Sample Questions

Computer Engineering / Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer Science and Engineering (Data Science) / Computer Science and Engineering (Internet of Things and Cyber Security Including Block Chain Technology) / Cyber Security / Data Engineering / Internet of Things (IoT)

Subject Name: Engineering Mathematics IV **Semester: IV**

Multiple Choice Questions

<table>
<tr><td></td><td>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</td></tr>
<tr><td>1.</td><td>The region of rejection of the null hypothesis H0 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 PX=1=PX=2, then P(X=3) is</td></tr>
<tr><td>Option A:</td><td>4e23</td></tr>
<tr><td>Option B:</td><td>4e2</td></tr>
<tr><td>Option C:</td><td>43e2</td></tr>
<tr><td>Option D:</td><td>4e2</td></tr>
<tr><td></td><td></td></tr>
<tr><td>4.</td><td>If A=1 0 0 0 0 2 0 0 3 , Then following is not the eigenvalue ofadj A.</td></tr>
<tr><td>Option A:</td><td>6</td></tr>
<tr><td>Option B:</td><td>2</td></tr>
</table>

Option C:	4
Option D:	3
5.	For the matrix2 -1 1 1 1 2 -1 -1 2 the eigenvector corresponding to the distinct eigenvalue λ=2 is
Option A:	1 1 1
Option B:	-1 1 1
Option C:	2 1 1
Option D:	1 2 1
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 3-72+11λ-5=0, then by the Cayley-Hamilton theorem A-1 is equal to
Option A:	15(A3-7A2+11A)
Option B:	15(A2+7A+11I)
Option C:	15(A3+7A2+11A)
Option D:	15(A2-7A+11I)
8.	Value of an integral 01+ix2-iydz along the path y=x2 is
Option A:	56-i6
Option B:	-56-i6
Option C:	56+i6
Option D:	-56+i6
9.	Integral 5z2+7z+1z+1 dz along a circle z=12is 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 fz=z2z+12(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 k=1 , at k=0 0 , otherwise is
Option A:	1
Option B:	0
Option C:	-1
Option D:	k
13.	zsin (3k+5) , k≥0 is
Option A:	z2sin 2-zsin 5 z2-2zcos 3+1
Option B:	z2sin 5+zsin 2 z2-2zcos 3+1
Option C:	z2sin 5-zsin 2 z2-2zcos 3+1
Option D:	z2sin 2+zsin 5 z2-2zcos 3+1
14.	The inverse z-transform of fz=zz-1z-2 ,z>2 is
Option A:	2k-2
Option B:	2k-1
Option C:	2k+1
Option D:	2k+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=2x1+9x2+11x3 Subject to x1-x2+x3≥3 -3x1+2x3≤1 2x1+x2-5x3=1 x1,x2,x3≥0
Option A:	Minimize w=-3y1+y2+y' Subject to -y1-3y2+2y'≥2 y1+y'≥9 -y1+2y2-5y'≥11 y1,y2≥0, y' unrestricted

Option B:	Minimize w=-3y1+y2+y3 Subject to -y1-3y2+2y3≥2 y1+y3≥9 -y1+2y2-5y3≥11 y1,y2,y3≥0
Option C:	Minimize w=2y1+9y2+11y' Subject to -y1-3y2+2y'≥3 y1+y'≥1 -y1+2y2-5y'≥1 y1,y2≥0, y' unrestricted
Option D:	Minimize w=2y1+9y2+11y3 Subject to -y1-3y2+2y3≥3 y1+y3≥1 -y1+2y2-5y3≥1 y1,y2≥0, y' unrestricted
18.	Consider the NLPP: Maximize z=f(x1,x2), subject to the constraint h=gx1,x2-b≤0. Let L=f-λg, then the Kuhn-Tucker conditions are
Option A:	$\partial Lx1\geq 0,\ \partial Lx2\geq 0,\ \lambda h\geq 0,\ h\geq 0,\ \lambda\geq 0$
Option B:	$\partial Lx1=0,\ \partial Lx2=0,\ \lambda h=0,\ h\leq 0,\ \lambda\geq 0$
Option C:	$\partial Lx1=0,\ \partial Lx2=0,\ \lambda h\geq 0,\ h\leq 0,\ \lambda\leq 0$
Option D:	$\partial Lx1\geq 0,\ \partial Lx2\geq 0,\ \lambda h\geq 0,\ h\geq 0,\ \lambda=0$
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≥7
Option B:	2x-y≤5
Option C:	x+y≤6
Option D:	x+2y=9
21.	The Eigen values of adjA where $A=\begin{bmatrix}2 & 3\\ 0 & 1\end{bmatrix}$
Option A:	1, 1
Option B:	1, 2
Option C:	3, 4
Option D:	2, 5
22.	If the algebraic multiplicity 't' of λ is equal to the geometric multiplicity 's', then the matrix is
Option A:	Orthogonal
Option B:	Symmetric
Option C:	Diagonalizable
Option D:	None of these

23.	The product of eigen values for $A=\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ is
Option A:	4
Option B:	0
Option C:	-5
Option D:	3
24.	Two of the eigen values of a 3×3 matrix are $-1,$ 2. If the determinant of the matrix is 4, then its third eigen value is
Option A:	2
Option B:	-2
Option C:	7
Option D:	5
25.	The value of the sample statistic which separates the regions of acceptance and rejection, is called the
Option A:	Accepted value
Option B:	Critical value
Option C:	Rejected Value
Option D:	Separated value
26.	The table value of Z at $\alpha = 0.05$ is
Option A:	$Z_\alpha = 1.96$
Option B:	$Z_\alpha = 2.58$
Option C:	$Z_\alpha = 2.145$
Option D:	$Z_\alpha = 1.254$
27.	If a random variable X follows Poisson distribution such that $P(X=1)=2P(X=2)$, the mean and the variance of the distribution is
Option A:	7
Option B:	4
Option C:	-1
Option D:	1
28.	The function $f(z)=\frac{\sin z}{z}$ has the singularity at $z=0$ is of the type
Option A:	Non isolated singularity
Option B:	Isolated singularity
Option C:	Removable singularity
Option D:	Isolated essential singularity

29.	Evaluate $\int_C \frac{z+3}{(z+8)(z+5)} dz$ where c is the circle z=2
Option A:	1
Option B:	I
Option C:	2πi
Option D:	0
30.	Pole of $f(z) = \frac{1}{(z-3)^2(z-2)^3}$
Option A:	z = 3 pole of order 2 and z = 2 pole of order 3
Option B:	z = 3 and z = 2 are simple pole
Option C:	$z=-3$ pole of order 2 and $z=-2$ pole of order 3
Option D:	$z=-3$ and $z=-2$ are simple pole
31.	The analytic function $f(z) = \frac{z-1}{z^2+1}$ has singularity at
Option A:	1 and -1
Option B:	1 and i
Option C:	1 and $-i$
Option D:	i and $-i$
32.	The Z- transform of Discrete Unit Step function $U(k) = \begin{cases} 1, & k \geq 0 \\ 0, & k < 0 \end{cases}$ is given by
Option A:	$Z\{U(k)\} = \frac{z}{z-1}, \quad k \geq 0$
Option B:	$Z\{U(k)\} = \frac{z}{z+1}, \quad k \geq 0$
Option C:	$Z\{U(k)\} = \frac{z^2+1}{z}, \quad k \geq 0$
Option D:	$Z\{U(k)\} = \frac{z}{z^2+1}, \quad k \geq 0$
33.	Find the Z- transform of fk= ak , k≥0
Option A:	zz+a
Option B:	11-az
Option C:	11+az
Option D:	zz-a

34.	If $Z\{f(k)\} = F(z)$ then $Z\{a^k f(k)\}$ is
Option A:	$a^k F\left(z/a\right)$
Option B:	$\frac{d}{dz}\{f(z)\}$
Option C:	$F\left(z/a\right)$
Option D:	$Z^{-n} F\left\{a/z\right\}$
35.	For a maximizing LPP, during the simplex method, the criteria for a variable to enter into the basis is
Option A:	Minimum ratio test
Option B:	Maximum ratio test
Option C:	Minimum deviation entry
Option D:	Maximum deviation entry
36.	The advantage of dual simplex algorithm is that
Option A:	It starts with a basic feasible solution
Option B:	It involves artificial variable
Option C:	It does not involve artificial variable
Option D:	It involves dual variables
37.	In a Simplex table, the pivot row is computed by
Option A:	dividing every number in the profit row by the pivot number.
Option B:	dividing every number in the pivot row by the corresponding number in the profit row.
Option C:	dividing every number in the pivot row by the pivot number.
Option D:	dividing every number in the net profit row by the corresponding number in the gross profit row.
38.	The value of Lagrange's multiplier λ for the following NLPP is Optimize $z = 6x_1^2 + 5x_2^2$ Subject to $x_1 + 5x_2 = 7$ $x_1, x_2 \geq 0$
Option A:	$\lambda = 31/84$
Option B:	$\lambda = 84/31$
Option C:	$\lambda = 13/74$
Option D:	$\lambda = 31/64$
39.	If the objective function of NLLP is maximization type, then in Kuhn-Tucker conditions is
Option A:	$\lambda=0$

Option B:	$\lambda<0$
Option C:	$\lambda\geq 0$
Option D:	λ is not defined
40.	In a non-linear programming problem (NLPP),
Option A:	All the constraints should be linear
Option B:	All the constraints should be non-linear
Option C:	Either the objective function or at least one of the constraints should be non-linear
Option D:	The objective function and all constraints should be linear.
41.	If A=2 3 1 0 -1 0 0 0 3 then eigen values of A2+2I are
Option A:	6,3,11
Option B:	2,-1,3
Option C:	4,3,-1
Option D:	0,3,2
42.	If A=-2 2 -3 2 1 -6 -1 -2 0 then by Cayley-Hamilton theorem
Option A:	2A3+A2-10A-45I=0
Option B:	A3-A2+16A-5I=0
Option C:	A3+A2-21A-45I=0
Option D:	A3+2A2-2A-9I=0
43.	If A=2 1 1 2 is diagonalisable then the diagonal matrix is
Option A:	D=1 0 0 3
Option B:	D=-1 0 0 3
Option C:	D=2 0 0 3
Option D:	D=-1 0 0 5
44.	If A is a singular matrix of order 3×3 then one of the eigen value of A is
Option A:	1
Option B:	0
Option C:	3
Option D:	-1
45.	If C the upper half of the unit circle then the value of ZdZ over C is
Option A:	πi
Option B:	0
Option C:	$-\pi i$
Option D:	$2\pi i$
46.	The value of CZ+3(Z-4)(Z+2)2 , C:Z=1 is
Option A:	0
Option B:	$4\pi i$

Option C:	-πi
Option D:	2πi
47.	fz=sin z z has the singularity at z=0 is of the type
Option A:	Non isolated singularity
Option B:	Isolated singularity
Option C:	Isolated essential singularity
Option D:	Removable singularity
48.	If fz=z2(z+2)(z-1)2 then residue at the pole z=-2 is
Option A:	49
Option B:	13
Option C:	29
Option D:	0
49.	The Z-transform of fk= 3k , k<0 is
Option A:	z3-z , z<3
Option B:	33-z , z<3
Option C:	zz-3 , z<3
Option D:	z3-z , z>3
50.	If Z transform of fk=F(Z) then Zakf(k) is
Option A:	akF(za)
Option B:	ddzF(z)
Option C:	F(za)
Option D:	znF(z)
51.	Inverse Z-transform of zz-4, z>4 is
Option A:	-4k , k≥0
Option B:	4k , k≥0
Option C:	-4k , k≤0
Option D:	4k , k<0
52.	If a random variable X follows Poisson distribution such that P (X=1) = 3P(X=2) then mean and variance of the distribution are
Option A:	Mean = 1, variance = 1
Option B:	Mean = 0, variance = 1
Option C:	Mean = 2/3, variance = 2/3
Option D:	Mean = 3/2, variance = 1/2
53.	If X is a normal variate with mean 9 and S.D. 6, then P(|X-15|)1 is..... (given area between z=0 to z=1 is 0.3413)
Option A:	0.3413

Option B:	1.0239
Option C:	0.6826
Option D:	0.2316
54.	To test independence of attributes, the degree of freedom is
Option A:	(r-1)(c+1)
Option B:	(r-1)(c-1)
Option C:	(r+1)(c-1)
Option D:	(r+1)(c+1)
55.	Basic feasible solution of the LPP is said to be degenerate if
Option A:	One or more values of basic variable are zero.
Option B:	All basic variables are positive.
Option C:	All basic variables are negative.
Option D:	Some basic variables are positive and some basic variables are negative.
56.	If the given LPP is in canonical form , then the primal-dual pair is said to be
Option A:	Symmetric
Option B:	Asymmetric
Option C:	Standard
Option D:	Pseudo
57.	The Standard form of following LPP is Minimise $Z= -2x1+x2$ Subject to $3x1-2x2\geq-4$ $x1+4x2\leq7$ $x1,x2\geq0$
Option A:	Maximise $Z'= -2x1+x2$ Subject to $3x1-2x2=4$ $x1+4x2=7$ $x1,x2\geq0$
Option B:	Maximise $Z'= 2x1-x2$ Subject to $3x1-2x2+s1=4$ $x1+4x2+s2=7$ $x1,x2,s1,s2\geq0$
Option C:	Maximise$Z'= 2x1-x2$ Subject to $3x1-2x2+s1=4$ $x1+4x2+s2=7$ $x1,x2,s1,s2\geq0$
Option D:	Maximise$Z'= 2x1-x2$ Subject to $-3x1+2x2+s1=4$

	x1+4x2+s2=7 x1,x2,s1,s2≥0
58.	If 3, 3 0 0 3 , 3 0 0 0 3 0 0 0 3 are the principal minor determinants of Hessian matrix at X0, then X0 is a
Option A:	Minima
Option B:	Maxima
Option C:	Saddle point
Option D:	No conclusion
59.	If the objective function of NLLP is maximization type, then in Kuhn-Tucker conditions is
Option A:	λ=0
Option B:	λ<0
Option C:	λ≥0
Option D:	is not defined
60.	The value of Lagrange's multiplier for the following NLPP is Optimise Z=7x12+5x22 Subject to 2x1+5x2=7 x1,x2≥0
Option A:	λ=49/39
Option B:	λ=14/36
Option C:	λ=98/39
Option D:	λ=39/64

Descriptive Questions

1	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
2	If A= [2 1 1 0 1 1 0 1 2] , By using Cayley-Hamilton theorem find the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 + 2A + I$
3	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 $\left\|z - \frac{1}{2}\right\| = 1$
4	Obtain inverse z-transform $\frac{z+2}{z^2-2z-3}$, $1 < \|z\| < 3$
5	Solve by the Simplex method Maximize $z = 10x_1 + x_2 + x_3$ Subject to $x_1 + x_2 - 3x_3 \leq 10$ $4x_1 + x_2 + x_3 \leq 20$ $x_1, x_2, x_3 \geq 0$
6	Using Lagrange's multipliers solve the following NLPP Optimise $z = 4x_1 + 8x_2 - x_1^2 - x_2^2$ Subject to $x_1 + x_2 = 2$ $x_1, x_2 \geq 0$

7	By using Cayley-Hamilton theorem find A^{-1} and A^{-2} where $A=\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$
8	Evaluate $\int_0^{1+i}(x^2+iy)dz$ along the path (i) $y=x$, (ii) $y=x^2$. Is the line integral independent of the path?
9	Find the Z-transform of $\left\{\left(\frac{1}{3}\right)^{\lvert k\rvert}\right\}$
10	A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean 1.5. Calculate the proportion of day on which i) neither car is used ii) some demand is refused.
11	Find the dual of the following LPP Maximize $z=2x_1-x_2+3x_3$ Subject to $x_1-2x_2+x_3\geq 4$; $2x_1+x_3\leq 10$; $x_1+x_2+3x_3=20$ $x_1,x_3\geq 0$ x_2 unrestricted.
12	Using the method of Lagrange's multiplier solve the following NLPP Optimize $z=2x_1+6x_2-x_1^2-x_2^2+14$ Subject to $x_1+x_2=4$; $x_1,x_2\geq 0$
13	Find the Eigen values and Eigen vectors of $A=[2\ 1\ 1\ 1\ 2\ 1\ 0\ 0\ 1\ ]$
14	Evaluate $\oint \frac{4z^2+1}{(2z-3)(z+1)^2}dz$, C: $\lvert z\rvert=4$ using Cauchy's residue theorem.
15	Find the Z transform of $\left\{\left(\frac{1}{2}\right)^{\lvert k\rvert}\right\}$
16	A certain drug administered to 12 patients resulted in the following change in their blood pressure. 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4 Can we conclude that the drug increases the blood pressure ?
17	Solve the following LPP by simplex method $Maximise\quad Z=3x_1+5x_2$ $Subject\ to\ 3x_1+2x_2\leq 18$ $x_1\leq 4\ , x_2\leq 6$ $x_1,x_2\geq 0$
18	Solve the following NLPP using Kuhn-Tucker conditions $Maximise\quad Z=16x_1+6x_2-2{x_1}^2-{x_2}^2-17$ $Subject\ to\quad 2x_1+x_2\leq 8$ $x_1,x_2\geq 0$
19	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.					
20	Show that the matrix $[4\ 6\ 6\ \ 1\ \ -1\ \ 3\ 2\ \ -5\ \ -2\ \ ]$ is not diagonalizable.					
21	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.					
22	If $f(k) = \frac{1}{2^k} * \frac{1}{3^k}$ find $z\{f(k)\},\ k \geq 0$					
23	Solve using dual simplex method Minimize $z = 2x_1 + 2x_2 + 4x_3$ Subject to $2x_1 + 3x_2 + 5x_3 \geq 2\ 3x_1 + x_2 + 7x_3 \leq 3\ x_1 + 4x_2 + 6x_3 \leq 5$ $x_1, x_2, x_3 \geq 0$					
24	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 $2x_1 + 5x_2 \leq 105$ $x_1, x_2 \geq 0$					
25	Find the eigen values and eigen vectors of $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$					
26	Evaluate by Cauchy's residue theorem $\int_C \frac{z^2}{(z-1)^2(z-2)} dz$; where $C: \|Z\| = 2.5$					
27	Find the inverse z-transforms of $F(z) = \frac{z}{(z-1)(z-2)}$; $\|z\| > 2$					
28	In an examination marks obtained by students in Mathematics, Physics and Chemistry are normally distributed with means 51, 53 and 46 with standard deviation 15, 12, 16 respectively. Find the probability of securing total marks i) 180 or above, ii) 80 or below					
29	Using Simplex method solve the following LPP Maximize $z = 5x_1 + 3x_2$ Subject to $x_1 + x_2 \leq 2$ $5x_1 + 2x_2 \leq 10$					

	$3x_1 + 8x_2 \leq 12$; $x_1, x_2 \geq 0$
30	Solve the following NLPP by using Kuhn-Tucker conditions: Maximize $z = 10x_1 + 4x_2 - 2x_1^2 - x_2^2$ Subject to $2x_1 + x_2 \leq 5$ $x_1, x_2 \geq 0$
31	Verify Cayley-Hamilton theorem for the matrix $A = [2\ -1\ 1\ -1\ 2\ -1\ 1\ -1\ 2\ ]$ Hence compute A^{-1}
32	Evaluate $\int_C \frac{z^2-3z+2}{(z-3)(z-4)} dz$, $C: \lvert z \rvert = 3.5$
33	Find the inverse Z transform of $\frac{3z^2+2z}{z^2-3z+2}$, $1 < \lvert z \rvert < 2$
34	In a competitive examination the top 15% of the students appeared will get grade A, while the bottom 20% will be declared fail. If the grades are normally distributed with mean % of marks 65 and S.D. 10, determine the lowest % of marks to receive grade A.
35	Write the dual of the following LPP $Maximise \quad Z = 3x_1 + x_2 - x_3$ $Subject\ to \quad x_1 + x_2 + x_3 \geq 8$ $2x_1 - x_2 + 3x_3 = 4$ $-x_1 + x_3 \leq 6$ $x_1, x_3 \geq 0, x_2$ is unrestricted.
36	Using Lagrange's multipliers solve $Optimise \quad Z = 3{x_1}^2 + 2{x_2}^2 + 4x_1 + 2x_2$ $Subject\ to \quad 3x_1 + 5x_2 = 11$ $x_1, x_2 \geq 0$

Sample Questions

Computer Engineering / Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer Science and Engineering (Data Science) / Computer Science and Engineering (Internet of Things and Cyber Security Including Block Chain Technology) / Cyber Security / Data Engineering / Internet of Things (IoT)

Subject Name: Analysis of Algorithm **Semester: IV**

Multiple Choice Questions

	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Compare the following functions asymptotically: F(n)=$2^{\log n}$ G(n)=$n^{\sqrt{n}}$
Option A:	F(n) = G(n)
Option B:	F(n)!=G(n)
Option C:	F(n) <G(n)
Option D:	F(n)> G(n)

2.	Express the complexity of the following algorithm using recurrence relation:
	Algo (int n)
	{
	if (n>0)
	{for(i=0; i<n; i=i*2) print(i);
	Algo(n-1);
	}
	}

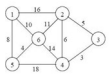
Option A:	T(n)=T(n-1) + log n
Option B:	T(n) =T(n-1) * log n
Option C:	T(n)= T(n/2) + log n
Option D:	T(n)=T(n/2) * log n
3.	Principle of Optimality is applicable to which of the following?
Option A:	Fractional Knapsack
Option B:	Fibonacci Series
Option C:	Minimum Spanning tree
Option D:	15- puzzle problem
4.	Which of the following algorithm does not use divide and conquer design strategy?
Option A:	Insertion sort
Option B:	Quick sort
Option C:	Max Min algorithm

Option D:	Merge Sort
5.	Which of the following is correct for the Bellman Ford algorithm?
Option A:	Allows both negative weight edges and negative cycles
Option B:	Does not allow either negative weight edges or negative weight cycles.
Option C:	Allows only negative weight cycles.
Option D:	Allows negative weight edges, but no negative weight cycles.
6.	Which of the following is not the subsequence of the following two strings? String1: COMPANION String2: OPINION
Option A:	OPON
Option B:	ONION
Option C:	OPNION
Option D:	OPANON
7.	Which of the following must be satisfied for a problem to be solvable using dynamic programming algorithm? i. Overlapping subproblems ii. Optimal substructure property iii. Recursive definition
Option A:	Only i
Option B:	Only ii
Option C:	Only i and ii
Option D:	Only i, ii and iii

8.	Consider the following code snippet:
	
	Bounding function(k,i) {
	
	for(j=1 to k-1)
	
	{ if ((x[j]==i) or (Abs(x[j]-i) ==abs(j-k))) return false;
	
	} return true }
	
	The above code represents the bounding function for which of the following algorithm?

Option A:	Subset sum problem using backtracking
Option B:	n-queens using backtracking
Option C:	Graph coloring using backtracking
Option D:	Subset sum using branch and bound
9.	Which of the following represent prefix table for the following string in KMP algorithm? P: abcdabcbcabc
Option A:	abcdabcbcabc ---------- 000012310123
Option B:	abcdabcbcabc

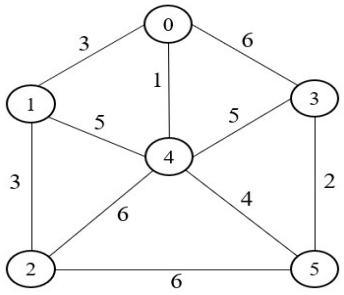
	---------- 000012301123
Option C:	abcdabcbcabc ---------- 000012300123
Option D:	abcdabcbcabc ---------- 000012310223
10.	Which of the following is correct for branch and bound technique? i. It is BFS generation of problem states ii. It is DFS generation of problem states iii. It is D-search.
Option A:	Only i
Option B:	Only ii
Option C:	Only ii and iii
Option D:	Only i, and iii
11.	Choose the correct option for Kruskal's minimum spanning tree algorithm. i. Algorithm will start with forest of |V| vertices. ii. FIND-SET function is used to connect disconnected component iii. A safe edge selected will always connect two different trees in a forest
Option A:	Only i
Option B:	Only i and ii
Option C:	Only i and iii
Option D:	All i, ii and iii
12.	What is the time complexity for the following piece of code? for (i =0; i *i<n; i = i++) { statement;}
Option A:	O($\sqrt{n}$)
Option B:	O($\log_2$ n)
Option C:	O($\log_3$ n)
Option D:	O(n^2)
13.	Select the correct option matching application in column A with algorithms in column B Column A 1. Package delivery robot has to deliver a package from point A to point B 2. Internet download manager 3. Airline crew scheduling between multiple legs (multiple flights). Column B a. Knapsack algorithm b. Dijkstra's algorithm c. Travelling salesman d. Prim's algorithm
Option A:	1-a; 2-b; 3-c
Option B:	1-b; 2-a; 3- c

Option C:	1-c; 2-b; 3-a
Option D:	1-c; 2-d; 3-b
14.	Worst case time complexity for Floyd Warshall is
Option A:	$O(n^2)$
Option B:	$O(n^3)$
Option C:	O(n!)
Option D:	O(nlogn)
15.	Using insertion sort algorithm on array a as shown below, select the correct option representing output after **Pass 3** **a[ ]=[31 59 41 26 43 58]**
Option A:	31 41 59 26 43 58
Option B:	26 31 41 59 43 58
Option C:	31 59 41 26 43 58
Option D:	26 31 41 43 59 58
16.	The worst case time complexity of graph coloring algorithm is? n:number of nodes, m: number of colors.
Option A:	O(n*m)
Option B:	O(n^m)
Option C:	O(n*m^n)
Option D:	O(m*n!)
17.	Which of the following is correct definition of NP Hard problems?
Option A:	A problem is **NP hard** if it is NP and it is difficult.
Option B:	A problem is **NP-hard** if all problems in NP are polynomial time reducible to it, and the problem itself is NP
Option C:	A problem is **NP hard** if it is NP and hard.
Option D:	A problem is **NP-hard** if all problems in NP are polynomial time reducible to it, even though it may not be in NP itself.
18.	For the following graph, choose the correct order(s) in which edges are getting selected to form a minimum spanning tree using Kruskal's Algorithm. 
Option A:	<1,5>, <2,3>, <2,6>, <3,4>, <5,6 >
Option B:	<2,6>, <1,5 >, <2,3>, <5,6 >, < 3,4>
Option C:	<3,4>, <5,6>, <2,3>, <1,5>, <2,6>
Option D:	<3,4>, <2,3>, <2 ,6>, < 5,6 >, < 1,5 >
19.	Which of the following is true for 0/1 Knapsack problem? i. Can be solved using greedy approach ii. Can be solved using dynamic programming iii. It can be used for resource allocation application.
Option A:	Only ii
Option B:	Only i and iii
Option C:	Only ii and iii

Option D:	All i, ii and iii
20.	Which of the following is true for Merge sort? i. It uses divide and conquer strategy ii. It is an in place sort iii. Its Complexity is O(nlogn)
Option A:	Only i
Option B:	Only i and ii
Option C:	Only i and iii
Option D:	All i, ii and iii
21.	The number of spanning trees for a graph with n vertices is
Option A:	n
Option B:	n^2
Option C:	n^{n-2}
Option D:	2^n
22.	The number of feasible solutions in Greedy method are:
Option A:	One
Option B:	Zero
Option C:	More than one
Option D:	Hundred
23.	The optimal solution for 4-queen problem is
Option A:	(2,3,1,4)
Option B:	(1,3,2,4)
Option C:	(3,1,2,4)
Option D:	(2,4,1,3)
24.	In which technique the previously calculated values are stored in memory
Option A:	Dynamic Programming
Option B:	Greedy Approach
Option C:	Divide and Conquer
Option D:	Backtracking
25.	For the recurrence relation, $T(n) = 3T(n/4) + cn^2$, the solution is
Option A:	O(n)
Option B:	$O(n^2)$
Option C:	O(logn)
Option D:	O(nlogn)
26.	Using Quick sort, if the array is already sorted, it will give
Option A:	Worst Case
Option B:	Average Case
Option C:	Best Case
Option D:	Average Case or Worst Case
27.	In KMP algorithm, the prefix table for the pattern P = ababada is

Option A:	1002301
Option B:	1012301
Option C:	0012201
Option D:	0012301

28.	What is the time complexity for the following piece of code?
	for (i =0; i<n; i++)
	for (j=0; j<n; j++)
	{ statement;}

Option A:	O(n)
Option B:	O(logn)
Option C:	$O(n^2)$
Option D:	O(nlogn)
29.	For the following graph, choose the correct order(s) in which edges are getting selected to form a minimum spanning tree using Prim's Algorithm. 
Option A:	(0-4), (3-5), (0-4), (1-2), (4-5)
Option B:	(0-4), (0-1), (1-2), (4-5), (3,5)
Option C:	(0-4), (4-5), (5-3), (4-3), (1-2)
Option D:	(0-4), (0-1), (1-2), (2-5), (5-3)
30.	The cost of a spanning tree is equal to:
Option A:	The sum of costs of the vertices of the tree
Option B:	The sum of costs of the edges of the tree
Option C:	The sum of costs of the edges of the graph
Option D:	The sum of costs of the edges and vertices of the tree
31.	For the given elements 6 4 11 17 2 24 14 using quick sort, what is the sequence after first phase, assuming the pivot as the first element?
Option A:	2 4 6 17 11 24 14
Option B:	2 4 6 11 17 14 24
Option C:	4 2 6 17 11 24 14
Option D:	2 4 6 11 17 24 14
32.	Which of the following is not the subsequence of the following two strings? String1: ENGINEERING String2: NITRING
Option A:	NING
Option B:	NRING

Option C:	NIRING
Option D:	NIARNG
33.	The worst case time complexity of Quick sort is
Option A:	$O(n^2)$
Option B:	$O(n^3)$
Option C:	O(nlogn)
Option D:	O(n)
34.	Which of the following is not an example of backtracking?
Option A:	N-queen problem
Option B:	15-puzzle problem
Option C:	Sum of Subset problem
Option D:	Graph coloring problem
35.	Which strategy is used in Job sequencing with deadlines?
Option A:	Backtracking
Option B:	Greedy Strategy
Option C:	Dynamic Programming
Option D:	Branch and Bound
36.	Given items as {value, weight} pairs {{80,40}, {60,20}, {40,10}}. The capacity of knapsack = 40. Find the maximum profit value assuming that the items can be fractioned
Option A:	80
Option B:	120
Option C:	105
Option D:	160
37.	Out of the given complexities of 4 different algorithms, which algorithm complexity is faster?
Option A:	O(n)
Option B:	O(logn)
Option C:	$O(n^2)$
Option D:	$O(2^n)$
38.	Match problem statement in Part A with the algorithm in Part B: Part A: 1. Single source - multiple destinations shortest path 2. Single source - single destination shortest path 3. All-pair shortest path Part B: a. Floyd-Warshall algorithm b. Disjkstra's algorithm c. Multistage graphs
Option A:	1-a, 2-b, 3-c
Option B:	1-c, 2-b, 3-a

Option C:	1-b, 2-c, 3-a
Option D:	1-b, 2-a, 3-c
39.	What will be the output after pass 2 for the following elements using selection sort? 61, 42, 19, 74, 25, 15, 54
Option A:	15, 19, 42, 74, 25, 61, 54
Option B:	15, 19, 25, 42, 54, 61, 74
Option C:	15, 19, 61, 42, 74, 25, 54
Option D:	61, 19, 42, 74, 25, 15, 54
40.	Bellman Ford algorithm is used to find out single source shortest path for negative edge weights. Bellman Ford algorithm uses which of the following strategy?
Option A:	Greedy method
Option B:	Dynamic Programming
Option C:	Backtracking
Option D:	Divide and Conquer
41.	We can solve any recurrence by using Master's theorem.
Option A:	True
Option B:	False
Option C:	Can't Say
Option D:	Not always
42.	Indicate constant time complexity in terms of Big-O notation.
Option A:	O(n)
Option B:	O(1)
Option C:	O(logn)
Option D:	O(n2)

43.	What is the time complexity for the following piece of code?
	for (i =0; i<n; i++)
	for (j=0; j<n; j++)
	{ statement;}

Option A:	O(n)
Option B:	O(logn)
Option C:	$O(n^2)$
Option D:	O(nlogn)
44.	Choose the correct option for Kruskal's minimum spanning tree algorithm. i. Algorithm will start with forest of |V| vertices. ii. FIND-SET function is used to connect disconnected component A safe edge selected will always connect two different trees in a forest
Option A:	Only i
Option B:	Only i and ii
Option C:	Only i and iii
Option D:	All i, ii and iii

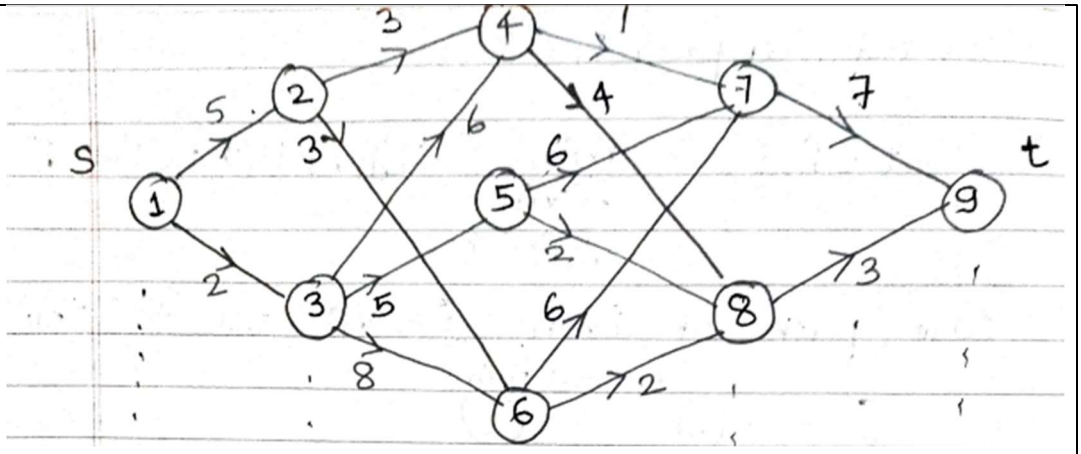
45.	Select the correct option matching application in column A with algorithms in column B Column A 1. Package delivery robot has to deliver a package from point A to point B 2. Resource Allocation Problem 3. Laying a telephone cable in an area with minimum cost Column B a. Knapsack algorithm b. Dijkstra's algorithm c. Travelling salesman d. Prim's algorithm
Option A:	1-a; 2-b; 3-c
Option B:	1-b; 2-a; 3-d
Option C:	1-c; 2-b; 3-a
Option D:	1-c; 2-d; 3-b
46.	Worst case time complexity for Floyd Warshall is
Option A:	$O(n^2)$
Option B:	$O(n^3)$
Option C:	O(n!)
Option D:	O(nlogn)
47.	Which of the following algorithm can be used to compute the global optimal profit value?
Option A:	0/1 knapsack
Option B:	Fractional knapsack
Option C:	Job Sequencing
Option D:	Bellman Ford
48.	Which of the following is true for 0/1 Knapsack problem? i. Can be solved using greedy approach ii. Can be solved using dynamic programming
Option A:	Only ii
Option B:	Only i
Option C:	Both i and ii
Option D:	Neither i nor ii
49.	Following data structure is used to implement LIFO Branch and Bound Strategy
Option A:	Priority Queue
Option B:	array
Option C:	stack
Option D:	Linked list
50.	Pre-processing time of Rabin and Karp Algorithm is
Option A:	$\theta(m^2)$
Option B:	θ (mlogn)

Option C:	θ (m)
Option D:	O(n)
51.	The solution of the recurrence T(n) = 4T(n/2) + n is
Option A:	O(n^2)
Option B:	O(n log^2 n)
Option C:	O(n logn)
Option D:	O(n^3)
52.	How many cases are there under Master's theorem?
Option A:	2
Option B:	3
Option C:	4
Option D:	5
53.	Using Quick sort, if the array is already sorted, it will give
Option A:	Worst Case
Option B:	Average Case
Option C:	Best Case
Option D:	Average Case or Worst Case
54.	Which of the following problem can be solved using greedy approach?
Option A:	N-queens problem
Option B:	All pairs shortest path problem
Option C:	Single source shortest path
Option D:	Multistage graph problem
55.	Principle of Optimality is applicable to which of the following?
Option A:	Fractional Knapsack
Option B:	Fibonacci Series
Option C:	Minimum Spanning tree
Option D:	15- puzzle problem
56.	Which of the following algorithm uses dynamic programming design strategy?
Option A:	Insertion sort
Option B:	Quick sort
Option C:	All pairs shortest path
Option D:	N-queens problem
57.	Which of the following is correct for the Bellman Ford algorithm?
Option A:	Allows both negative weight edges and negative cycles
Option B:	Does not allow either negative weight edges or negative weight cycles.
Option C:	Allows only negative weight cycles.
Option D:	Allows negative weight edges, but no negative weight cycles.
58.	Which of the following must be satisfied for a problem to be solvable using dynamic programming algorithm?

	i. Overlapping subproblems ii. Optimal substructure property iii. Recursive definition
Option A:	Only i
Option B:	Only ii
Option C:	Only i and ii
Option D:	Only i, ii and iii
59.	_____strategy is used to solve N-Queen Problem
Option A:	Greedy Method
Option B:	Backtracking
Option C:	Divide and Conquer
Option D:	Dynamic Programming
60.	Which Graph Traversal method is used to construct State-space tree in backtracking?
Option A:	Depth First Search
Option B:	Breadth First Search
Option C:	Nearest Neighbor First
Option D:	Twice around the tree

Descriptive Questions

1	Given the following recurrence relation, find its complexity using recursion tree method. T(n)=c ; if n=1 =2* T(n/2) +cn ;otherwise
2	Sort the following array using quicksort algorithm. [40,11,4,72,17,2,49]
3	Explain subset sum problem using backtracking approach with the help of state space tree.
4	Consider assembly line scheduling problem with following specifications: e1=2, e2=4, x1=3, x2=2, a1={7,9,3,4,8,4}, a2={ 8,5,6,4,5,7}, t1={2,3,1,3,4}, t2={2,1,2,2,1} What will be the minimum time from start to station 3 on assembly line 1.
5	Write a short note on Rabin Karp algorithm.
6	Explain the characteristics of dynamic programming approach with the help of Floyd-Warshall algorithm.
7	Consider following multistage graph. Write a backword approach algorithm for computing the cost from soursce node s to target node t. Also Compute the cost from s to t using backword approach.

	
8	Explain Dijkstra's Single source shortest path algorithm. Explain how it is different from Bellman Ford algorithm. Explain 15-puzzle problem using LC search technique.
9	Write short note on divide and conquer strategy
10	Define: P, NP, NP-complete, NP-Hard
11	Compare Bellman Ford algorithm with Dijkstra's algorithm.
12	Apply dynamic programming approach to compute the maximum profit for the following instance of knapsack problem. N= 4, Profit= {1,2,5,6}, Weight = {2,3,4,5}
13	Write a short note on job sequencing with deadline.
14	What is backtracking? Explain how it is applicable to Graph coloring problem?
15	Explain the different asymptotic notations with graphs.
16	Explain multistage graph problem with suitable example.
17	What is minimum spanning tree. Explain Prim's algorithm for computing minimum spanning tree.
18	Sort the following elements using quick sort: 74, 25, 14, 66, 84, 53, 30, 48
19	Write the Kruskal's algorithm for minimum spanning tree. What is the complexity of Kruskal's algorithm?
20	Explain Branch and Bound with Travelling salesperson problem.
21	Explain the different asymptotic notations with graphs.
22	Explain multistage graph problem with suitable example.
23	What is minimum spanning tree. Explain Prim's algorithm for computing minimum spanning tree.
24	Write algorithm for binary search. Explain the algorithm with example
25	Solve the following using master method: i. $T(n) = 8T(n/2) + n^2$ ii. $T(n) = 4T(n/2) + n\log n$
26	Explain the difference between greedy approach and dynamic programming approach.
27	Determine the LCS of the following sequences: X: {A, B, C, B, D, A, B} Y: {B, D, C, A, B, A}
28	Write a short note on Bellman Ford Algorithm.

29	Explain and apply Naïve string matching on following strings String1: COMPANION String2: PANI
30	Explain the different methods used to solve recurrence equations.
31	Explain Single source shortest path algorithm using dynamic programming approach. Explain how it is different from Dijkstra's greedy approach.
32	Explain assembly line scheduling problem with example.
33	Write an algorithm to find min and max number using divide and conquer strategy.
34	Write a short note on All pairs shortest path algorithm.
35	Rewrite and Compare Rabin Karp and Knuth Morris Pratt Algorithms

Sample Questions

Computer Engineering / Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer Science and Engineering (Data Science) / Computer Science and Engineering (Internet of Things and Cyber Security Including Block Chain Technology) / Cyber Security / Data Engineering / Internet of Things (IoT)

Subject Name: Database Management System **Semester: IV**

Multiple Choice Questions

	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.	i. 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 ∩ s =
Option A:	r – (r – s)
Option B:	s – (r – s)
Option C:	(r u s) – (r – s)
Option D:	(r u s) /(s u r)
9.	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.
Option A:	2
Option B:	4
Option C:	3
Option D:	5
10.	Write a query to set default value for salary to 25000 for table employee
Option A:	UPDATE employee MODIFY salary DEFAULT 25000
Option B:	UPDATE employee SET salary To DEFAULT 25000
Option C:	ALTER TABLE employee SET salary To DEFAULT 25000
Option D:	ALTER TABLE employee MODIFY salary DEFAULT 25000
11.	i. 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.
Option A:	INSERT INTO TABLE employee VALUES (`E-101',`Ashwin Singh',`Wireless', 100000)
Option B:	INSERT INTO employee (`E-101',`Ashwin Singh',`DEVELOPER', 50000)
Option C:	INSERT INTO employee VALUES(`E-101',`Ashwin Singh',`DEVELOPER', 50000)
Option D:	INSERT INTO employee table(employee id, name, dept name, salary) VALUES (`E-101',`Ashwin Singh',`DEVELOPER', 50000)

12.	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> 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.	a. 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
21.	Which is not a level in three level schema architecture?
Option A:	conceptual schema
Option B:	Abstraction level
Option C:	external schema
Option D:	internal schema
22.	The operation produces a new relation with only some of the attributes of R, and removes duplicate tuples.
Option A:	Union
Option B:	Intersect
Option C:	Select
Option D:	Project
23.	In which operation the resultant relation contains all pairs of tuples from the two relations, regardless of whether their attribute values match.

Option A:	Join
Option B:	Set Difference
Option C:	Cartesian product
Option D:	Union
24.	What is not true for a file based system to store data?
Option A:	Provides data consistency
Option B:	More redundancy
Option C:	No security
Option D:	Difficulty in accessing data.
25.	In SQL which CLAUSE is used to apply conditions on a group?
Option A:	ON
Option B:	WHERE
Option C:	HAVING
Option D:	GROUP BY
26.	An ER model of a database consists of entity types E1 and E2. These are connected by a relationship R which does not have its own attribute. Under which one of the following conditions, can the relational table for R be merged with that of E1?
Option A:	Relationship R is one-to-many and the participation of E1 in R is total.
Option B:	Relationships are one-to-many and the participation of E1 in R is partial.
Option C:	Relationship R is many-to-one and the participation of E1 in R is total.
Option D:	Relationship R is many-to-one and the participation of E1 in R is partial.
27.	Consider the relation Sailors:

Sid	Sname	Rating	Age
22	Dustin	7	45.0
29	Brutus	1	33.0

	31	Lubber	8	55.5
	58	Rusty	10	35.0
	64	Horatio	7	35.0
	71	Zorba	10	16.0

What will be the output if following query?

SELECT AVG (S.age)

FROM Sailors S

WHERE S.rating = 10;

Option A:	20
Option B:	10.5
Option C:	25.5
Option D:	30
28.	Which concurrency control protocols ensure freedom from deadlock?
Option A:	2-phase locking
Option B:	Timestamp Ordering
Option C:	Validation Based
Option D:	Strict 2-phase locking
29.	The Join operation in which it keeps every tuple in first or left relation R if no matching tuple is found in S, then the attributes of S in join result filled with NULL values
Option A:	Left outer join
Option B:	Right outer join
Option C:	Full join
Option D:	Inner join
30.	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.

Option A:	INSERT INTO TABLE employee VALUES (`E-101',`Ashwin Singh',`Wireless', 10,00,000)
Option B:	INSERT INTO employee (`E-101',`Ashwin Singh',`DEVELOPER', 50,000)
Option C:	INSERT INTO employee VALUES(`E-101',`Ashwin Singh',`DEVELOPER', 50,000)
Option D:	INSERT INTO employee table(employee id, name, dept name, salary) VALUES (`E-101',`Ashwin Singh',`DEVELOPER', 50,000)
31.	An association between an entity and itself is called?
Option A:	Binary relationship
Option B:	Recursive relationship
Option C:	Aggregation
Option D:	Specialization
32.	If several concurrent transactions are executed over the same data set and the second transaction updates the database before the first transaction is finished, the ____ property is violated and the database is no longer consistent
Option A:	Atomicity
Option B:	Consistency
Option C:	Durability
Option D:	Isolation
33.	"Consider a relation R (A, B, C, D, E, F, G, H), where each attribute is atomic, and following functional dependencies exist. CH → G , A → BC, B → CFH, E → A, F → EG The relation R is _____ ."
Option A:	in 1NF but not in 2NF
Option B:	in 2NF but not in 3NF
Option C:	in 3NF but not in BCNF
Option D:	in BCNF
34.	In the process of normalization, the decomposition should satisfy the following properties

Option A:	lossy but dependency preserving
Option B:	lossless but not dependency preserving
Option C:	lossless and dependency preserving
Option D:	lossy and not dependency preserving
35.	Relation R=(A,B,C,D,E,G) having the functional dependencies F=(A->B, BG->E, C->D, D->G) What is the candidate key?
Option A:	BG
Option B:	AB
Option C:	ABG
Option D:	AC
36.	The scheme of database recovery is that all the updates of transactions are recorded in the database on disk before the transaction commits.
Option A:	Immediate update
Option B:	Deferred update
Option C:	Shadow paging
Option D:	Checkpoint
37.	Consider following 2 schedules S1:r1(X);r3(Y);r3(X);r2(Y);r2(Z);w3(Y);w2(Z);r1(Z);w1(X);w1(Z) S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z);r2(Z); w3(Y); w1(X); w2(Z);w1(Z);W3(Z)
Option A:	S1 and S2 both are conflict serializable
Option B:	only S1 is conflict serializable
Option C:	only S2 is conflict serializable
Option D:	S1 and S2 both are not conflict serializable

38.	a. Choose the option that correctly explains in words, the function of the following relational algebra expression b. $\sigma_{\text{year} \geq 2017 \ \wedge \ \text{salary} < 42000}(\text{Employee})$ c.
Option A:	Selects all tuples from the Employee
Option B:	Selects all the tuples from Employee wherever the year is lesser than 2017 and salary less than 42000
Option C:	Selects all the tuples from the Employee wherever the year is greater than or equal to 2017 and salary is less than 42000.
Option D:	Selects all tuples from the Employee wherever the year is greater than or equal to 2009
39.	When a person in the university is belonging to more than one lower level entity set such as student as well as faculty then the constraint is
Option A:	Disjoint
Option B:	Total
Option C:	Overlapping
Option D:	Partial
40.	Consider the following two statements about database transaction schedules: I. Strict two-phase locking protocol generates conflict serializable schedules that are also recoverable. II. Timestamp-ordering concurrency control protocol with Thomas' Write Rule can generate view serializable schedules that are conflict serializable. Which of the above statements is/are TRUE?
Option A:	I only
Option B:	II only
Option C:	I and II both
Option D:	Neither I nor II
41.	The capacity to alter the database schema at one level without affecting any other levels is termed as

Option A:	Data Independence
Option B:	Data Mapping
Option C:	Data Isolation
Option D:	Data Transformation
42.	Which of the following describes the database structure and constraints?
Option A:	View
Option B:	Schema
Option C:	Meta data
Option D:	Instance
43.	Overlapping with partial specialization constraint can be defined as
Option A:	When a higher level entity instance may be a member of multiple lower level Entities or it must be a member of at least one lower level entity set..
Option B:	When a higher level entity instance may be a member of multiple lower level Entities or it does not have to be a member of any lower level entity.
Option C:	When an entity instance may be a member of at most one lower level entity set.
Option D:	When an entity instance may be a member of at least one lower level entity set..
44.	If car is the entity type then Maruti 800, Swift dzire are the _____?
Option A:	Instance
Option B:	Schema
Option C:	Field
Option D:	Attribute
45.	a. How to form the primary key of a weak entity set?
Option A:	Using weak entity set discriminator attribute only
Option B:	By combining all the attributes of weak entity set
Option C:	Using primary key of identifying entity set and discriminator of weak entity set
Option D:	Not possible to have primary key for weak entity set
46.	If relation r contains Nr tuples, and relation s contains Ns tuples, then the result of which operation contains Nr × Ns tuples?
Option A:	Union

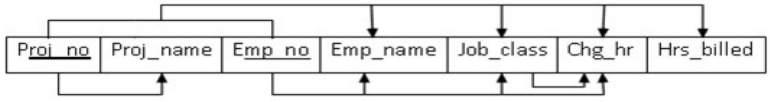
Option B:	Join
Option C:	Cartesian Product
Option D:	Set difference
47.	Consider the following relations: Parts(pid,pname,color) PartCost(pid,cost) What does the following relational algebra expression represent? $\Pi_{pid}((\sigma_{color='red'} (Parts)) \bowtie (\sigma_{cost \geq 1000}(PartCost)))$
Option A:	Find the pid of all parts whose color is red.
Option B:	Find the pid of all parts whose color is red or cost ≥ 1000.
Option C:	Find the pid of all parts whose color is red but not cost ≥ 1000.
Option D:	Find the pid of all parts whose color is red and cost ≥ 1000 .
48.	i. What is the cardinality of column A, if a relation R(A,B,C,D,E) contains 40 rows and every column contains unique values.
Option A:	200
Option B:	40
Option C:	4
Option D:	20
49.	Consider Entity set A and B in ER diagram having many to many relationship between A and B. How to map this relationship into a relational model?
Option A:	By adding primary key of Entity set A as a foreign key component in Entity set B
Option B:	By adding primary key of Entity set B as a foreign key component in Entity set A
Option C:	By creating a separate relation(R) for mapping binary many to many relationships which includes the primary key of both A and B.

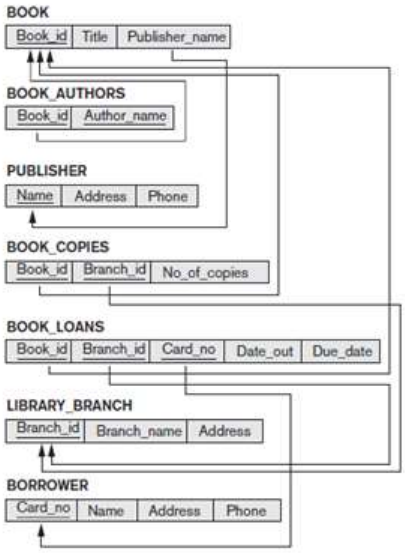
Option D:	By creating combine relation for entity set A and B
50.	Consider Table Employees have 10 records and it has NOT NULL salary column which is also UNIQUE. SELECT COUNT(*) FROM Employee WHERE SALARY > ANY (SELECT SALARY FROM EMPLOYEE); How many rows will come in the OUTPUT of the given query?
Option A:	10
Option B:	5
Option C:	9
Option D:	0
51.	Consider Schema: **Dept(dept_name, location, city);** Which command can be used to delete column location from the given relation
Option A:	MODIFY TABLE Dept DROP COLUMN location;
Option B:	ALTER TABLE Dept DROP COLUMN location;
Option C:	ALTER TABLE Dept DROP location;
Option D:	MODIFY TABLE Dept DROP location;
52.	Consider the instructor table: INSTRUCTOR (instr_id, name, dept name, salary) Create a new instructor `I-101', named `Ashwin singh', with 50,000 salary for department `Maths'. Identify the appropriate SQL staerment.
Option A:	INSERT INTO TABLE instructor VALUES (`I-101',`Ashwin Singh',`science', 10,00,000)
Option B:	INSERT INTO instructor (`I-101',`Ashwin Singh',`Maths', 50,000)
Option C:	INSERT INTO instructor VALUES(`I-101',`Ashwin Singh',`Maths', 50,000)
Option D:	INSERT INTO instructor tableinstr_id, name, dept name, salary) VALUES (`I-101',`Ashwin Singh',`maths', 50,000)

53.	Consider a relation R(A,B,C,D,) with the following functional dependency: AB-> CD . The number of superkeys of R is:
Option A:	1
Option B:	2
Option C:	3
Option D:	4
54.	Identify the incorrect statement .
Option A:	3NF doesn't have transitive dependencies
Option B:	Composite attributes are not allowed in 1NF
Option C:	In 2NF ,there should not be any Full functional dependencies
Option D:	In BCNF, trivial FD are allowed
55.	consider the relation schema: Student_Performance (name, courseNo, rollNo, grade) has the following set of functional dependencies. F= { rollNo,courseNo->grade rollNo->name } and candidate key is (rollNo,courseNo) The highest normal form of this relation scheme is
Option A:	2NF
Option B:	3NF
Option C:	1NF
Option D:	BCNF
56.	If T1 , T2 are two transactions and I1 , I2 are two instructions of T1 and T2 respectively then I1 and I2 are conflicting instructions if
Option A:	They operate on the different data item
Option B:	They belong to different transactions
Option C:	At Least one of them is a write operation
Option D:	At Least one of them is a read operation

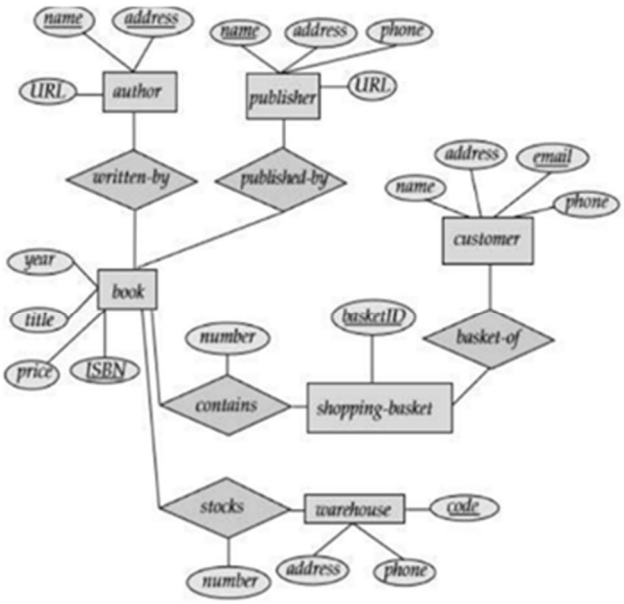
57.	What is true about the Wait-Die Algorithm for deadlock handling.
Option A:	Preemptive
Option B:	Non-preemptive
Option C:	Prefers Younger Transactions
Option D:	Both B And C
58.	i. Identify correct rules in growing phase (first phase) in two-phase locking protocol.
Option A:	Transaction can acquire only shared lock(LOCK-S) and exclusive (lock-X)
Option B:	Transaction can acquire only 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)
59.	Choose the correct option
Option A:	Every Conflict serializable schedule is also View serializable
Option B:	Every View serializable schedule is also conflict serializable
Option C:	Both a and b
Option D:	Every serial schedule has same conflict and view equivalent schedule
60.	When a transaction is aborted due to ant kind of failure,which instruction should be executed to keep database in consistent state
Option A:	Commit
Option B:	Rollback
Option C:	Savepoint
Option D:	Checkpoint

Descriptive Questions

1	Consider a dependency diagram of relation R and normalize it up to third normal form. 

2	Explain conflict and view serializability with suitable examples .
3	Explain deadlock handling in DBMS with suitable examples.
4	What are different database users? Give responsibilities of DBA
5	Produce ER Diagram from the following relational database Schema. 
6	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)
7	Explain the transaction processing with the help of a state diagram?
8	Consider the schema R={A,B,C,D,E,F,G,H,I,J} and set of functional dependencies F= {{A,B}→{C}, {A}→{D,E}, {B}→ {F}, {F}→{G,H},{D}→{I,J}}. What is the key of R? Decompose R into 2NF and 3NF relations.
9	Explain log based recovery techniques with examples?

10	Explain different types of Database users and the responsibilities of the DBA?
11	Design an EER schema for a **BANK** database. Each bank can have multiple branches, and each branch can have multiple accounts and loans. Bank keeps the track of different types of Accounts (Saving_aacount, Checking_account) , Loans(Car_loans,Home_loans,…) , each account's Transaction (deposit, withdrawal,check,..) and each loan's Payments; both of these include the amount, date and time. State any assumptions you make about the additional requirement clearly.
12	Write SQL queries for the given database : Emp(Eid, Ename, Sal, City) Works(Eid, Cid) Company(Cid, Cname, City) i. Find the lowest paid employee. ii. Find how many employees are working for the company 'ANZ Cooperation". iii. Modify the database so that Joe now lives in "New York". iv. Find the total number of employees of each company. v. Give all employees of 'XYZ 'company a 10% raise in salary.
13	Explain the three levels of abstraction in DBMS including physical and logical data independence.
14	Consider the given schema: ● **Employees (**Empid, Fname, Lname, Email, Phoneno, Hiredate, Jobid, Salary, Mid, Did**)** ● **Departments** (Did, Dname,Managerid) ● **Locations** (Did, City,State) Write the SQL queries for the following: 1. List the employees who have a manager who works for a department based in Mumbai. 2. Give a 10% hike to all the Employees working in '**D01'** department. 3. Display the information of the employees whose first name starts with 'R' in descending order of their salary.

	4. Find name of the department which are having more than 20 employees 5. Add a new record in departments(Assume values as per requirement)
15	Convert following E-R diagram to relational schema and equivalent schema diagram 
16	Explain 3NF .Consider relation r1 with the functional dependencies that hold on it. r1(p, q, r, s, t) p → q,r,s,t s → t check whether r1 is in 3NF or not .If it is not in 3NF decompose into 3NF.
17	Explain transaction ,properties and states with suitable example
18	Explain timestamp based protocol and how timestamp-ordering protocol guarantees serializability

Sample Questions

Computer Engineering / Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer Science and Engineering (Data Science) / Computer Science and Engineering (Internet of Things and Cyber Security Including Block Chain Technology) / Cyber Security / Data Engineering / Internet of Things (IoT)

Subject Name: Database Management System **Semester: IV**

Multiple Choice Questions

	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.	i. 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.	i. 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.	a. 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
21.	The interface is provided by the _____ to access the services of operating system,
Option A:	System calls
Option B:	API
Option C:	Library
Option D:	Assembly instructions
22.	Which runs on computer hardware and serve as platform for other software to run on?
Option A:	Operating System
Option B:	Application Software
Option C:	System Software
Option D:	Rootkit
23.	_____structure designs the operating system by removing all non-essential components from the kernel and implementing them as system and user programs.
Option A:	Layered
Option B:	Microkernel
Option C:	Modular
Option D:	Hybrid
24.	Which is not state of process in state diagram
Option A:	New
Option B:	Create
Option C:	running
Option D:	waiting
25.	Convoy effect is drawback of
Option A:	FCFS
Option B:	SJF
Option C:	ROUND ROBIN
Option D:	PRIORITY SCHEDULING
26.	In Shortest remaining time next Scheduling Algorithm, when a process arrives at the ready queue, its burst time is compared with the burst time of
Option A:	All process
Option B:	Currently running process
Option C:	Parent process
Option D:	Init process

27.	Process is _____
Option A:	program in High level language kept on disk
Option B:	contents of main memory
Option C:	a program in execution
Option D:	lightweight thread
28.	The system call used to implement signal operation of semaphore is____
Option A:	getup( )
Option B:	wakeup( )
Option C:	start( )
Option D:	continue( )
29.	An operating system contains 3 user processes each requiring 2 units of resource R.The minimum number of units of R such that no deadlocks will ever arise is
Option A:	3
Option B:	5
Option C:	4
Option D:	6
30.	Which one is the incorrect necessary condition for deadlock to occur?
Option A:	Mutual exclusion
Option B:	Circular wait
Option C:	Hold and wait
Option D:	Pre-emption
31.	The value of semaphore can be manipulated using_____
Option A:	Entry section
Option B:	Remainder section
Option C:	Critical section
Option D:	Non- critical section
32.	logical address is generated by _____
Option A:	page table
Option B:	CPU
Option C:	Segment table
Option D:	IO unit
33.	Which technique is used to overcome external fragmentation when Dynamic Partitioning is used during the process to memory allocation?
Option A:	compaction
Option B:	page fault
Option C:	context switch
Option D:	polling
34.	What is the name of memory allocation technique, where the OS searches for a memory block from last placement and chooses the next available block large enough to fit a process ?
Option A:	Worst Fit

Option B:	Best Fit
Option C:	First Fit
Option D:	Next Fit
35.	when page is allocated to the frame and in this allocation if a memory frame is not completely full then it leads to the _____
Option A:	Dynamic Linking
Option B:	External fragmentation
Option C:	Internal fragmentation
Option D:	Page fault
36.	which among the options below is not the desirable property of files ?
Option A:	Long-term existence
Option B:	Shareable between processes
Option C:	Short-term existence
Option D:	Structure
37.	What is the basic element of data in a file?
Option A:	Field
Option B:	Array
Option C:	Track
Option D:	Sector
38.	a. In_____algorithm the disk arm goes as far as the final request in each direction, then reverses direction immediately without going to the end of the disk.
Option A:	FCFS
Option B:	C-SCAN
Option C:	SCAN
Option D:	LOOK
39.	The time it takes to position the head at the track on a movable head is known as_____
Option A:	Rotational delay
Option B:	Seek time
Option C:	Access time
Option D:	Transfer rate
40.	In the layered approach of Operating Systems _____
Option A:	Bottom Layer(0) is the User interface
Option B:	Highest Layer(N) is the User interface
Option C:	Bottom Layer(N) is the hardware
Option D:	Highest Layer(N) is the hardware

41.	In layered approach layers are selected such that each uses functions (operations) and services of _____
Option A:	Only topmost level layers
Option B:	Only upper level layers
Option C:	Only lower-level layers
Option D:	Only bottom most level layers
42.	Most of routine system call are written in
Option A:	java
Option B:	C & C++
Option C:	Python
Option D:	COBOL
43.	The number of processes completed per unit time is known as_____
Option A:	Output
Option B:	Efficiency
Option C:	Throughput
Option D:	Capacity
44.	A single thread of control allows the process to perform _____
Option A:	Only one task at a time
Option B:	Multiple tasks at a time
Option C:	Only two tasks at a time
Option D:	Only three tasks at a time
45.	_____Scheduler reduces degree of multiprogramming
Option A:	Short term scheduler
Option B:	Medium term scheduler
Option C:	Long term scheduler

Option D:	CPU term scheduler
46.	Shortest job first scheduling is special case of
Option A:	Priority scheduling
Option B:	Round robin
Option C:	Multilevel scheduling
Option D:	FCFS
47.	The fastest form of IPC provided in UNIX system is
Option A:	Virtual memory
Option B:	Shared memory
Option C:	Main memory
Option D:	Secondary memory
48.	Which one is not Reusable resource in the system?
Option A:	databases
Option B:	Main memory
Option C:	Interrupts
Option D:	Processor
49.	Deadlock avoidance requires knowledge of future
Option A:	process
Option B:	resource
Option C:	program
Option D:	application
50.	A graph that is an important tool used to characterize and allocate resources to processes is
Option A:	Location graph

Option B:	Resource allocation graph
Option C:	Time graph
Option D:	Process graph
51.	When the page table is kept in main memory, where does the page table base register (PTBR) points to?
Option A:	page table
Option B:	segment table
Option C:	limit of segment
Option D:	program counter
52.	which one among the below option is the problem seen in contiguous dynamic memory partitioning
Option A:	internal fragmentation
Option B:	external fragmentation
Option C:	deadlock
Option D:	page fault
53.	To achieve Memory protection in a paged environment a bit is set to valid or invalid ,what does bit value “invalid” signifies here?
Option A:	the page is in the process's logical address space
Option B:	the page is not in the process's physical address space
Option C:	the page is in the process's physical address space
Option D:	the page is not in the process's logical address space
54.	Each entry in the segment table has _____
Option A:	page number and a page offset
Option B:	segment base and a segment limit
Option C:	page number and a segment limit
Option D:	a segment offset and a segment limit

55.	The kind of directory structure where The Master File Directory is indexed by user name, and each entry points to the User File Directory for that user is called as _____
Option A:	Two-level directory structure
Option B:	Single level directory structure
Option C:	General Graph Directory
Option D:	Acyclic-Graph Directories
56.	The file access method where Records are stored and accessed in key sequence is called as _____
Option A:	Direct access
Option B:	Indexed access
Option C:	Pile access
Option D:	Sequential access
57.	Which buffer holds the output for a device?
Option A:	Control
Option B:	Spool
Option C:	Status
Option D:	Output
58.	Device driver is required by which of the following component?
Option A:	Cache memory
Option B:	Registers
Option C:	Hard disk
Option D:	Main memory
59.	Which one of the following is the incorrect pair of device and its controller?
Option A:	Disk - disk controller

Option B:	Keyboard- Video adapter
Option C:	Mouse- USB controller
Option D:	Monitor- Video adaptor
60.	In the layered approach of Operating Systems _____
Option A:	Bottom Layer(0) is the User interface
Option B:	Highest Layer(N) is the User interface
Option C:	Bottom Layer(N) is the hardware
Option D:	Highest Layer(N) is the hardware

Descriptive Questions

1	*Describe microkernel operating system structure*
2	*What is thread? Describe any four advantages of multithreading model.*
3	*Why is semaphore known as a synchronisation tool?Give an example.*
4	*Describe how logical address is converted into physical address when the program and its associated data is divided into segments*
5	*Summarize various File Attributes*
6	*With the help of a diagram explain I/O management.*
7	*Compare short term, medium term and long term scheduler along with diagram*
8	*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?*
9	*describe in detail requirements that intends to achieve memory Management*
10	*With help of a diagram explain how the system call will be generated?*
11	*Compare preemptive and non preemptive scheduling algorithm?*
12	*Define deadlock. List the conditions that lead to deadlock.*
13	*Describe how logical address is converted into physical address when the process is strictly divided into equal size chunks*
14	*Summarize file system organization architecture*
15	*Explain disk organization using diagram.*
16	*Give the importance of proper time quantum selection in Round Robin CPU Scheduling algorithm. Draw Gantt Chart and Find average waiting time and*

<table>
<tr><td></td><td>average turnaround time for following using Round Robin Scheduling (Time quantum of 3 msec) and FCFS scheduling: :

<table><tr><td>Process</td><td>Burst Time(msec)</td></tr><tr><td>P1</td><td>10</td></tr><tr><td>P2</td><td>3</td></tr><tr><td>P3</td><td>5</td></tr><tr><td>P4</td><td>7</td></tr></table></td></tr>
<tr><td>17</td><td>What is the producer consumer problem? Provide solution to producer consumer problem using semaphores.</td></tr>
<tr><td>18</td><td>Discuss the operation of translation lookaside buffer(TLB) in terms of memory management</td></tr>
<tr><td>19</td><td>What is an operating system? Describe role of Kernel in operating system</td></tr>
<tr><td>20</td><td>Describe criteria in CPU scheduling</td></tr>
<tr><td>21</td><td>What is the Dining Philosophers problem?Give one solution.</td></tr>
<tr><td>22</td><td>explain the problem of thrashing in detail</td></tr>
<tr><td>23</td><td>Describe various requirements for file management system</td></tr>
<tr><td>24</td><td>Define following terms in relation with disk management: Rotational delay, Transfer rate, Access time, Seek time, Cylinder.</td></tr>
<tr><td>25</td><td>With the help of diagrams explain different multithreading models</td></tr>
<tr><td>26</td><td>Explain Banker’s algorithm for deadlock avoidance. How is it different from deadlock detection?</td></tr>
<tr><td>27</td><td>Apply FIFO,LRU,OPTIMAL(OPT) page replacement algorithms on the following page sequence

1,2,3,4,5,1,4,2,3,4

and calculate number page of HIT and MISS occurred</td></tr>
</table>

Sample Questions

Computer Engineering / Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer Science and Engineering (Data Science) / Computer Science and Engineering (Internet of Things and Cyber Security Including Block Chain Technology) / Cyber Security / Data Engineering / Internet of Things (IoT)

Subject Name: Microprocessor **Semester: IV**

Multiple Choice Questions

	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.	i. 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.	i. 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.	a. 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
21.	The flag that is used in 8086 for string manipulation instructions is
Option A:	AF
Option B:	ZF
Option C:	DF
Option D:	CF
22.	In 8086 microprocessor one of the following statements is not true.
Option A:	Coprocessor is interfaced in Min mode
Option B:	Coprocessor is interfaced in Max mode
Option C:	20 bit address bus
Option D:	Supports pipelining
23.	The BIU prefetches the instruction from memory and store them in
Option A:	Queue

Option B:	Register
Option C:	Memory
Option D:	Stack
24.	Segment address, Offset address & Physical address are _____ bits each in 8086
Option A:	8, 8 & 16
Option B:	8, 16 & 20
Option C:	16, 16 & 20
Option D:	8, 8 & 8
25.	The OUT DX, AX instruction present in 8086 microprocessor causes?
Option A:	data retrieval from IO device
Option B:	data transfer to memory
Option C:	data transfer to IO device
Option D:	data retrieval from memory
26.	The instruction that unconditionally transfers the control of execution to the specified address is
Option A:	CALL
Option B:	IRET
Option C:	RET
Option D:	JNZ
27.	In PUSH instruction, after each execution of the instruction, the stack pointer is
Option A:	incremented by 1
Option B:	decremented by 1
Option C:	incremented by 2
Option D:	decremented by 2
28.	In DMA if more than one channel requests service simultaneously, the transfer will occur as
Option A:	burst transfer
Option B:	simultaneous transfer
Option C:	Parallel transfer
Option D:	multi transfer
29.	When the SP(active low)/EN(active low) pin of 8259A used in buffered mode, then it can be used as a
Option A:	input to designate chip is master or slave
Option B:	buffer disable
Option C:	buffer enable
Option D:	input to designate chip is master
30.	In 8255, BSR mode is applicable for which port
Option A:	Port A
Option B:	Port B
Option C:	Port C

Option D:	Port A &B
31.	Cascade PIC mode provides maximum how many interrupt levels in 8259
Option A:	8
Option B:	16
Option C:	63
Option D:	64
32.	80386 support which type of descriptor table from the following?
Option A:	TDS
Option B:	ADT
Option C:	GDT
Option D:	MDS
33.	Which control registers of 80386 are associated with paging mechanism?
Option A:	CR0, CR2, CR3
Option B:	CR1, CR2, CR3
Option C:	CR0, CR1 CR2
Option D:	CR0, CR1 CR2,CR3
34.	How many flags are active in flag register of 80386?
Option A:	9
Option B:	12
Option C:	13
Option D:	10
35.	80386 real mode have
Option A:	Only overlapped segments
Option B:	Either overlapped or non-overlapped segments
Option C:	Only nonoverlapped segments
Option D:	Paging
36.	MESI protocol of Pentium comprises of
Option A:	Mutual, Exclusive, Shared, and Invalid
Option B:	Modified, Exhaustive, Shared, and Interactive
Option C:	Modified, Exclusive, Shared, and Valid
Option D:	Modified, Exclusive, Shared, and Invalid
37.	The speed of integer arithmetic of Pentium is increased to a large extent by
Option A:	4-stage pipelines
Option B:	superscalar and superpipelined architecture
Option C:	superscalar architecture
Option D:	on-chip floating point unit
38.	a. In Pentium, the percentage of hits to the total cache access is given by
Option A:	Hit Ratio
Option B:	Accuracy
Option C:	Efficiency

Option D:	Precision
39.	Which of this is not true for Pentium 4?
Option A:	Hyperthreading (HT) gets illusion as if two processors are executing code in parallel
Option B:	Execution trace cache to store 12k micro-operation
Option C:	126 instruction window in instruction pool
Option D:	Data Bus of 32 bit
40.	Hyperthreading uses the concept of
Option A:	Simultaneous multithreading
Option B:	Distributed decoding
Option C:	Multiple switching
Option D:	Pipelining
41.	8086 supports _____ s/w Interrupts
Option A:	2
Option B:	64K
Option C:	256
Option D:	8
42.	After RESET is given to 8086 the content of CS is
Option A:	FFFF0
Option B:	0000
Option C:	FFFF
Option D:	0FFFF
43.	If segment address = FF00 H, offset address = 00FF H, then the physical address is _____
Option A:	FFFF0
Option B:	0FFFF
Option C:	FF0FF
Option D:	FFFFF
44.	In 8086 size of pre fetch queue is
Option A:	6 Byte
Option B:	4 Byte
Option C:	4 Bit
Option D:	2 Byte
45.	In an instruction, generally a destination operand is
Option A:	Only Register
Option B:	Only Memory location
Option C:	Register or Memory location
Option D:	Immediate data
46.	MOV AX, FFFFH will affect

Option A:	All flags
Option B:	No flags
Option C:	CY and AC flags
Option D:	Zero flag
47.	Which of the following instruction is not valid
Option A:	MOV AX,1000H
Option B:	MOV AH, BL
Option C:	MOV DS, 0100H
Option D:	MOV [SI], AX
48.	_____ stores the bits required to mask the IR lines of 8259
Option A:	ISR
Option B:	IMR
Option C:	IRR
Option D:	PR
49.	The bus is available when the DMA controller receives the signal
Option A:	HRQ
Option B:	HLDA
Option C:	DACK
Option D:	INTA
50.	If microprocessor has 10-bits address bus, then it can generate _____addresses.
Option A:	32767
Option B:	25652
Option C:	65536
Option D:	1024
51.	In 8255 strobed input/output mode is
Option A:	Mode 0 of I/O mode
Option B:	Mode 1 of I/O mode
Option C:	Mode 2 of I/O mode
Option D:	BSR mode
52.	Size of page in 80386 is
Option A:	1 Kb
Option B:	2 Kb
Option C:	4 Kb
Option D:	8 Kb
53.	The 80386DX has an address bus of
Option A:	8 address lines
Option B:	16 address lines
Option C:	20 address lines
Option D:	32 address lines

54.	In a selector if table indicator = 1 then it select
Option A:	Local descriptor table
Option B:	Global descriptor table
Option C:	Trap gate
Option D:	Task gate
55.	The control register that stores the 32-bit linear address, at which the previous page fault is detected is
Option A:	CR0
Option B:	CR1
Option C:	CR2
Option D:	CR3
56.	Pentium floating point unit has
Option A:	2 stage pipelines
Option B:	4 stage pipelines
Option C:	8 stage pipelines
Option D:	16 stage pipelines
57.	Due to the branch instruction, the incorrect instruction loaded into pipeline must be discarded. This is called
Option A:	Flushing
Option B:	Bubble
Option C:	Disturbance
Option D:	Wrong entry
58.	What lead to the development of MESI and MEI protocol ?
Option A:	Cache size
Option B:	Cache Coherency
Option C:	Bus snooping
Option D:	Number of caches
59.	P4 has hyper pipelined technology with
Option A:	3 stages
Option B:	5 stages
Option C:	10 stages
Option D:	20 stages
60.	Trace cache can store up to
Option A:	10 K decoded micro operation
Option B:	8 K decoded micro operation
Option C:	12K decoded micro operation
Option D:	4 K decoded micro operation

Descriptive Questions

1	Explain different types of Interrupts? Explain Interrupt Vector table for 8086

2	Draw and explain the internal block diagram of 8257? How DMA operations are performed?
3	Explain what is Branch Prediction Logic in Pentium? Explain working of Branch Prediction with suitable diagram?
4	Compare the 8086, 80386, Pentium Processor.
5	Draw and explain the internal architecture of 80386 microprocessor?
6	Explain the operating modes of 80386?
7	Explain the internal architecture of 8086 microprocessor? Differentiate the functioning of Minimum mode and Maximum mode?
8	Write an assembly language program to find the largest number from an unordered array of 8-bit numbers?
9	Interface 32K word of memory to 8086 microprocessor system. Available memory chips are 16K*8 RAM. Use suitable decoder for generating chip logic.
10	Explain address and data bus demultiplexing in 8086 with diagram.
11	Discuss need for memory banking in 8086
12	Explain mode-0 and mode-2 of 8255
13	Explain interrupt procedure of 8086
14	Explain integer pipeline of Pentium
15	Write a note on Hyperthreading
16	Write 8086 assembly language program to find Even and Odd number from the set of 5 8-bit numbers.
17	Design 8086 system based on the following specifications 1. 16Kb ROM using 8 Kb chips 2. Minimum mode 3. 5Mhz clock
18	Explain protection mechanism of 80386 with diagram.
19	Explain memory segmentation in 8086 with neat diagram.
20	Draw timing diagram of memory read operation in minimum mode.
21	Explain programmer's model of 8086 microprocessor.
22	Explain BSR mode of 8255.
23	Explain Branch Prediction logic with neat diagram.
24	With neat diagram explain Net burst micro architecture of Pentium 4
25	Explain with neat diagram architecture of 80386 microprocessor.
26	Design 8086 microprocessor based system working in minimum mode with the following specifications. I) 8086 microprocessor working at 8 MHz. II) 16 KB EPROM using 8K devices. Clearly show memory map with address range. Draw a neat schematic.
27	Write an 8086 assembly language program to print content of flag register.