University of Mumbai

Examination 2021 under cluster __ (Lead College: _____)

Examinations Commencing from 1st June 2021 to 10th June 2021

Program: BE (COMPUTER ENGINEERING)

Curriculum Scheme: 2016

Examination: SE Semester IV

Course Code: CSC401 and Course Name: Applied Mathematics IV

Time: 2hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	If a random variable X has following probability distribution, then find the moment generating function **x** | 0 | 1 | 2 | 3 | 4 **P (X= x)** | 1/5 | 1/5 | 1/5 | 1/5 | 1/5
Option A:	$\frac{1}{8}[1 - e^{t} + e^{2t} - e^{3t} + e^{4t}]$
Option B:	$\frac{1}{16}[1 + e^{t} + e^{4t} + e^{9t} + e^{16t}]$
Option C:	$\frac{1}{16}[1 - e^{t} + e^{2t} - e^{3t} + e^{4t}]$
Option D:	$\frac{1}{5}[1 + e^{t} + e^{2t} + e^{3t} + e^{4t}]$
2.	Evaluate $\int_c z^3 dz, where\ c\ is\ the\ upper\ half\ of\ a\ circle\ \|z\| = 1$
Option A:	0
Option B:	$2/3$
Option C:	$-2/3$
Option D:	$2/3i$
3.	*Three factories A, B and C produces 30%, 50% and 20% of the total production of an item. Out of their production 80% , 50% and 10% are defective respectively. An item is chosen randomly and found to be defective. Find the probability that it was produced by the factory A?*
Option A:	0.47
Option B:	0.57
Option C:	0.67
Option D:	0.77
4.	The average marks scored by 33 boys is 73 with standard deviation 9 while that of 37 girls is 71 with standard deviation 7 find the value of calculated standard normal variate 'z'
Option A:	2
Option B:	2.32
Option C:	1.03
Option D:	1.72

5.	The dual of the following LPP is $Max\ z = 5x_1 + 2x_2$ Subject to : $3x_1 + 2x_2 \leq 17,$ $2x_1 + 2x_2 \leq 7$ $x_1 + 2x_2 \leq 19$
Option A:	$Min\ z = 17y_1 + 7y_2 + 19y_2$ Subject to : $3y_1 + 2y_2 + y_3 \leq 5,$ $2y_1 + 2y_2 + 2y_3 \leq 19$ $y_1, y_2, y_3 \geq 0$
Option B:	$Min\ z = 17y_1 + 7y_2 + 19y_2$ Subject to : $3y_1 + 2y_2 + y_3 \geq 5,$ $2y_1 + 2y_2 + 2y_3 \leq 19$ $y_1, y_2, y_3 \geq 0$
Option C:	$Min\ z = 5y_1 + 2y_2 + 19y_2$ Subject to : $3y_1 + 2y_2 + y_3 \geq 17,$ $2y_1 + 2y_2 + 2y_3 \geq 7$ $y_1, y_2, y_3 \geq 0$
Option D:	$Min\ z = 17y_1 + 7y_2 + 19y_2$ Subject to : $3y_1 + 2y_2 + y_3 \geq 5,$ $2y_1 + 2y_2 + 2y_3 \geq 2$ $y_1, y_2, y_3 \geq 0$
6.	If $A = \begin{bmatrix} 7 & 4 & -1 \\ 4 & 7 & -1 \\ -4 & -4 & 4 \end{bmatrix}$, *then the minimal polynomial of a matrix A is*
Option A:	$x^2 - 5x + 36$
Option B:	$x^2 - 4$
Option C:	$x^2 - 15x + 36$
Option D:	$x^3 - 7x^2 + 16x - 12$
7.	Suppose we know that births in a hospital occur randomly at an average rate of 1.8 births per hour. What is the probability that we observe 5 births in a given 2-hour interval
Option A:	0.3681
Option B:	0.1377
Option C:	0.031
Option D:	0.0253
8.	Evaluate $\int_C \frac{e^{2\pi z}}{z+i} dz$, *where c is a circle* $\lvert z + i \rvert = 1$
Option A:	$-2\pi i/e$
Option B:	$2\pi i$
Option C:	$-2\pi i e^3$
Option D:	$-2\pi i e^{-3}$
9.	The optimal solution of the LPP, $Max.Z = 2x_1 + 5x_2$ subject to $x_1 + 3x_2 \leq 3$ $3x_1 + 2x_2 \leq 6,\ x_1, x_2 \geq 0$ is
Option A:	$x_1 = 0, x_2 = -2\ , Z = -10$
Option B:	$x_1 = 2, x_2 = 0\ , Z = -4$
Option C:	$x_1 = 2, x_2 = 0\ , Z = 4$

Option D:	$x_1 = 2, x_2 = 0, Z = 2$
10.	If $A = \begin{bmatrix} -2 & 0 \\ 0 & -3 \end{bmatrix}$, *the the matrix* e^A *is*
Option A:	$\begin{bmatrix} 3^{-A} & 0 \\ 0 & 2^{-A} \end{bmatrix}$
Option B:	$\begin{bmatrix} 2^A & 0 \\ 0 & 3^A \end{bmatrix}$
Option C:	$\begin{bmatrix} e^{-2} & 0 \\ 0 & e^{-3} \end{bmatrix}$
Option D:	$\begin{bmatrix} e^3 & 0 \\ 0 & e^2 \end{bmatrix}$
11.	In a LPP the constants $c_1, c_2, \ldots . c_n$ in the objective function of the primal appear in ---------- of the dual
Option A:	Objective function
Option B:	RHS of constraints
Option C:	Coefficients of the variables in constraints
Option D:	Slack variables
12.	If a continuous random variable X has a probability density function $f(x) = \frac{x}{2}, 0 < x < 2,$ then find the probability that x is greater than 1
Option A:	1/3
Option B:	1/2
Option C:	1/4
Option D:	3/4
13.	If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, *then the matrix* $A^2 - 2A - 3I$ is
Option A:	a Null matrix
Option B:	The matrix A itself
Option C:	$\begin{bmatrix} -2 & -1 \\ 0 & -1 \end{bmatrix}$
Option D:	$\begin{bmatrix} -2 & -2 \\ -1 & -1 \end{bmatrix}$
14.	The Eigen values of the Matrix $A = \begin{bmatrix} 2 & 1 & -2 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$ are
Option A:	1, 1, 9
Option B:	0, 1, -1
Option C:	1, 9, 2
Option D:	1, 2, -1
15.	The number of the accidents in a city during a week is given as follows. Find the χ^2 calculated value and test the hypothesis that accidents are distributed evenly over the week. [*given* $\chi^2 = 12.59$ *at* 6 *degrees of freedom and* 5% *LOS*]

Day	1	2	3	4	5	6	7
No. of accidents	10	11	9	8	12	9	11

Option A:	$\chi^2 = 2.2, Hypothesis\ rejected$
Option B:	$\chi^2 = 1.2, Hypothesis\ rejected$
Option C:	$\chi^2 = 1.2, Hypothesis\ accepted$
Option D:	$\chi^2 = 2.2, Hypothesis\ accepted$
16.	The oil paint is marketed in the tin of 12 kgs. If sample of 40 tins showed the mean weight as 11.8kg with standard deviation 2 kgs. Find the calculated absolute value of test statistic z .
Option A:	0.8975
Option B:	0.6325
Option C:	0.8124
Option D:	0.7895
17.	The residue of $f(z) = \frac{e^{2z}}{z^3}$ $at\ its\ pole$
Option A:	4
Option B:	2
Option C:	0
Option D:	-2/3
18.	If $f(z) = \frac{1}{z-2} - \frac{1}{z-1}, then\ the\ Taylor's\ series of\ f(z) in$ $the\ region\ of\ convergence\ \|z\| < 1\ is$
Option A:	$-\frac{1}{2}\left[1 - \frac{z}{2} + \frac{z^2}{4} - \frac{z^3}{8} + \cdots\right] + [1 + z + z^2 + z^3 + \cdots]$
Option B:	$-\frac{1}{2}\left[1 + \frac{z}{2} + \frac{z^2}{4} + \frac{z^3}{8} + \cdots\right] + [1 - z + z^2 - z^3 + \cdots]$
Option C:	$-\frac{1}{z}\left[1 + \frac{z}{2!} + \frac{z^2}{4!} + \frac{z^3}{8!} + \cdots\right] + [1 + z + z^2 + z^3 + \cdots]$
Option D:	$-\frac{1}{2}\left[1 + \frac{z}{2} + \frac{z^2}{4} + \frac{z^3}{8} + \cdots\right] + [1 + z + z^2 + z^3 + \cdots]$
19.	For Diagonalizable matrix $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 4 & 5 \\ 0 & 4 & 3 \end{bmatrix}$,
Option A:	Algebraic Multiplicity ≠ Geometric Multiplicity
Option B:	Algebraic Multiplicity = Geometric Multiplicity = 1
Option C:	Algebraic Multiplicity = 2, Geometric Multiplicity = 1
Option D:	Algebraic Multiplicity = Geometric Multiplicity = 2
20.	The value of the $\int_{-\infty}^{\infty} \frac{1}{x^2+4} dx\ using\ contour\ integration$ is
Option A:	$\frac{\pi}{2}$
Option B:	π
Option C:	$\frac{1}{2i}$
Option D:	$2\pi i$

Q2	**Solve any Four out of Six** **5 marks each**
A	*Evaluate* $\int_c \frac{e^{2z}}{(z-1)^3} dz, \quad c: \lvert z+i \rvert = 2$ *using Cauchy'sResidue theorem*
B	*Find the Eigen values and Eigen vectors of* $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$
C	*Find the probability that at most 2 defective fuses will be found in a box of 200 fuses. If experience shows that 2% of such fuses are defective?*
D	A Principal at certain school claims that the students in his school are above average intelligence. A random sample of 30 students IQ scores have a mean score of 112.5. Is there sufficient evidence to support the principal's claim? The mean population IQ is 100 with standard deviation of 15.
E	The manufacturer of a certain make of LED bulb claims that his bulbs have a mean life of 20 months. A random sample of 7 such bulbs gave the following values. Life of bulbs in months: 19, 21, 25, 16, 17, 14, 21. Can you regard the producer's claim to be valid at 1% level of significance?
F	Solve the LPP by simplex method, $Max\ Z = 4x_1 + 10x_2$ $Sub.\ to.\ 2x_1 + x_2 \leq 50$ $2x_1 + 5x_2 \leq 100$ $2x_1 + 3x_2 \leq 90, \qquad x_1, x_2 \geq 0$

Q3	**Solve any Four out of Six** **5 marks each**
A	*Obtain Taylor's and Laurent's expansions of* $f(z) = \frac{z-1}{z^2-2z-3}$ *about* $z = 2$ *in the region of convergence* $\lvert z-2 \rvert < 1$
B	*If* $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$, *Obtain the minimal polynomial and Eigen values of* $3A^{-1}$
C	*If the probability that an individual suffers a bad reaction from particular infection is 0.001, determine the probability that out of 2000 individuals i) exactly three ii) more than two individuals will suffer a bad reaction.*
D	In the Normal distribution exactly 30% of items are below 45 and 8% of the items are above 64. Find the mean and variance of normal distribution.
E	The following table gives the data of boys and their fathers. Do these figures support hypothesis that educated fathers have intelligent boys?

	Intelligent sons	Unintelligent sons	Total
Educated Fathers	50	45	95
Uneducated fathers	45	90	135
Total	95	135	230

F	Optimize $x_1^2 + x_2^2 + x_3^2 - 6x_1 - 8x_2 - 10x_3$

University of Mumbai
Examination June 2021
Examinations Commencing from 1st June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2016

Examination: SE Semester IV

Course Code: CSC402 and Course Name: Analysis of Algorithm

Time: 2 hour Max. Marks: 80

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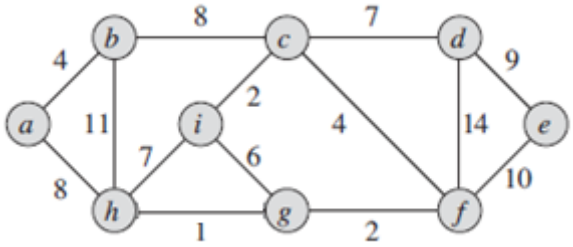
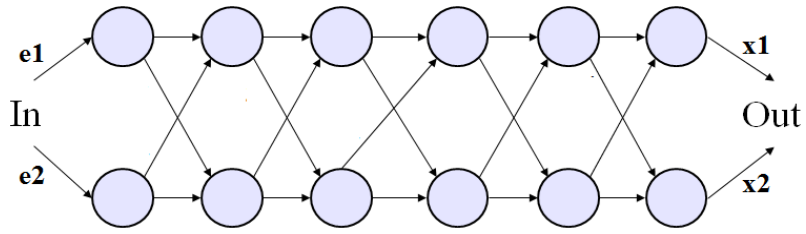
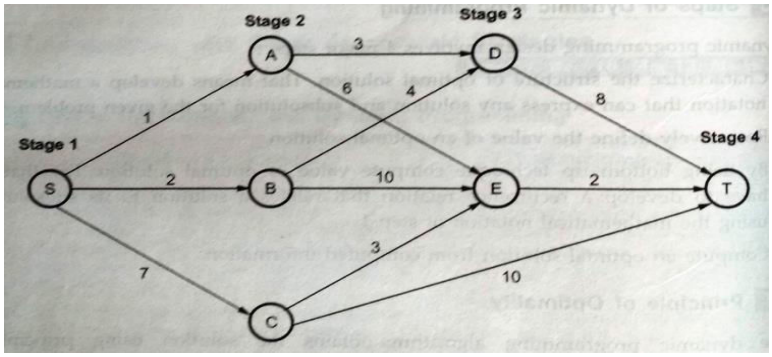
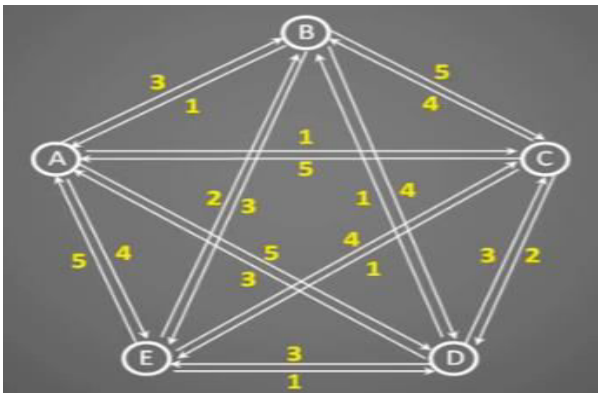
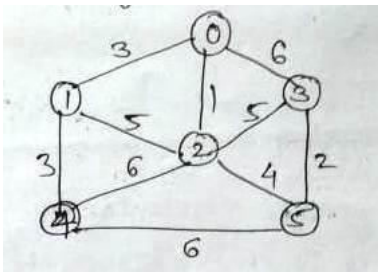
Q1.	**Choose the correct option for following questions.** **All the Questions are compulsory and carry equal marks**
1.	For $f(n) = 2n^2 + 5$ and $g(n)= 7n$ what is the value of n where $f(n) \in \Omega(g(n))$
Option A:	1
Option B:	2
Option C:	3
Option D:	4
2.	For given elements 70, 30, 20, 50, 60, 10, 40, if sort them using selection sort then what will be the output after iteration (pass) 3
Option A:	70, 30, 20, 50, 10, 60, 40
Option B:	70, 30, 20, 50, 60, 10, 40
Option C:	10, 20, 30, 50, 60, 70, 40
Option D:	10, 30, 20, 50, 60, 70, 40
3.	In the problem of finding minimum and maximum using straightforward algorithm, it take ___ run time
Option A:	$O(n^2)$
Option B:	Ω (n)
Option C:	O(n)
Option D:	θ(n)
4.	What is time complexity for following list using Quick sort algorithm If pivot is the last element. 7 6 10 12 8 3 1
Option A:	O(n)
Option B:	O(log n)
Option C:	O(nlogn)
Option D:	$O(n^2)$
5.	What is the time complexity if binary search algorithm used for finding element from a set of n elements.
Option A:	O(n)
Option B:	O(nlogn)

Option C:	O(log n)
Option D:	$O(n^2)$
6.	In fractional Knapsack Problem, suppose n = 3, profit = (25, 24, 15),Weight (in kg) = (18, 15, 10) and capacity = 20, then optimal solution having total profit is____
Option A:	28.2
Option B:	31
Option C:	31.5
Option D:	32.2
7.	What is the cost of following graph using Kruskal's algorithm 
Option A:	37
Option B:	38
Option C:	36
Option D:	39
8.	For a problem, it is strategy that builds a sequence of choices for getting the optimal solution.
Option A:	Backtracking and Branch-and-bound
Option B:	Divide and Conquer
Option C:	Greedy technique
Option D:	Dynamic Programming
9.	In assembly line scheduling problem to go in stations at stage 5 what are the probable ways 
Option A:	16
Option B:	25
Option C:	32
Option D:	5
10.	In multistage graphs with source S and sink T, which vertex is backward vertex

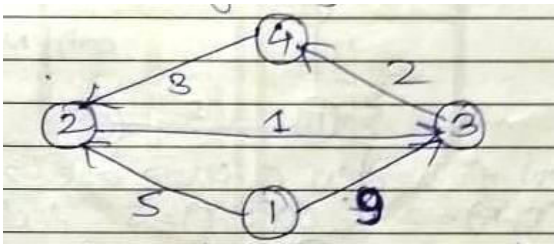
	while finding the distance from each vertex A, B, C to vertex T. 
Option A:	B
Option B:	C
Option C:	D
Option D:	E
11.	In following graph for the TSP, if the intermediate set S= ϕ , then using dynamic programming the Cost (B, ϕ, E) is _____ 
Option A:	2
Option B:	3
Option C:	7
Option D:	9
12.	Identify spurious hit in the given text string for pattern of length- 5 window Pattern: 3 1 4 1 5 Modulus: 10 Text: 1 2 5 9 7 8 6 3 1 4 1 5 7 9 4 3 2 1 5 8 3 1 4 1 5 6 8
Option A:	8-21
Option B:	13-17
Option C:	3-7
Option D:	7-20
13.	Apply naive string matching algorithm to find the shift count where pattern matches with the Text= abcdabcdyabcdadbadf and pattern= abcdad
Option A:	8
Option B:	9

Option C:	10
Option D:	11
14.	In 15 puzzle problem a node currently being expanded is called _____
Option A:	Live node
Option B:	E node
Option C:	Dead node
Option D:	Root node
15.	Which of the following statement about 0/1 knapsack and fractional knapsack problem is correct?
Option A:	In 0/1 knapsack problem items are divisible and in fractional knapsack items are indivisible
Option B:	0/1 knapsack and fractional knapsack both are the same
Option C:	0/1 knapsack is solved using a greedy algorithm and fractional knapsack is solved using dynamic programming
Option D:	In 0/1 knapsack problem items are indivisible and in fractional knapsack items are divisible
16.	Backtracking algorithm is implemented by constructing a tree of choices called as?
Option A:	State-space tree
Option B:	State-chart tree
Option C:	Backtracking tree
Option D:	Node tree
17.	Of the following given options, which one of the following is a correct option that provides an optimal solution for 4-queens problem?
Option A:	(4,3,2,1)
Option B:	(2,3,1,4)
Option C:	(3,1,4,2)
Option D:	(4,2,3,1)
18.	_____ is the class of decision problems that can be solved by non-deterministic polynomial algorithms?
Option A:	P
Option B:	NP
Option C:	Complete
Option D:	Hard
19.	To which of the following class does a CNF-satisfiability problem belong?
Option A:	NP class
Option B:	P class
Option C:	NP hard

Option D:	NP complete
20.	What is vertex coloring of a graph?
Option A:	A condition where all vertices should have same color
Option B:	A condition where any two vertices having a common edge should always have same color
Option C:	A condition where any two vertices having a common edge should not have same color
Option D:	A condition where all vertices should have a different color

Q2	**Solve any Four out of Six** **5 marks each**
A	Define O, Ω, θ notations and find complexity of following recurrence relations i) $T(n) = 4T(n/2) + n^2$ ii) $T(n) = 2T(n/2) + n^3$
B	Find all possible subsets of weight that sum to m, let n=6,m=30 and w[1:6]={5,10,12,13,15,18} and draw portion of state space tree.
C	Find the MST and its cost using Prim and Kruskal algorithm 
D	Describe terms P, NP, NP complete and NP hard. Explain the NP completeness and reducibility
E	Sort following list using Quick sort and show the output in passes. 2 8 7 1 3 5 6 4
F	Describe the String matching with finite automata with suitable example.

Q3.	
A	**Solve any Two** **5 marks each**
i.	Find an optimal solution to the knapsack instance n=7, W=15, Profit – (10,5,15,7,6,18,3), Weight – (2,3,5,7,1,4,1)
ii.	Describe 8 queen problem using backtracking method and write minimum 2 different ways of keeping the 8 queen where no two queens can attack other.
iii.	Using Rabin karp string matching algorithm, find the all position where the string

	matches with given pattern. Text= “569821987632198” Pattern = “2198” and q =10
B	**Solve any One** **10 marks**
i.	Apply all pair shortest path Floyd-Warshall algorithm to following graph and find the all pair shortest path and draw the final graph. 
ii.	Determine the LCS of X = <101000111010> and Y = <01001001010>

University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: SE Semester IV

Course Code: CSC403 and Course Name: Computer Organization and Architecture

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In restoring division algorithm, after performing operations left shift operation on A,Q and A=A-M, if MSB of A = 1 then
Option A:	Q0= 1
Option B:	Q0=0, A=A+M
Option C:	A=A+M
Option D:	A= A+Q
2.	Exponent overflow is defined as
Option A:	a negative exponent exceeds the minimum possible exponent value
Option B:	a negative exponent exceeds the maximum possible exponent value
Option C:	a positive exponent exceeds the maximum possible exponent value
Option D:	a positive exponent exceeds the minimum possible exponent value
3.	Two's complement representation of +18 and -18 using 16 bits are
Option A:	0000000000011010, 1111111111101010
Option B:	0000000000010011, 1111111111111110
Option C:	0000000000010110, 1111111111101111
Option D:	0000000000010010, 1111111111101110
4.	Arithmetic and logic unit does not consist of
Option A:	Status flag
Option B:	Complementer

<table>
<tr><td>Option C:</td><td>Shifter</td></tr>
<tr><td>Option D:</td><td>Control Unit</td></tr>
<tr><td></td><td></td></tr>
<tr><td>5.</td><td>To minimize main memory references, the machine or assembly language programmer optimize the use of</td></tr>
<tr><td>Option A:</td><td>Control registers</td></tr>
<tr><td>Option B:</td><td>User visible registers</td></tr>
<tr><td>Option C:</td><td>Status registers</td></tr>
<tr><td>Option D:</td><td>Instruction register</td></tr>
<tr><td></td><td></td></tr>
<tr><td>6.</td><td>Identify the correct matching
<table>
<tr><th>Addressing Modes</th><th>Description</th></tr>
<tr><td>1. Direct</td><td>a. The address field refers to the address of a word in register, which in turn contains a full-length address of the operand.</td></tr>
<tr><td>2. Immediate</td><td>b. The address field refers to the address of a word in memory, which in turn contains a full-length address of the operand.</td></tr>
<tr><td>3. Indirect</td><td>c. Used to define and use constants or set initial values of variables.</td></tr>
<tr><td>4. Register Indirect</td><td>d. the address field contains the effective address of the operand</td></tr>
</table></td></tr>
<tr><td>Option A:</td><td>1-d, 2-c, 3-b, 4-a</td></tr>
<tr><td>Option B:</td><td>1-a, 2-b, 3-c, 4-d</td></tr>
<tr><td>Option C:</td><td>1-b, 2-d, 3-a, 4-c</td></tr>
<tr><td>Option D:</td><td>1-c, 2-a, 3-d, 4-b</td></tr>
<tr><td></td><td></td></tr>
<tr><td>7.</td><td>_____ contains a word to be stored in memory or sent to the I/O unit, or is used to receive a word from memory or from the I/O unit.</td></tr>
<tr><td>Option A:</td><td>Instruction Register</td></tr>
<tr><td>Option B:</td><td>Memory Address Register</td></tr>
<tr><td>Option C:</td><td>Memory Buffer Register</td></tr>
<tr><td>Option D:</td><td>Instruction Buffer Register</td></tr>
</table>

8.	When an instruction is to be fetched following micro-operations may be performed
Option A:	t1: MAR <- (IR(Address)), t2: MBR <- Memory, t3: IR(Address) <- (MBR(Address))
Option B:	t1: MAR <- (PC), t2: MBR <- Memory, PC <- (PC) + 1, t3: IR <- (MBR)
Option C:	t1: MBR <- (PC), t2: MAR <- Save-address, PC <- Routine- address, t3: Memory <- (MBR)
Option D:	t1: MBR <- (PC), t2: MAR <- Save-address, PC <- Routine- address, t3: Memory <- (MAR)
9.	A microprogrammed control unit design method
Option A:	contain complex logic for sequencing through the many micro-operations of the instruction cycle.
Option B:	is used to implement a control unit that simplifies its design
Option C:	is faster than a hardwired unit
Option D:	is useful when small programs are to be executed
10.	The set of microinstructions is stored in
Option A:	main memory
Option B:	cache memory
Option C:	interleaved memory
Option D:	control memory
11.	Possible approaches to cache coherency does not include
Option A:	Non-cacheable memory
Option B:	Hardware transparency
Option C:	Bus watching with write through
Option D:	Associative memory
12.	In Interleaved memory, the upper order bits of the address is used to
Option A:	get block address

Option B:	get the data
Option C:	select a word within a memory bank
Option D:	select the given memory bank.
13.	Which of the following statements is correct in regards of memory
Option A:	The memory that is farthest away from processor is the costliest
Option B:	The memory that is smallest is the farthest.
Option C:	The smallest and fastest memory are always closer to the processor
Option D:	As we move away from the processor, the speed increases
14.	Which of the following type of memory is used for cache memory?
Option A:	DRAM
Option B:	SRAM
Option C:	SDRAM
Option D:	EPROM
15.	_____ mapping permits each main memory block to be loaded into any line of the cache
Option A:	Associative Mapping
Option B:	Direct Mapping
Option C:	Set Associative Mapping
Option D:	Data Mapping
16.	Interrupt is a signal
Option A:	which has highest priority from hardware or software which processor should process its signal immediately
Option B:	which has lowest priority from hardware or software which processor should process its signal later
Option C:	which has highest priority from hardware or software which processor should process its signal later
Option D:	which has lowest priority from hardware or software which processor should process its signal immediately.

17.	Which I/O data transfer technique has direct I/O to memory transfer?
Option A:	I/O module
Option B:	Programmed I/O
Option C:	Interrupt driven I/O
Option D:	DMA
18.	In Flynn's taxonomy, vector and array processors are classified as
Option A:	MIMD
Option B:	SISD
Option C:	SIMD
Option D:	MISD
19.	A hazard that occurs if the write operations take place in the reverse order of the intended sequence is
Option A:	RAR
Option B:	WAW
Option C:	RAW
Option D:	WAR
20.	In out-of-order processor, the instructions are executed
Option A:	original order of the instructions in the program
Option B:	different sub-steps of sequential instructions simultaneously
Option C:	one after the other as per program sequence
Option D:	in an order of availability of operands

Q2 **(20 Marks)**	
A	**Solve any Two** **5 marks each**
i.	Write a note on Performance measures for computer system

ii.	Explain State table and delay element methods for Hardwired Control Unit Design.
iii.	Explain DMA with diagram
B	**Solve any One** **10 marks each**
i.	Explain Booth's Algorithm with flowchart. Hence solve -7 * -3
ii.	Explain the concept of paging with allocation of free frames

Q3 **(20 Marks)**	
A	**Solve any Two** **5 marks each**
i.	Explain IEEE 754 floating point number representation. Hence represent 186.42 in single precision format
ii.	Explain Cache Coherency with Write Policies
iii.	Explain Flynn's Classification with examples and diagrams
B	**Solve any One** **10 marks each**
i.	Explain 6 stages instruction pipelining with effect of conditional branch
ii.	Explain Multi-core processor architecture with diagram

University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: SE Semester IV

Course Code: CSC404 and Course Name: Computer Graphics

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The anti-aliasing procedure that increases the number of intensity levels for each pixel to the total number of sub-pixels is called _____.
Option A:	Pixel shaping
Option B:	Area-sampling
Option C:	Pixel Phasing
Option D:	Super-sampling
2.	Random (vector) scan display uses _____ to store the picture/image information and they are mainly used for applications like _____.
Option A:	Bitmap file, Color drawing application
Option B:	Data file, pixel drawing application
Option C:	Frame buffer, image drawing application
Option D:	Display file, line drawing application
3.	Reflection of a point about x-axis ,followed by a counter-clockwise rotation of 90˚ is equivalent to reflection about the line _____.
Option A:	X = - Y
Option B:	Y = - X
Option C:	X = Y
Option D:	X+Y=1

4.	By applying properties of _____ computations are reduced in Scan Line Polygon Fill Algorithm.
Option A:	Relativity
Option B:	Coherence
Option C:	Reference
Option D:	Symmetry
5.	A picture is stored in the computer's memory in _____.
Option A:	PDCS
Option B:	WCS
Option C:	NDC
Option D:	WDS
6.	Which curve can be controlled locally?
Option A:	B-Spline
Option B:	Bezier curve
Option C:	Helmite curve
Option D:	Bezier Surface
7.	The projection in which the projection plane is allowed to intersect the x, y and z-axes at equal distances.
Option A:	Wire frame model
Option B:	Constructive solid geometry methods
Option C:	Isometric projection
Option D:	Back face removal
8.	The process of representing continuous graphics object as a collection of discrete pixels is called:
Option A:	Rasterization
Option B:	Scan conversion
Option C:	Rendering

Option D:	Discretization
9.	Shear transformations can be expressed in terms of _____.
Option A:	Rotation only
Option B:	Reflection only
Option C:	Scaling only
Option D:	Product of scaling and rotation
10.	If we rasterize a line segment AB with A(-3,3) and B(4,-4) using DDA line algorithm, which are the points that will lie on the line segment?
Option A:	(-3,3), (-3,2), (-2,1), (1,0), (1,-1), (2,-2), (3,-3), (4,-4)
Option B:	(-3,3), (-2,2), (-1,1), (1,1), (1,-1), (2,-2), (3,-3), (4,-4)
Option C:	(-3,3), (-2,2), (-1,1), (0,0), (1,-1), (2,-2), (3,-3), (4,-4)
Option D:	(-3,3), (-2,2), (-1,1), (1,0), (1,-1), (2,-2), (3,-3), (4,-4)
11.	The scale factor of view-port transformation for x co-ordinate is _____.
Option A:	Sx = (xvmax – xvmin)/ (xwmax – xwmin)
Option B:	Sx = (xvmax – xvmin)/ (xwmax + xwmin)
Option C:	Sx = (xvmin – xvmax)/ (xwmax – xwmin)
Option D:	Sx = (xvmax + xvmin)/ (xwmax – xwmin)
12.	_____ are the three dimensional analogs of quad trees.
Option A:	Quadric
Option B:	Octrees
Option C:	Geometry
Option D:	Wireframe models

13.	Painter's algorithm is also called as:
Option A:	Wornock algorithm
Option B:	Area subdivision algorithm
Option C:	Z-buffer algorithm
Option D:	Depth-sort algorithm
14.	Given a circle with radius of 6-units centered at (10,15), the following are the points that will lie on the 1/8th part of the circle:
Option A:	(10,21), (11,21), (12,21), (13,20), (14,19)
Option B:	(0,6), (1,6), (2,6), (3,5), (4,4)
Option C:	(0,6), (1,6), (2,5), (3,5), (4,4)
Option D:	(10,21), (11,21), (12,20), (13,20), (14,19)
15.	Back face detection is:
Option A:	Object space method
Option B:	Image space method
Option C:	Coordinate space method
Option D:	Geometry space method
16.	A triangle ABC with coordinates A(4,3), B(1,1) and C(7,1) is translated by 3-units in x-direction and 2-units in y-direction, followed by anticlockwise rotation of the triangle by 90 degrees. The resulted triangle is further scaled to double in x-direction without any scaling in y-direction. What will be the resultant position of the triangle?
Option A:	A'(-10,7), B'(-6,4), C'(-6,-10)
Option B:	A'(-10,7), B'(-6,-4), C'(-6,10)
Option C:	A'(-10,-7), B'(-6,4), C'(-6,10)
Option D:	A'(-10,7), B'(-6,4), C'(-6,10)
17.	The phenomenon of apparent increase in the number of available intensities by considering combine intensity of multiple pixels is known as _____.
Option A:	Dithering

Option B:	Half toning
Option C:	Printing
Option D:	Scanning
18.	_____ is used to calculate the intensity of light that is reflected at a given point on surface.
Option A:	Illumination model
Option B:	Rendering model
Option C:	Diffusion model
Option D:	Warn model
19.	In Liang-Barsky line clipping algorithm, if pk=0 and qk>=0, then
Option A:	line is parallel to any one clipping boundary and is completely inside the clipping boundary.
Option B:	line is parallel to any one clipping boundary and is completely outside the clipping boundary.
Option C:	The line is an entering line (outside to inside).
Option D:	The line is exiting line (inside to outside).
20.	Construct the Bezier curve of order-3 with the polygon vertices A(0,0), B(1,2), C(3,2), and D(2,0). Generate at least 5 points on the curve. (Consider t=0.15,0.35,0.5,0.65,0.85)
Option A:	(0.50,0.76), (1.24,1.36), (1.75,1.5), (2.12,1.36), (2.14,0.76)
Option B:	(0.60,0.76), (1.4,1.36), (1.75,1.5), (2.12,1.36), (2.14,0.76)
Option C:	(0.50,0.76), (1.24,1.36), (2.75,1.5), (2.12,2.36), (2.14,0.76)
Option D:	(0.50,0.96), (1.24,1.36), (1.75,1.5), (2.12,1.36), (2.14,0.76)

Q2.	
A	**Solve any Two** **5 marks each**
i.	If an ellipse with x-radius of 4-units and y-radius of 3-units is rasterized using mid-point ellipse algorithm, find the points that lie on the ellipse in the first quadrant.

ii.	Explain Depth buffer algorithm.
iii.	Write a short note on sweep representations.
B	**Solve any One** **10 marks each**
i.	Triangle PQR has vertices as P(4,3), Q(6,5) and R(5,7). It is Desired to reflect through an arbitrary line L whose equation is y = x + 3. Calculate the new vertices of triangle.
ii.	Explain any one polygon clipping algorithm in detail.

Q3.	
A	**Solve any Two** **5 marks each**
i.	Given a circle with radius of 6-units centered at (10,15), Find the points that will lie on the 1/8th part of the circle.
ii.	Write a short note on fractals.
iii.	Explain any one shading techniques in detail.
B	**Solve any One** **10 marks each**
i.	Find the clipping co-ordinates to clip the line segment AB against the window using any one line clipping algorithm A(5,12), B(70,50) and the window co-ordinates are lower left corner of the window is (10,10) and upper right corner is (60,60).
ii.	Explain 3D clipping in detail.

University of Mumbai
Examination June 2021
Examinations Commencing from 1st June 2021
Program: Computer Engineering
Curriculum Scheme: Rev2016
Examination: BE Semester IV
Course Code: CSC405 and Course Name: Operating System
Time: 2 hour Max. Marks: 80
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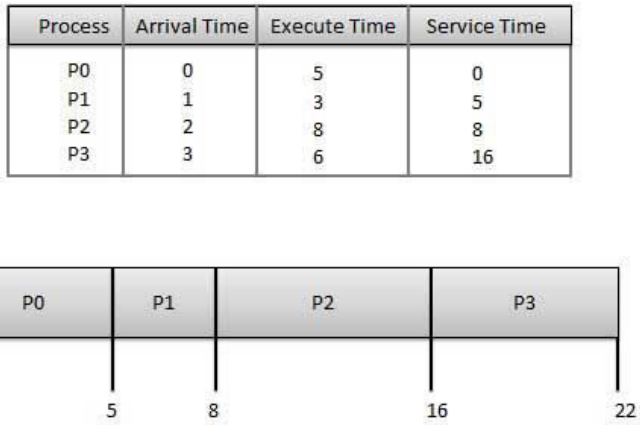
Q1.	A program is called as
Option A:	Active
Option B:	Passive
Option C:	Running
Option D:	Dead
Q2.	Which of following is not the function of the Kernel?
Option A:	Process Management
Option B:	Memory Management
Option C:	Device Management
Option D:	Program Compilation
Q3.	A Binary semaphore is restricted to values of
Option A:	0 or 1
Option B:	1 or 2
Option C:	-1 or +1
Option D:	0 or -1
Q4.	What is a shell script?
Option A:	Group of commands
Option B:	A file containing special symbols
Option C:	A file containing a series of commands
Option D:	Group of functions
Q5.	

	 Consider above processes to be executed on first come, first serve basis. It is a non-preemptive. What the waiting time of P2?
Option A:	6
Option B:	8
Option C:	16
Option D:	0
Q6.	If the time quantum is made very large for a Round Robin (RR) scheduler, then which one of the following assertions would be true?
Option A:	The scheduling algorithm degenerates to the First Come First Served (FCFS) algorithm
Option B:	More context switches occur.
Option C:	The average turnaround time decreases
Option D:	The scheduling algorithm degenerates to the Shortest Job Next (SJN) algorithm
Q7.	The Primary distinction between Short term scheduler and Long-term scheduler is
Option A:	The Length of their queues
Option B:	The type of process they schedule
Option C:	The frequency of their execution
Option D:	The device for which the schedule the process
Q8.	Determine the number of page faults when references to pages occur in the following order: 1, 2, 4, 5, 2, 1, 2, 4. Assume that the main memory can accommodate 3 pages and the main memory already has the pages 1 and 2, with page 1 having been brought earlier than page 2. (LRU algorithm is used)
Option A:	3
Option B:	5
Option C:	4
Option D:	1
Q9.	Disk requests are received by a disk drive for cylinders 5, 25,18,3,39,8 and 35 in this order. A seek takes 7ms per cylinder moved. How much seek time is needed to server these requests for a Shortest Seek First (SSF) Algorithm? Assume that arm cylinder is at 20 when the last of these requests are made with one of the request yet served
Option A:	125ms
Option B:	413ms

Option C:	368ms
Option D:	750ms
Q10.	A counting semaphore was initialized to 13. Then 10 P (wait) operations and 4V (signal) operations were completed on this semaphore. The resulting value of the semaphore is
Option A:	10
Option B:	8
Option C:	7
Option D:	16
Q11.	In Dinning Philosopher Problem, deadlock can occur
Option A:	If all philosophers pick their left chopstick simultaneously and wait for the other chopstick to be available
Option B:	If all philosophers pick up both the sticks
Option C:	If no philosopher picks up sticks
Option D:	If only two philosophers pick up two sticks
Q12.	Three processes having burst time of 3, 10 and 7 time units each arrive simultaneously at time 0. Using non-preemptive SJF scheduling, their total waiting time is
Option A:	4
Option B:	3
Option C:	20
Option D:	10
Q13.	Consider a disk where blocks 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 17, 18, 25, 26 and 27 are free and the rest of the blocks are allocated. Then the free space bitmap would be
Option A:	10000110000001110011111100011111…
Option B:	11000011000000111001111110001111…
Option C:	01111001111110001100000011100000…
Option D:	11111001111110001100000011100000…
Q14.	Which of following two atomic operations semaphore uses for process synchronization.
Option A:	Wait , Signal
Option B:	add, del
Option C:	W,X
Option D:	not wait , not signal
Q15.	In segmentation, each address is specified by
Option A:	An offset & value
Option B:	A value & segment number
Option C:	A key & value
Option D:	A segment number & offset
Q16.	Working set model for page replacement is based on the assumption of
Option A:	Modularity

Option B:	Locality
Option C:	Globalization
Option D:	Random access
Q17.	Thrashing occurs when
Option A:	When a page fault occurs
Option B:	Processes on system frequently access pages not memory
Option C:	Processes on system are in running state
Option D:	Processes on system are in waiting state
Q18.	Which statement is true for indexed file allocation method?
Option A:	Each file must occupy a set of contiguous blocks on the disk
Option B:	All the pointers to scattered blocks are placed together in one location
Option C:	All pointer are NULL
Option D:	Entire file is stored in one block
Q19.	Which of following is responsible for all file I/O initiation and termination.
Option A:	Device drivers
Option B:	Physical I/O
Option C:	Basic I/O supervisor
Option D:	Logical I/O
Q20.	A Translation look aside buffer can be used to
Option A:	To reduce the time taken to access the page table again and again.
Option B:	To increase the time taken to access the page table again and again.
Option C:	To equalize the time taken to access the page table again and again.
Option D:	To moderate the time taken to access the page table again and again.

Q2	
A	**Solve any Two** **5 marks each**
i.	Describe the Producer and Consumer synchronization problems.
ii.	Explain the difference between preemptive and non-preemptive scheduling.
iii.	Write about Banker's Algorithm for Single & Multiple Resources to avoid deadlock.
B	**Solve any One** **10 marks each**
i.	Assume you have the following jobs to execute with one processor, with the jobs arriving in the order listed here: i T(pi) 0 80 1 20 2 10 3 20 4 50 a. Suppose a system uses FCFS scheduling .Create a Gantt chart illustrating the execution of these processes? b. What is the turnaround time for process p3? c. What is the average wait time for the processes?

ii.	A system uses 3 page frames for storing process pages in main memory. It uses the First in First out (FIFO) page replacement policy. Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given below- 4 , 7, 6, 1, 7, 6, 1, 2, 7, 2 Also calculate the hit ratio and miss ratio.

Q3.	**Solve any Four out of Six** **5 marks each**
A	Describe Inter process communication (IPC) in brief.
B	Define and describe the Memory Allocation Strategies Best-Fit, First Fit, and Worst Fit & Next Fit.
C	List the various functions of operating system and describe any one in brief.
D	Differentiate between paging and segmentation.
E	List the different accessing methods of a file and describe any one in detail**.**
F	Compare the various Disk-Scheduling algorithms.

University of Mumbai

Examination 2021 under cluster __ (Lead College: _____)

Examinations Commencing from 1st June 2021 to 10th June 2021

Program: S.E.(Computer Engineering)

Curriculum Scheme: Rev-2019 'C' Scheme

Examination: S.E. Semester IV

Course Code: CSC401 Course Name: Engineering Mathematics IV

Time: 2 hour Max. Marks: 80

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<table>
<tr><td>Q1.</td><td>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</td></tr>
<tr><td></td><td></td></tr>
<tr><td>1.</td><td>The region of rejection of the null hypothesis H_0 is known as</td></tr>
<tr><td>Option A:</td><td>Critical region</td></tr>
<tr><td>Option B:</td><td>Favourable region</td></tr>
<tr><td>Option C:</td><td>Domain</td></tr>
<tr><td>Option D:</td><td>Confidence region</td></tr>
<tr><td></td><td></td></tr>
<tr><td>2.</td><td>Sample of two types of electric bulbs were tested for length of life and the following data were obtained
<table>
<tr><td></td><td>Size</td><td>Mean</td><td>SD</td></tr>
<tr><td>Sample 1</td><td>8</td><td>1234 h</td><td>36 h</td></tr>
<tr><td>Sample 2</td><td>7</td><td>1036 h</td><td>40 h</td></tr>
</table>
The absolute value of test statistic in testing the significance of difference between means is</td></tr>
<tr><td>Option A:</td><td>t=10.77</td></tr>
<tr><td>Option B:</td><td>t=9.39</td></tr>
<tr><td>Option C:</td><td>t=8.5</td></tr>
<tr><td>Option D:</td><td>t=6.95</td></tr>
<tr><td></td><td></td></tr>
<tr><td>3.</td><td>If X is a poisson variate such that $P(X=1)=P(X=2)$, then $P(X=3)$ is</td></tr>
<tr><td>Option A:</td><td>$\frac{4e^2}{3}$</td></tr>
<tr><td>Option B:</td><td>$4e^2$</td></tr>
<tr><td>Option C:</td><td>$\frac{4}{3e^2}$</td></tr>
<tr><td>Option D:</td><td>$\frac{4}{e^2}$</td></tr>
<tr><td></td><td></td></tr>
</table>

4.	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$, Then following is not the eigenvalue ofadj A.
Option A:	6
Option B:	2
Option C:	4
Option D:	3
5.	For the matrix $\begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ the eigenvector corresponding to the distinct eigenvalue $\lambda = 2$ is
Option A:	$\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$
Option B:	$\begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$
Option C:	$\begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}$
Option D:	$\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$
6.	The necessary and sufficient condition for a square matrix to be diagonalizable is that for each of it's eigenvalue
Option A:	algebraic multiplicity > geometric multiplicity
Option B:	algebraic multiplicity = geometric multiplicity
Option C:	algebraic multiplicity < geometric multiplicity
Option D:	algebraic multiplicity ≠ geometric multiplicity
7.	If the characteristic equation of a matrix A of order 3×3 is $\lambda^3 - 7\lambda^2 + 11\lambda - 5 = 0$, then by the Cayley-Hamilton theorem A^{-1} is equal to
Option A:	$\frac{1}{5}(A^3 - 7A^2 + 11\mathrm{A})$
Option B:	$\frac{1}{5}(A^2 + 7A + 11\mathrm{I})$
Option C:	$\frac{1}{5}(A^3 + 7A^2 + 11\mathrm{A})$
Option D:	$\frac{1}{5}(A^2 - 7A + 11\mathrm{I})$
8.	Value of an integral $\int_0^{1+i}(x^2 - iy)dz$ along the path $y = x^2$ is
Option A:	$\frac{5}{6} - \frac{i}{6}$
Option B:	$-\frac{5}{6} - \frac{i}{6}$
Option C:	$\frac{5}{6} + \frac{i}{6}$
Option D:	$\frac{-5}{6} + \frac{i}{6}$

9.	Integral $\int \frac{5z^2+7z+1}{z+1}\, dz$ along a circle $\lvert z\rvert = \frac{1}{2}$ is equal to
Option A:	1
Option B:	-1
Option C:	3/2
Option D:	0
10.	Analytic function gets expanded as a Laurent series if the region of convergence is
Option A:	rectangular
Option B:	triangular
Option C:	circular
Option D:	annular
11.	Residue of $f(z) = \frac{z^2}{(z+1)^2(z-2)}$ at a pole $z = 2$ is
Option A:	4/9
Option B:	2/9
Option C:	1/2
Option D:	0
12.	z-transform of an unit impulse function $\delta(k) = \begin{matrix} 1, & at\ k = 0 \\ 0, & otherwise \end{matrix}$ is
Option A:	1
Option B:	0
Option C:	-1
Option D:	k
13.	$z\{\sin(3k+5)\},\ k \geq 0$ is
Option A:	$\frac{z^2 \sin 2 - z \sin 5}{z^2 - 2z\cos 3 + 1}$
Option B:	$\frac{z^2 \sin 5 + z \sin 2}{z^2 - 2z\cos 3 + 1}$
Option C:	$\frac{z^2 \sin 5 - z \sin 2}{z^2 - 2z\cos 3 + 1}$
Option D:	$\frac{z^2 \sin 2 + z \sin 5}{z^2 - 2z\cos 3 + 1}$
14.	The inverse z-transform of $f(z) = \frac{z}{(z-1)(z-2)}$, $\lvert z\rvert > 2$ is
Option A:	$2^k - 2$
Option B:	$2^k - 1$
Option C:	$2^k + 1$
Option D:	$2^k + 2$
15.	If the basic solution of LPP is $x = 1, y = 0$ then the solution is
Option A:	Feasible and non-Degenerate
Option B:	Non-Feasible and Degenerate
Option C:	Feasible and Degenerate
Option D:	Non-Feasible and non-Degenerate

16.	If the primal LPP has an unbounded solution then the dual has
Option A:	Unbounded solution
Option B:	Bounded solution
Option C:	Feasible solution
Option D:	Infeasible solution
17.	Dual of the following LPP is Maximize $z = 2x_1 + 9x_2 + 11x_3$ $x_1 - x_2 + x_3 \geq 3$ Subject to $-3x_1 + 2x_3 \leq 1$ $2x_1 + x_2 - 5x_3 = 1$ $x_1, x_2, x_3 \geq 0$
Option A:	Minimize $w = -3y_1 + y_2 + y'$ $-y_1 - 3y_2 + 2y' \geq 2$ Subject to $y_1 + y' \geq 9$ $-y_1 + 2y_2 - 5y' \geq 11$ $y_1, y_2 \geq 0$, y' unrestricted
Option B:	Minimize $w = -3y_1 + y_2 + y_3$ $-y_1 - 3y_2 + 2y_3 \geq 2$ Subject to $y_1 + y_3 \geq 9$ $-y_1 + 2y_2 - 5y_3 \geq 11$ $y_1, y_2, y_3 \geq 0$
Option C:	Minimize $w = 2y_1 + 9y_2 + 11y'$ $-y_1 - 3y_2 + 2y' \geq 3$ Subject to $y_1 + y' \geq 1$ $-y_1 + 2y_2 - 5y' \geq 1$ $y_1, y_2 \geq 0$, y' unrestricted
Option D:	Minimize $w = 2y_1 + 9y_2 + 11y_3$ $-y_1 - 3y_2 + 2y_3 \geq 3$ Subject to $y_1 + y_3 \geq 1$ $-y_1 + 2y_2 - 5y_3 \geq 1$ $y_1, y_2 \geq 0$, y' unrestricted
18.	Consider the NLPP: Maximize $z = f(x_1, x_2)$, subject to the constraint $h = g(x_1, x_2) - b \leq 0$. Let $L = f - \lambda g$, then the Kuhn-Tucker conditions are
Option A:	$\frac{\partial L}{\partial x_1} \geq 0, \quad \frac{\partial L}{\partial x_2} \geq 0, \quad \lambda h \geq 0, \quad h \geq 0, \quad \lambda \geq 0$
Option B:	$\frac{\partial L}{\partial x_1} = 0, \quad \frac{\partial L}{\partial x_2} = 0, \quad \lambda h = 0, \quad h \leq 0, \quad \lambda \geq 0$
Option C:	$\frac{\partial L}{\partial x_1} = 0, \quad \frac{\partial L}{\partial x_2} = 0, \quad \lambda h \geq 0, \quad h \leq 0, \quad \lambda \leq 0$
Option D:	$\frac{\partial L}{\partial x_1} \geq 0, \quad \frac{\partial L}{\partial x_2} \geq 0, \quad \lambda h \geq 0, \quad h \geq 0, \quad \lambda = 0$
19.	In a non-linear programming problem,
Option A:	All the constraints should be linear
Option B:	All the constraints should be non-linear

Option C:	Either the objective function or atleast one of the constraints should be non-linear
Option D:	The objective function and all constraints should be linear.
20.	Pick the non-linear constraint
Option A:	$xy + y \geq 7$
Option B:	$2x - y \leq 5$
Option C:	$x + y \leq 6$
Option D:	$x + 2y = 9$

Subjective/descriptive questions

Q2 **(20 Marks)**	**Solve any Four out of Six5 marks each**
A	In an exam taken by 800 candidates, the average and standard deviation of marks obtained (normally distributed) are 40% and 10% respectively. What should be the minimum score if 350 candidates are to be declared as passed
B	If A= $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$, By using Cayley-Hamilton theorem find the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 + 2A + I$
C	Evaluate the following integral using Cauchy-Residue theorem. $I = \int_C \frac{z^2+3z}{\left(z+\frac{1}{4}\right)^2 (z-2)} dz$ where c is the circle $\left\|z - \frac{1}{2}\right\| = 1$
D	Obtain inverse z-transform $\frac{z+2}{z^2-2z-3}$, $1 < \|z\| < 3$
E	Solve by the Simplex method Maximize $z = 10x_1 + x_2 + x_3$ Subject to $x_1 + x_2 - 3x_3 \leq 10$ $4x_1 + x_2 + x_3 \leq 20$ $x_1, x_2, x_3 \geq 0$
F	Using Lagrange's multipliers solve the following NLPP Optimise $z = 4x_1 + 8x_2 - x_1^2 - x_2^2$ Subject to $x_1 + x_2 = 2$ $x_1, x_2 \geq 0$

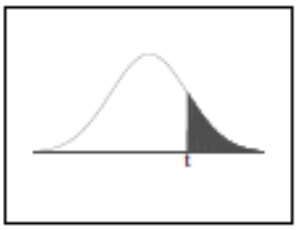
Q3 **(20 Marks)**	**Solve any Four out of Six5 marks each**
A	When the first proof of 392 pages of a book of 1200 pages were read, the distribution of printing mistakes were found to be as follows. No of mistakes in page (X): 0 | 1 | 2 | 3 | 4 No. of pages (f): 275 | 72 | 30 | 7 | 5 Fit a poisson distribution to the above data and test the goodness of fit.

B	Show that the matrix $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ is not diagonalizable.
C	If $f(z) = \frac{z-1}{(z-3)(z+1)}$ obtain Taylor's and Laurent's series expansions of f(z) in the domain $\|z\| < 1 \& 1 < \|z\| < 3$ respectively.
D	If $f(k) = \frac{1}{2^k} * \frac{1}{3^k}$ find $z\{f(k)\},\ k \geq 0$
E	Solve using dual simplex method Minimize $z = 2x_1 + 2x_2 + 4x_3$ Subject to $2x_1 + 3x_2 + 5x_3 \geq 2$ $3x_1 + x_2 + 7x_3 \leq 3$ $x_1 + 4x_2 + 6x_3 \leq 5$ $x_1, x_2, x_3 \geq 0$
F	Solve following NLPP using Kuhn-Tucker method Maximize $z = 2x_1^2 - 7x_2^2 - 16x_1 + 2x_2 + 12x_1x_2 + 7$ Subject to $2x_1 + 5x_2 \leq 105$ $x_1, x_2 \geq 0$

Standard Normal Distribution Table

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

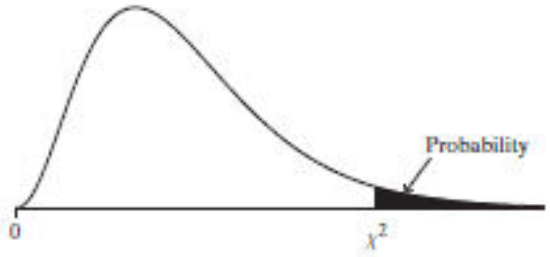
t-Distribution Table



The shaded area is equal to α for $t = t_\alpha$.

df	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
32	1.309	1.694	2.037	2.449	2.738
34	1.307	1.691	2.032	2.441	2.728
36	1.306	1.688	2.028	2.434	2.719
38	1.304	1.686	2.024	2.429	2.712
∞	1.282	1.645	1.960	2.326	2.576

TABLE C: Chi-Squared Distribution Values for Various Right-Tail Probabilities



	Right-Tail Probability						
df	0.250	0.100	0.050	0.025	0.010	0.005	0.001
1	1.32	2.71	3.84	5.02	6.63	7.88	10.83
2	2.77	4.61	5.99	7.38	9.21	10.60	13.82
3	4.11	6.25	7.81	9.35	11.34	12.84	16.27
4	5.39	7.78	9.49	11.14	13.28	14.86	18.47
5	6.63	9.24	11.07	12.83	15.09	16.75	20.52
6	7.84	10.64	12.59	14.45	16.81	18.55	22.46
7	9.04	12.02	14.07	16.01	18.48	20.28	24.32
8	10.22	13.36	15.51	17.53	20.09	21.96	26.12
9	11.39	14.68	16.92	19.02	21.67	23.59	27.88
10	12.55	15.99	18.31	20.48	23.21	25.19	29.59
11	13.70	17.28	19.68	21.92	24.72	26.76	31.26
12	14.85	18.55	21.03	23.34	26.22	28.30	32.91
13	15.98	19.81	22.36	24.74	27.69	29.82	34.53
14	17.12	21.06	23.68	26.12	29.14	31.32	36.12
15	18.25	22.31	25.00	27.49	30.58	32.80	37.70
16	19.37	23.54	26.30	28.85	32.00	34.27	39.25
17	20.49	24.77	27.59	30.19	33.41	35.72	40.79
18	21.60	25.99	28.87	31.53	34.81	37.16	42.31
19	22.72	27.20	30.14	32.85	36.19	38.58	43.82
20	23.83	28.41	31.41	34.17	37.57	40.00	45.32
25	29.34	34.38	37.65	40.65	44.31	46.93	52.62
30	34.80	40.26	43.77	46.98	50.89	53.67	59.70
40	45.62	51.80	55.76	59.34	63.69	66.77	73.40
50	56.33	63.17	67.50	71.42	76.15	79.49	86.66
60	66.98	74.40	79.08	83.30	88.38	91.95	99.61
70	77.58	85.53	90.53	95.02	100.4	104.2	112.3
80	88.13	96.58	101.8	106.6	112.3	116.3	124.8
90	98.65	107.6	113.1	118.1	124.1	128.3	137.2
100	109.1	118.5	124.3	129.6	135.8	140.2	149.5

University of Mumbai
Examination June 2021
Examinations Commencing from 1st June 2021
Program: **Computer Engineering**
Curriculum Scheme: Rev2019
Examination: SE Semester IV
Course Code: CSC402 and Course Name: Analysis of Algorithm
Time: 2 hour Max. Marks: 80

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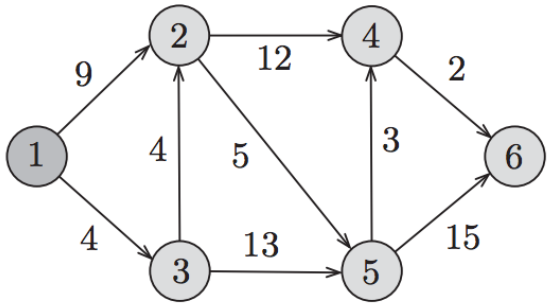
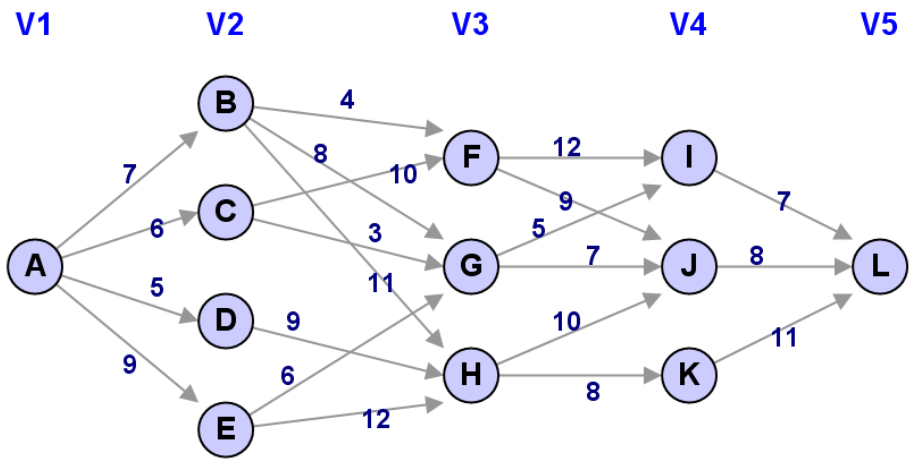
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following is not $O(n^2)$?
Option A:	$(5^{10}) * n + 990$
Option B:	$N^{1.45}$
Option C:	$n^3 / (\sqrt{n})$
Option D:	$(3^{50}) * n$
2.	If A is asymptotically less efficient than B, it means?
Option A:	B will be a better choice for all inputs
Option B:	B will be a better choice for all inputs except possibly small inputs
Option C:	B will be a better choice for all inputs except possibly large inputs
Option D:	B will be a better choice for small inputs
3.	In Quicksort algorithm, there is a procedure for finding a pivot element that splits the array into two sub-arrays, each of which contains at least Two-fifth of the elements. Let T(n) be the number of comparisons required to sort n elements. Then
Option A:	$T(n) <= 2T(n/5) + n$
Option B:	$T(n) <= T(2n/5) + T(3n/5) + n$
Option C:	$T(n) <= 2T(4n/5) + n$
Option D:	$T(n) <= 2T(n/2) + n$
4.	What is the result of following recurrences $T(n)=aT(n/b)+n^c$?
Option A:	$T(n) = O(n^{\log_b a})$
Option B:	$T(n) = O(n^c \log n)$
Option C:	$T(n) = O(f(n))$
Option D:	$T(n) = O(n^2)$
5.	The class of decision problems that can be solved by non-deterministic polynomial algorithms are called as.
Option A:	NP
Option B:	P
Option C:	Hard
Option D:	Complete
6.	If you are sorting in ascending order with insertion sort, average case running time it will take is?
Option A:	O(N)

Option B:	O(N log N)
Option C:	O(log N)
Option D:	$O(N^2)$
7.	Worst case time complexity of merge sort is
Option A:	O(n log n)
Option B:	$O(n^2)$
Option C:	$O(n^2 \log n)$
Option D:	$O(n \log n^2)$
8.	Apply Quick sort on a given sequence 6 10 13 5 8 3 2 11. What is the sequence after first phase, pivot is first element?
Option A:	5 3 2 6 10 8 13 11
Option B:	5 2 3 6 8 13 10 11
Option C:	6 5 13 10 8 3 2 11
Option D:	6 5 3 2 8 13 10 11
9.	Consider the graph M with 3 vertices. Its adjacency matrix is shown below. Which of the following is true? 0 2 2 2 0 2 2 2 0
Option A:	Graph M has no minimum spanning tree
Option B:	Graph M has a unique minimum spanning trees of cost 4
Option C:	Graph M has 3 distinct minimum spanning trees, each of cost 4
Option D:	Graph M has 3 spanning trees of different costs
10.	Given items as {value, weight} pairs {{60,10}, {20,10}, {40,5}}. The capacity of knapsack=20. Find the maximum value output assuming items to be divisible.
Option A:	110
Option B:	80
Option C:	100
Option D:	40
11.	A graph with negative weight cycle is having _____no. of shortest paths
Option A:	One
Option B:	Two
Option C:	Zero
Option D:	Infinite
12.	Floyd Warshall Algorithm falls into _____
Option A:	Greedy technique
Option B:	Dynamic Programming
Option C:	Linear Programming
Option D:	Backtracking
13.	In assembly line scheduling problem, _____ lookup tables are required.
Option A:	0
Option B:	1
Option C:	2
Option D:	3

14.	A travelling salesman problem with 55 cities has_____no. of feasible tours.
Option A:	37 arcs
Option B:	54 arcs
Option C:	55 arcs
Option D:	990 arcs
15.	_____is not a branch and bound strategy to generate branches
Option A:	LIFO branch and bound
Option B:	FIFO branch and bound
Option C:	Lowest cost branch and bound
Option D:	Highest cost branch and bound
16.	Of the following given options, which one of the following is a correct option that provides an optimal solution for 4-queens problem?
Option A:	(3,1,4,2)
Option B:	(2,3,1,4)
Option C:	(4,3,2,1)
Option D:	(4,2,3,1)
17.	Chromatic number of a graph is _____no of colors required to color the vertices in graph.
Option A:	Maximum
Option B:	Same
Option C:	Minimum
Option D:	More than Number of vertices
18.	In Rabin and Karp Algorithm, preprocessing can be done in
Option A:	$\theta(m^2)$
Option B:	θ (mlogn)
Option C:	θ (m)
Option D:	O(n)
19.	What happens when the modulo value(q) is taken large?
Option A:	Complexity increases
Option B:	Spurious hits occur frequently
Option C:	Cost of extra checking is low
Option D:	Matching time increases
20.	Given a pattern of length- 5 window, find the spurious hit in the given text string. Pattern: 7 3 9 9 2 Modulus: 13 Index: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Text: 2 3 5 9 0 2 3 1 4 1 5 2 6 7 3 9 9 2 1 3 9

Option A:	6-10
Option B:	12-16
Option C:	3-7
Option D:	13-17

Q2	**Solve any Four out of Six** **5 marks each**
A	Explain Master theorem with example
B	Define P, NP, NP-Hard and NP-Complete Complexity Classes.
C	Discuss Complexity of Quicksort Algorithm in all cases.
D	Rewrite Binary Search Algorithm and Explain its complexity
E	Find LCS for strings X= "ABSDG" and Y= "GBSTR"
F	Write short note on Rabin Karp Algorithm

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Apply Dijkstra algorithm on following graph. Show all intermediate steps. 
B	Explain 15 Puzzle problem with Branch and Bound method
C	Find a minimum cost path from A to L in the following multistage graph 

University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: SE SEM IV R2019 C Scheme May 2021

Curriculum Scheme: Rev2019

Examination: SE Semester IV

Course Code: CSC403 and Course Name: Database Management System

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following is true about Data Independence? It is the ability:
Option A:	To modify schema definition in one level without affecting schema definition in the next lower level.
Option B:	To modify schema definition in one level without affecting schema definition in the next higher level.
Option C:	To modify data in one level without affecting the data in the next lower level.
Option D:	To modify data in one level without affecting the data in the next higher level.
2.	Data redundancy leads to higher storage and access cost. It may lead to
Option A:	Data isolation
Option B:	Data inconsistency
Option C:	Integrity problem
Option D:	Atomicity
3.	The an attribute (say X) of entity set is calculated from other attribute value (say Y). The attribute X is called
Option A:	Single valued
Option B:	Multi valued
Option C:	Composite
Option D:	Derived
4.	A weak entity type always has a total participation constraint w.r.t. its identifying relationship, because

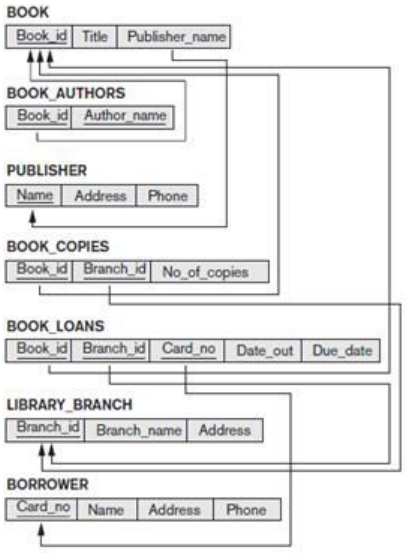
Option A:	Weak entity have a partial key
Option B:	Weak entity cannot be identified with an owner entity.
Option C:	Weak entity cannot be identified without an owner entity.
Option D:	Weak entity cannot identified without an identifying relationship
5.	In an Entity-Relationship (ER) model, suppose R is a one-to-many relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E2 is greater than the cardinality of E1. Which one of the following is true about R?
Option A:	Every entity in E1 is associated with exactly one entity in E2.
Option B:	Some entities in E1 are associated with more than one entity in E2.
Option C:	Every entity in E2 is associated with exactly one entity in E1.
Option D:	Every entity in E2 is associated with at most one entity in E1.
6.	The type of operation which extends the Projection operation by allowing functions of attributes to be included in the projection list.
Option A:	Join
Option B:	Generalized Projection
Option C:	Projection
Option D:	Aggregate functions
7.	What is union compatibility ?
Option A:	Two or more table share the same number of columns
Option B:	Two or more tables share the same number of columns and same domain
Option C:	Two or more tables have the same degree
Option D:	Two or more tables share the same domains
8.	$r \cap s =$
Option A:	$r - (r - s)$
Option B:	$s - (r - s)$
Option C:	$(r \cup s) - (r - s)$
Option D:	$(r \cup s) / (s \cup r)$

<table>
<tr><td></td><td></td></tr>
<tr><td>9.</td><td>Let E1 and E2 be two entities in an E-R diagram with one multi-valued attribute in E1,R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many and R2 is many-to-many,R1 and R2 do not have any attributes of their own,What is the minimum number of tables required to represent this situation in the relational model.</td></tr>
<tr><td>Option A:</td><td>2</td></tr>
<tr><td>Option B:</td><td>4</td></tr>
<tr><td>Option C:</td><td>3</td></tr>
<tr><td>Option D:</td><td>5</td></tr>
<tr><td></td><td></td></tr>
<tr><td>10.</td><td>Write a query to set default value for salary to 25000 for table employee</td></tr>
<tr><td>Option A:</td><td>UPDATE employee MODIFY salary DEFAULT 25000</td></tr>
<tr><td>Option B:</td><td>UPDATE employee SET salary To DEFAULT 25000</td></tr>
<tr><td>Option C:</td><td>ALTER TABLE employee SET salary To DEFAULT 25000</td></tr>
<tr><td>Option D:</td><td>ALTER TABLE employee MODIFY salary DEFAULT 25000</td></tr>
<tr><td></td><td></td></tr>
<tr><td>11.</td><td>Consider the employee table:employee (employee id, name, dept name, salary)Create a new employee `E-101', named `Ashwin singh', with 50,000 salary for department `developer'. Identify the appropriate SQL.</td></tr>
<tr><td>Option A:</td><td>INSERT INTO TABLE employee VALUES (`E-101',`Ashwin Singh',`Wireless', 100000)</td></tr>
<tr><td>Option B:</td><td>INSERT INTO employee (`E-101',`Ashwin Singh',`DEVELOPER', 50000)</td></tr>
<tr><td>Option C:</td><td>INSERT INTO employee VALUES(`E-101',`Ashwin Singh',`DEVELOPER', 50000)</td></tr>
<tr><td>Option D:</td><td>INSERT INTO employee table(employee id, name, dept name, salary) VALUES (`E-101',`Ashwin Singh',`DEVELOPER', 50000)</td></tr>
<tr><td></td><td></td></tr>
<tr><td>12.</td><td>Consider the following instance:
<table>
<tr><td>Name</td><td>Price</td></tr>
<tr><td>IPHONE</td><td>5000</td></tr>
<tr><td>PHONE</td><td>1500</td></tr>
<tr><td>LAPTOP</td><td>1000</td></tr>
<tr><td>IPAD</td><td>5500</td></tr>
</table></td></tr>
</table>

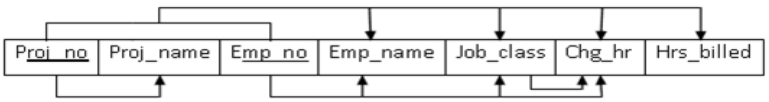
	The following Query is executed SELECT Price from Product order by Name DESC; Find out correct order of tuple numbers in the output ,if the tuple numbers in the above table are 1,2,3,4
Option A:	2,3,4,1
Option B:	3,4,2,1
Option C:	4,1,2,3
Option D:	2,3,1,4
13.	Which of the following statement is CORRECT ?
Option A:	Every relation in 3NF is also in BCNF
Option B:	A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R
Option C:	Every relation in BCNF is also in 3NF
Option D:	No relation can be in both BCNF and 3NF
14.	Let R= (A,B,C,D,E,F) be a relation with the following dependencies. C->F, E->A, EC->D, A->B. Which of the following is a key for R
Option A:	CD
Option B:	EC
Option C:	AE
Option D:	AC
15.	Consider relational schema Member(phone,name,address,room,floor,stay) which satisfies following FDs: phone,name->address Phone->Room name->floor,stay. The given relation satisfies which highest normal form?
Option A:	1NF
Option B:	2NF
Option C:	3NF

Option D:	BCNF
16.	What is true about timestamp based ordering protocol
Option A:	Ensure both conflict serializability and freedom from deadlock
Option B:	Ensure only conflict serializability
Option C:	Ensure only freedom from deadlock
Option D:	Ensure only view serializability
17.	Identify correct rules in growing phase (first phase) in two-phase locking protocol.
Option A:	Transaction can only acquire shared lock(lock-s) and exclusive (lock-X)
Option B:	transaction can only acquire shared lock(lock-s) ,exclusive (lock-X) and covert lock-s to lock-X
Option C:	transaction can release shared lock(lock-s) ,release exclusive (lock-X) and covert lock-s to lock-X
Option D:	transaction can acquire only shared lock(lock-s) and release exclusive (lock-X)
18.	Suppose in a database, there are three transactions T1, T2 and T3 with timestamp 10, 20 and 30 respectively. T2 is holding a data item which T1 and T3 are requesting to acquire. Which of the following statement is correct in respect of Wait-die Deadlock Prevention scheme?
Option A:	Transaction T1 will wait for T2 to release the data item.
Option B:	Transaction T1 will be aborted.
Option C:	Transaction T3 will wait for T2 to release the data item.
Option D:	Transaction T2 will wait for T1 to release the data item.
19.	Choose correct statement regarding immediate database modification method of log based recovery method
Option A:	Only Redo operation is performed
Option B:	Redo and undo operations are performed
Option C:	Only undo operation is performed
Option D:	No redo and undo operations are performed

20.	When transactions execute properly without interference from concurrently executing transactions then this property is referred to as.
Option A:	Atomicity
Option B:	Concurrency
Option C:	Consistency
Option D:	Isolation

Q2	**Solve any Two Questions out of Three 10 marks each**
A	What are different database users? Give responsibilities of DBA
B	Produce ER Diagram from the following relational database Schema. 
C	Book(book_id, title,author, cost) Store(store_no, city, state, inventory_val) Stock(store_no, book_id,quantity) Consider above relational schema and formulate SQL queries for the following: (i)Modify the cost of DBMS books by 10% (ii)Find the author of the books which are available in Mumbai store (iii)Find the title of the most expensive book (iv)Find the total quantity of books in each store (v) Add a new record in Book(Assume values as per requirement)

Q3	Solve any Two Questions out of Three 10 marks each
A	Consider a dependency diagram of relation R and normalize it up to third normal form.

	
B	Explain conflict and view serializability with suitable examples .
C	Explain deadlock handling in DBMS with suitable examples.

University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2019 "C" Scheme

Examination: SE Semester IV

Course Code: CSC404 and Course Name: Operating System

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Core of operating system is _____
Option A:	Shell
Option B:	Script
Option C:	Commands
Option D:	Kernel
2.	Multiprogramming systems_____
Option A:	Are easier to develop than single programming systems
Option B:	Execute each job faster
Option C:	Execute more jobs in the same time period
Option D:	Are used only one large mainframe computers
3.	Once operating system is loaded, execution of applications is in _____ mode
Option A:	Kernel
Option B:	User
Option C:	Read-Only
Option D:	Standalone
4.	We want to keep the CPU as busy as possible, This criteria refers to as
Option A:	Burst Time

Option B:	CPU utilization
Option C:	Response time
Option D:	Throughput
5.	A Process Control Block (PCB) does not contain which of the following?
Option A:	Code
Option B:	Data
Option C:	Stack
Option D:	Bootstrap program
6.	Which of the following state transitions is not possible?
Option A:	Blocked to running
Option B:	Ready to running
Option C:	Running to blocked
Option D:	Blocked to ready
7.	SRTN Scheduling is type of
Option A:	Preemptive scheduling
Option B:	Non preemptive scheduling
Option C:	Multi level scheduling
Option D:	Non blocking scheduling
8.	_____is a synchronization tool and _____operation decrements its value.
Option A:	thread, wait
Option B:	semaphore, signal
Option C:	semaphore, wait

Option D:	socket, signal
9.	A scenario in which thread *A* performs an action that causes thread *B* to perform an action that in turn causes thread *A* to perform its original action is called____
Option A:	Spinlock
Option B:	Livelock
Option C:	Belady's anomaly
Option D:	Deadlock
10.	Which algorithm requires that the system must have some additional *a priori* information available about resources?
Option A:	Deadlock prevention
Option B:	Deadlock recovery
Option C:	Deadlock avoidance
Option D:	Deadlock allocation
11.	Which one is Reusable resource in the system?
Option A:	Interrupts
Option B:	Main memory
Option C:	Signals
Option D:	Information in I/O buffers
12.	What is the name of the memory allocation strategy in which the OS allocates the smallest free partition that is big enough to hold the process?
Option A:	Worst Fit
Option B:	Best Fit
Option C:	First Fit
Option D:	Next Fit

13.	If the size of the logical address space is 2^m, and a page size is 2^n addressing units then how many high order bits of a logical address designate the page number?
Option A:	m-n
Option B:	m
Option C:	n
Option D:	m+n
14.	What is the name of the system where processes initially reside in secondary memory and when it needs to execute a process OS swaps it into main memory?
Option A:	Internal fragmentation
Option B:	Context Switch
Option C:	Demand Paging
Option D:	External Fragmentation
15.	Instruction or data near to the current memory location that is being fetched , may be needed soon in near future. this is the principal of _____
Option A:	Spatial Locality
Option B:	Temporal Locality
Option C:	Buffering
Option D:	Branching
16.	A low-level integer used to identify an opened file at the kernel level, in Linux called as _____
Option A:	Spin lock
Option B:	file pointer
Option C:	file descriptor
Option D:	Signal
17.	a named collection of related information that is recorded on secondary storage is called as _____

Option A:	Process
Option B:	Memory
Option C:	Interrupt
Option D:	File
18.	Which one is not the correct purpose of the device controller?
Option A:	Detect/Correct errors
Option B:	Accept commands from software
Option C:	Control arm motion
Option D:	Buffering
19.	If the drive controller is busy and a process needs I/O to or from a disk, then ____
Option A:	the request will be ignored
Option B:	the request will be placed in the queue of pending requests for that drive
Option C:	the request will be processed immediately
Option D:	the request will be transferred to different controller
20.	In which of the following algorithms, the disk head moves from one end to the other , servicing requests along the way, when the head reaches the other end, it immediately returns to the beginning of the disk without servicing any requests on the return trip?
Option A:	LOOK
Option B:	SCAN
Option C:	C-LOOK
Option D:	C-SCAN

subjective/ descriptive questions

Q2	**Solve any Four out of Six** **5 marks each**

A	*Describe microkernel operating system structure*
B	*What is thread? Describe any four advantages of multithreading model.*
C	*Why is semaphore known as a synchronisation tool?Give an example.*
D	*Describe how logical address is converted into physical address when the program and its associated data is divided into segments*
E	*Summarize various File Attributes*
F	*With the help of a diagram explain I/O management.*

Q3.	**Solve any Two Questions out of Three 10 marks each**
A	*Compare short term, medium term and long term scheduler along with diagram*
B	*Consider a disk with 51(0 to 50) cylinders. While the seek to cylinder 11 is in progress, the request comes for the following cylinders, in the order 1, 36, 16, 34, 9, 12 and 40. The arm moves in an increasing number of cylinders. What is the total distance the arm moves to complete pending requests using FCFS and LOOK algorithms?*
C	*describe in detail requirements that intends to achieve memory Management*

University of Mumbai
Examination June 2021
Examinations Commencing from 1st June 2021
Program: **Computer Engineering**
Curriculum Scheme: Rev2019
Examination: SE Semester IV
Course Code: CSC405 and Course Name: Microprocessor

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In protected mode of 80386, the VM flag is set by using
Option A:	IRET instruction or task switch operation
Option B:	IRET instruction
Option C:	Task switch operation
Option D:	NOP
2.	The instructions that are used for reading an input port and writing an output port respectively are
Option A:	MOV, XCHG
Option B:	MOV, IN
Option C:	IN, MOV
Option D:	IN, OUT
3.	While CPU is executing a program, an interrupt exists then it
Option A:	follows the next instruction in the program
Option B:	jumps to instruction in other registers
Option C:	breaks the normal sequence of execution of instructions
Option D:	stops executing the program
4.	8086 can access up to?
Option A:	512KB

Option B:	1MB
Option C:	2MB
Option D:	256KB
5.	Because of Pentium's superscalar architecture, the number of instructions that are executed per clock cycle is
Option A:	1
Option B:	2
Option C:	3
Option D:	4
6.	The paging unit is enabled only in
Option A:	virtual mode
Option B:	addressing mode
Option C:	protected mode
Option D:	Real Mode
7.	In 8257 register format, the selected channel is disabled after the terminal count condition is reached when
Option A:	Auto load is set
Option B:	Auto load is reset
Option C:	TC STOP bit is reset
Option D:	TC STOP bit is set
8.	All the functions of the ports of 8255 are achieved by programming the bits of an internal register called
Option A:	data bus control
Option B:	read logic control
Option C:	control word register
Option D:	Status Register
9.	When non-specific EOI command is issued to 8259A it will automatically

Option A:	set the ISR
Option B:	reset the ISR
Option C:	set the INTR
Option D:	reset the INTR
10.	For a single task in protected mode, the 80386 can address the virtual memory of
Option A:	32 GB
Option B:	64 MB
Option C:	32 TB
Option D:	64 TB
11.	The recurrence of the numerical values or constants in a program code is reduced by
Option A:	EQU
Option B:	ASSUME
Option C:	LOCAL
Option D:	LABEL
12.	The hyperthreading technology automatically involves the
Option A:	decrease of die area
Option B:	increase of die area
Option C:	decrease of die area to half
Option D:	increase of die area to half
13.	The 80386 enables itself to organize the available physical memory into pages, which is known as
Option A:	segmentation
Option B:	Paging
Option C:	memory division
Option D:	Virtual memory

14.	The number of debug registers that are available in 80386, for hardware debugging and control is
Option A:	2
Option B:	4
Option C:	8
Option D:	16
15.	The instruction, JMP 5000H:2000H; is an example of
Option A:	intrasegment direct mode
Option B:	intrasegment indirect mode
Option C:	intersegment direct mode
Option D:	intersegment indirect mode
16.	The salient feature of Pentium is
Option A:	superscalar architecture
Option B:	superpipelined architecture
Option C:	superscalar and superpipelined architecture
Option D:	multiple instruction issue
17.	The speed of integer arithmetic of Pentium is increased to a large extent by
Option A:	on-chip floating point unit
Option B:	superscalar architecture
Option C:	4-stage pipelines
Option D:	instruction cache
18.	For 8086 microprocessor, the stack segment may have a memory block of a maximum of
Option A:	32K bytes
Option B:	64K bytes
Option C:	16K bytes

Option D:	128K bytes
19.	Which of the following is not a module of Pentium 4 architecture?
Option A:	front end module
Option B:	execution module
Option C:	control module
Option D:	Memory subsystem module
20.	The type of the interrupt may be passed to the interrupt structure of CPU from
Option A:	interrupt service routine
Option B:	Stack
Option C:	interrupt controller
Option D:	Segments

Q2	**Solve any Four out of Six** **5 marks each**
A	Explain different types of Interrupts? Explain Interrupt Vector table for 8086
B	Draw and explain the internal block diagram of 8257? How DMA operations are performed?
C	Explain what is Branch Prediction Logic in Pentium? Explain working of Branch Prediction with suitable diagram?
D	Compare the 8086, 80386, Pentium Processor.
E	Draw and explain the internal architecture of 80386 microprocessor?
F	Explain the operating modes of 80386?

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the internal architecture of 8086 microprocessor? Differentiate the functioning of Minimum mode and Maximum mode?
B	Write an assembly language program to find the largest number from an

	unordered array of 8-bit numbers?
C	Interface 32K word of memory to 8086 microprocessor system. Available memory chips are 16K*8 RAM. Use suitable decoder for generating chip logic.