [0][1] follows X [0][0] in memory). Which of the two code fragments shown below will generate the lowest number of page faults using FIFO? Explain and compute the total number of page faults.

Fragment A

```
for (int j=0; j<64; j++)
      for (int i=0; i<64; i++)
            X[i][j] =0;
```

Fragment B

```
for (int i=0; i<64; i++)
      for (int j=0; j<64; j++)
            X[i][j] =0;
```

(d) What do you mean by Kernel? Explain monolithic kernel and microkernel.

(e) Explain the various states through which a process goes throughout its lifetime with a suitable diagram.

(f) What is Process Control Block? What is its role in context switching?

2. Attempt any two parts of the following: **(2× 5 = 10)**

(a) Attempt the following questions-

I. Consider three processes, all arriving at time zero, with total execution time of 10, 20 and 30 units, respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remain idle?

II. Consider three CPU-intensive processes, which require 10, 20 and 30-time units and arrive at times 0, 2 and 6, respectively. How many context switches are needed if the operating system implements a shortest remaining time first scheduling algorithm? Do not count the context switches at time zero and at the end.

(b) What is deadlock? Explain its four necessary conditions. How we can prevent deadlock in Operating System?

(c) A system has 4 processes and 5 allocatable resource. The current allocation and maximum needs are as follows:

	Allocated	Maximum	Available
P1	10211	11212	00x11
P2	20110	22210	
P3	11010	21310	
P4	11110	11221	

What is the smallest value of x for which this a safe state. Also find out safe sequence for the value of x. Check requests P1(1,0,1,0,1) and P2(0,0,1,0,0) can be granted or not.

3. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) Consider the following set of processes, with the arrival times and the CPU burst times given in milliseconds.

Process	Arrival-Time	Burst-Time
P1	0	7
P2	1	3
P3	2	8
P4	4	6

What is the average Turnaround Time, Waiting Time, Throughput, and Response Time for these processes with the preemptive shortest remaining time first (SRTF) and Round Robin algorithm with time quantum 1ms and 2ms?

(b) I. What is thread? How its differs from process? Explain the various states involve in thread life cycle.

II. Consider the following program and write the output with explanation.

```
#include <stdio.h>
#include <sys/types.h>
int main ()
{
    fork();
    fork();
    fork();
    printf("hello\n");
    return 0;
```

(c) What is Dining Philosopher Problem? Give the deadlock free solution of it using semaphore with detail.

4. Attempt any two parts of the following: (2× 5 = 10)

(a) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous was at cylinder 125. The queue of pending requests, in FIFO order, is:

86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for FCFS, SSTF, SCAN, LOOK, C-SCAN, and C-LOOK

(b) Explain the various disk performance features? Consider a disk pack with a seek time of 4 milliseconds and rotational speed of 10000 rotations per minute (RPM). It has 600 sectors per track and each sector can store 512 bytes of data. Consider a file stored in the disk. The file contains 2000 sectors. Assume that every sector access necessitates a seek, and the average rotational latency for accessing each sector is half of the time for one complete rotation. Calculate the total time (in milliseconds) needed to read the entire file.

(c) What is directory? List the various operations that can be performed on directory. Explain the various ways of directory structure in brief.

5. Attempt any two parts of the following: (2× 5 = 10)

(a) What is a file? Explain its various attributes as well as operations can be performed on it. Describe File Descriptor in brief.

(b) How Operating system protection differs from security? Explain the various forms of security violations? Also explain the various ways to protect a system in brief.

(c) Explain the Confinement Problem. What are the various solutions of it.

BCS-28

Roll No. 2 0 1 6 0 2 2 0 1 0

B. Tech.(CSE)
(SEM V) ODD SEMESTER
MINORTEST 2017 - 2018
Design and analysis of Algorithms

Time: 2 Hrs. **Max. Marks: 20**

Note: Answer all questions

1 Attempt any three of the followings. Q. 1 (a) is Compulsory.

(a) Calculate the asymptotic bounds for the following recurrence by using recursion tree method. 4
$T(n)= T(n/3) + T(2n/3)+ cn$

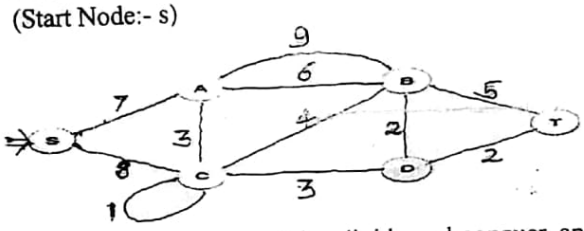
(b) Defined and differentiate the little-Oh (o) and little-Omega (ω) notations. 2

(c) What is best, worst, and average case time complexity of quick sort and also compare the complexity of quick sort with insertion sort, merge sort, and heap sort for all cases. 2

(d) Calculate the asymptotic bounds for the following recurrences by using Master Theorem.
(i) $T(n)= 4T(n/2) + n$ 2
(ii) $T(n)= 4T(n/2) + n^2$
(iii) $T(n)= 4T(n/2) + n^3$

2 Attempt any two of the followings. Q. 2 (a) is Compulsory.

(a) Find the minimum cost spanning tree of the following graph by using Prim's algorithm. 4
(Start Node:- s)

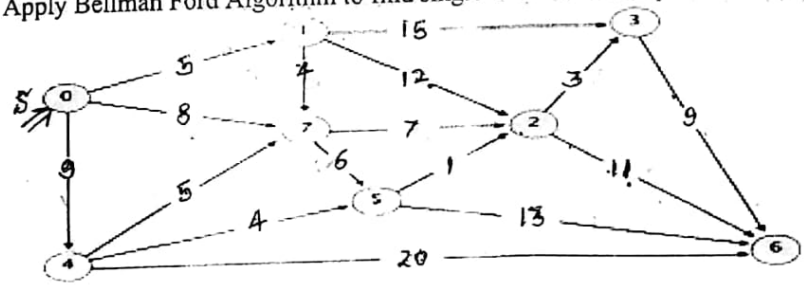


(b) What do you understand by divide-and-conquer approach and write the major difference between the dynamic programming and divide-and-conquer approach. 2

(c) What is the running time complexity of quick sort when all elements of an array have a same value, justify your answer? 2

3 Attempt any ~~three~~ two of the followings. Q. 3 (a) is Compulsory.

(a) Apply Bellman Ford Algorithm to find single source shortest path 4



(b) Using Strassen's algorithm compute the product of given matrix and show your steps. 2
$A = \begin{bmatrix} 5 & 8 \\ 3 & 5 \end{bmatrix}, B = \begin{bmatrix} 8 & 4 \\ 4 & 3 \end{bmatrix}$

(c) Sort the following array A= [2, 8, 7, 1, 3, 5, 6, 4] by using quick sort algorithm. 2

BCS-28

Roll No. 2 0 1 6 0 2 2 0 1 8

B. Tech
ODD SEMESTER
MAJOR EXAMINATION 2017 - 2018
DESIGN & ANALYSIS OF ALGORITHMS

Time: 3 Hrs. **Max. Marks: 50**

Note: Attempt all questions. Each question carry equal marks.

1. **Attempt any four parts of the following:** **(4× 2.5 = 10)**

(a) What is best, worst, and average case time complexity of insertion sort and also compare the complexity of insertion sort with merge sort for all cases.

(b) Define and differentiate the worst case, best case, and average case complexity of algorithms.

(c) Expiain the method of comparing the order of the growth limits. Compare order of growth of following functions :
(i) $\log_2 n$ and $n^{1/2}$
(ii) $(\log_2 n)^2$ and $\log_2 n^2$

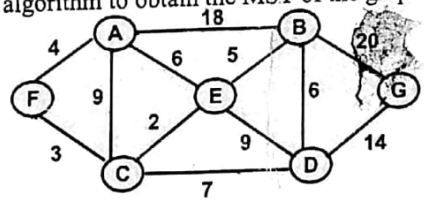
(d) Describe graph coloring problem and its time complexity.

(e) Defined and differentiate the big-oh (O) and big-Omega (Ω) and Theta (Θ) notations.

(f) Solve the following recursion by master method
(a) $T(n) = 9\,T(n/3) + n2$
(b) $T(n) = 8T(n/2) + 1$

2. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) Apply Kruskal's algorithm to obtain the MST of the graph given below.



(b) Write the merge sort algorithm and discuss its efficiency. Sort the list E, X, A, M, P, L, E in alphabetical order using merge sort.

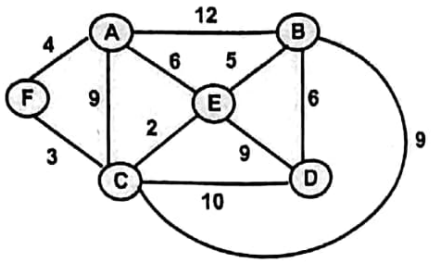
(c) What is the difference between Kruskal's and Prim's Algorithm.

3. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) Draw the state space tree to generate one solution for 4-queens problem.

(b) Write a short notes on the following:
(i) Travelling Salesman Problem
(ii) Hamiltonian Cycle

(c) Apply Dijkstra's algorithm to find out shortest distances from vertex "A" to all other vertices in the graph given below.



4. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) Defined Red-Black tree and write down the properties of Red-Black tree.

(b) Show the red black trees that resulting after successively inserting the key K, A, N, B, G, O, E, H into an initially empty red-black tree?

(c) Solve the following 0/1 Knapsack problem using dynamic programming I= (11,21,31,33), W=(2,11, 22, 15), capacity of bag C= 40.

5. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) For string matching working module q=11, how many spurious hits does the Rabin-krap matcher encounter in the text T= 3141592653589793, when looking for the pattern P=26?

(b) Defined NP, NP-hard and NP-complete problems. How they are related to each other?

(c) *Explain the following:*
(i) Approximation Algorithm
(ii) Properties of B-Tree
(iii) Fibonacci Heap

Roll No. 2016022010

Session: 2017-18

Course: B. Tech. (Computer Sc & Engineering)

Subject: BCS-29 (Advanced Computer Architecture)

Class Test

Time: 2 Hrs. Max Marks: 30

Note: Attempt ALL questions. Each question carries equal marks

Q1. Attempt any **Three** of the following. Q.1(a) is compulsory.

a) Discuss the Classific ation of Instruction Set Architectures. Give the code to compute the function $f = a + b * c - d / e$ through various Instruction Set Architectures.

b) Give various architectural classification schemes for parallel computer. Also discuss the Flynn's classification in detail. NUMA

c) Analyze the data dependences among the following statements in a given program, draw the dependence graph and schedule the instructions for parallel execution.

S1: A = B + C
S2: C = D + E
S3: F = G + E
S4: C = A + F
S5: M = G + C
S6: A = L + C
S7: A = E + A

d) Distinguish between medium-grain and fine-grain processors in their architectures and programming requirements.

Q2. Attempt any Three of the following. Q.2(a) is compulsory.

a) A 400-MHz processor was used to execute a benchmark program with the following instruction mix and clock cycle counts:

Instruction type	Instruction Count	Clock needed
Integer arithmetic	450000	1
Data transfer	320000	2
Floating point	150000	4
Control transfer	80000	8

Compute the effective CPI, MIPS rate and execution time for this program.

b) Discuss the Hardware and software parallelism and their mismatch with the help of suitable example.

c) Discuss the synchronous and asynchronous models of linear pipeline, its Clocking and Timing Control. Also derive formula to compute the Speedup, Efficiency, and Throughput of linear pipeline.

d) Discuss linear and non-linear pipeline with examples.

Q3. Attempt any Three of the following. Q.3(a) is compulsory.

a) Consider the following reservation table corresponds to a two-function pipeline A and B :

	T1	T2	T3	T4	T5
S1	A	B		A	B
S2		A		B	A
S3	B		AB		

I. List all four cross forbidden lists of latencies and corresponding combined cross-collision matrices.

II. Draw the state diagram for the two-functional pipeline.

b) Explain pipeline Hazards. Discuss internal forwarding to avoid W-R hazard.

c) Design a binary integer multiply pipelines with five stages is for partial product generation. The last stage is a 36-bitr carry-lookahead adder. The middle three stages are made of 16 carry-save adders of appropriate lengths.

I. Prepare a schematic design of the five stage multiply pipeline. All lines widths and inter-stages must be shown.

II. Determine the maximal clock rate of the pipeline if the stage delays are $\tau 1 = \tau 2 = \tau 3 = \tau 4 = 90$ ns, $\tau 5 = 45$ ns, and the latch delay is 20 ns.

What is the maximal throughput of this pipeline in terms of the number of 36-bit results generated per second?

d) Discuss superscalar and super-pipelined processing. Also estimate the performance of superscalar processor of degree m.

$$\tau = \{\tau_i\}_{max} + d$$

$$\frac{1}{\tau} \quad 110 = 90 + 20$$

BCS-27

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B.Tech.

(SEM V) ODD SEMESTER

MAJOR EXAMINATION 2017-18

Computer Graphics

Time: 3Hrs. **Max. Marks:50**

Note: Attempt all questions. Each question carries equal marks.

1. **Attempt any four parts of the following.** **4x2.5=10**
   - **(a) Write Symmetrical DDA algorithm for drawing line and use it to draw** a line whose end points are (2,5) and (7,8).
   - **(b) Construct a DDA for Circle Generation. It will not generate a closed circle, why? Suggest modifications** to the DDA to let it generate closed circle.
   - **(c) Write Bresenham's algorithm for drawing line and use it to draw a line whose end points are (2,5) and (7,8).**
   - (d) Describe the construction and explain the functioning of Shadow **Mask CRT.**
   - **(e) State and explain Mid-Point Subdivision line clipping algorithm.**
   - (f) Write notes on Graphical Input Techniques.
2. **Attempt any two parts of the following.** **2x5=10**
   - **(a) Discuss techniques to achieve realism while displaying a 3D object on a 2D** screen.
   - **(b) Demonstrate 3-D modelling with a suitable example.**
   - **(c) Write notes on Need for 3-Dimensional Imaging.**
3. Attempt any two parts of the following. 2x5=10
   - **(a) Discuss the properties that are important for designing curves.**
   - **(b) Differentiate between interpolation spline and approximation spline. What** do Bezier and B-splines curves indicate as far as splines are concerned?
   - **(c) Write the properties of Bazier and B-spline curves.**
4. **Attempt any two parts of the following.** **2x5=10**
   - **(a) What is scan conversion? Write (YX) algorithm for scan converting polygons and explain it with suitable example.**
   - **(b) What is singularity in scan converting polygon? Write Singularity** algorithm and explain it with suitable example.
   - **(c) Write notes on 3-D Transformations.**
5. Attempt any two parts of the following. 2x5=10
   - (a) State and explain Depth- Buffer algorithm and itslimitations.
   - (b) State and explain scan line coherence algorithm.
   - (c) State and explain area coherence algorithm.