University of Mumbai
Examination 2021 under cluster __ (Lead College: _)
Examinations Commencing from 15th June 2021 to 24th June 2021

Program: BE (Information Technology)
Curriculum Scheme: Rev 2016 (CBCGS)
Examination: SE Semester III
Course Code: ITC301 and Course Name: Applied Mathematics III

Time: 2-hours   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.	$I = \int_0^\infty e^{-t} \frac{\sin t}{t} dt$ then value of I is
Option A:	$\pi/2$
Option B:	$\pi/4$
Option C:	$-\pi/4$
Option D:	π
2.	On set of integers , a relation R is defined as aRb iff a $\leq$ b then which of the following is true ?
Option A:	R is equivalence
Option B:	R is symmetric
Option C:	R is not transitive
Option D:	R is reflexive
3.	$f : \mathbb{R} \to \mathbb{R}$ defined as $f(x) = 2x + 1$ for $x \in \mathbb{R}$. Find rule for $f^{-1}(x)$
Option A:	$f^{-1}(x) = \frac{x+1}{2}$
Option B:	$f^{-1}(x) = \frac{x-1}{2}$
Option C:	$f^{-1}(x) = 2x - 1$
Option D:	f^{-1} doesn't exist
4.	Inverse Laplace transform of $\frac{1}{s^2 - 2s + 1}$ is
Option A:	e^t
Option B:	te^t
Option C:	$\sin t$
Option D:	te^{-t}
5.	$S = [0,1]$ then S is
Option A:	countable set
Option B:	finite
Option C:	uncountable
Option D:	Both countable as well as uncountable

6.	$f : \mathbb{R} \to \mathbb{R}$ defined as $f(x) = x^2$ for $x \in \mathbb{R}$ then f is
Option A:	injective
Option B:	surjective
Option C:	bijective
Option D:	not bijective

7.	$f(x) = x + 3 \quad g(x) = 2x + 1$ then $gof(x) =$
Option A:	$2x - 7$
Option B:	$2x + 7$
Option C:	$2x + 4$
Option D:	$3x + 4$

8.	$L\{t \sin t\} =$
Option A:	$\dfrac{2s}{(s^2 + 1)^2}$
Option B:	$\dfrac{-2s}{(s^2 + 1)^2}$
Option C:	$\dfrac{s}{(s^2 + 1)^2}$
Option D:	$\dfrac{1}{(s^2 + 1)^2}$

9.	Inverse Laplace transform of $\dfrac{1}{s(s+1)}$ is
Option A:	$1 - e^{-t}$
Option B:	$1 - e^{t}$
Option C:	$\cos ht$
Option D:	e^{-t}

10.	If $f(z) = \bar{z}$ where $z = x + iy$ then which of the following is true ?
Option A:	$f(z)$ is everywhere analytic
Option B:	Cauchy-Riemann equations are satisfied
Option C:	$f(z)$ is not analytic at $x = 0$
Option D:	$f(z)$ is analytic only at $x = 0$

11.	Fixed points of transformation $f(z) = \dfrac{z-1}{z+1}$ are
Option A:	± 1
Option B:	$\pm i$
Option C:	$\pm 2i$
Option D:	± 2

12.	How many friends you must have to gurantee that at least two of them have birthday in same month
Option A:	8
Option B:	13
Option C:	12
Option D:	10

13.	Analytic function $f(z) = u + iv$ whose imaginary part $v = \tan^{-1}\dfrac{y}{x}$ is

Option A:	$\tan z$
Option B:	$\log z$
Option C:	$\sin z$
Option D:	$\cos z$
14.	A relation R is defined on $\mathbb{Z}$ such that aRb if $a - b$ is divisible by 5.How many distinct equivalence classes are there corresponding to R?
Option A:	1
Option B:	3
Option C:	4
Option D:	5
15.	$L\{J_0(t)\} = \frac{1}{\sqrt{s^2+1}}$ then $L\{J_0(4t)\} =$
Option A:	$\dfrac{1}{\sqrt{s^2 + 16}}$
Option B:	$\dfrac{4}{\sqrt{s^2 + 16}}$
Option C:	$\dfrac{4}{\sqrt{s^2 + 4}}$
Option D:	$\dfrac{1}{4}\dfrac{1}{\sqrt{s^2 + 16}}$
16.	Image of $\|z\| = 1$ under $w = z + 2 + 3i$ is
Option A:	straight line
Option B:	line segment
Option C:	circle
Option D:	ellipse
17.	If repetitions are not permitted , How many 4-digited numbers can be formed using digits 1,2,3,5,7,8
Option A:	360
Option B:	720
Option C:	180
Option D:	1296
18.	From integers 1 to 100 , any one integer is chosen at random. Determine probability that it divisible by 3 or 5.
Option A:	0.47
Option B:	0.53
Option C:	0.59
Option D:	0.48
19.	$P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ where $A \; and \; B$ are independent events then $P(A \cup B) =$
Option A:	$\dfrac{2}{3}$
Option B:	$\dfrac{1}{3}$
Option C:	$\dfrac{1}{6}$

Option D:	$\dfrac{5}{6}$
20.	Three students solve a problem in Mathematics independently.Their chances of solving problem are $\dfrac{1}{2},\dfrac{1}{3},\dfrac{1}{4}$ respectively.Probability that problem is solved is
Option A:	$\dfrac{1}{4}$
Option B:	$\dfrac{3}{4}$
Option C:	$\dfrac{1}{24}$
Option D:	$\dfrac{13}{12}$

Q2. **(20 Marks)**	**Solve any Four out of Six. (5 marks each)**
A	Determine constants a,b,c,d so that $f(z) = (x^2 + axy + by^2) + i(cx^2 + dxy + y^2)$ is analytic
B	$f: \mathbb{R} \to \mathbb{R}$ $g: \mathbb{R} \to \mathbb{R}$ $h: \mathbb{R} \to \mathbb{R}$ $f(x) = x + 4$, $g(x) = x - 4$, $h(x) = 4x$ for $x \in \mathbb{R}$ Compute fog, gof, hoh
C	Find $L\{te^{3t}\sin 4t\}$
D	Find $L^{-1}\left\{\dfrac{s+2}{(s^2+4s+8)^2}\right\}$
E	In a bolt factory , machines A , B , C manufacture respectively 25% , 35% and 40% of total production. Of this output ,Defective bolts produced by machine A , B , C are 5% , 4% and 3% respectively.A bolt is drawn at random from total production and is found to be defective.What is the probability that it is manufactured by machine A?
F	If four points are drawn inside an equilateral triangle of side 1 unit then prove that there are two among them whose distance apart is less than ½ units.

Q3. **(20 Marks)**	**Solve any Four out of Six .(5 marks each)**
A	Find $L^{-1}\left\{\log(\dfrac{s+a}{s+b})\right\}$
B	Evaluate $\int_0^\infty e^{-t}\dfrac{\sin^2 t}{t}dt$
C	$f: \mathbb{R} - \left\{\dfrac{7}{3}\right\} \to \mathbb{R} - \left\{\dfrac{4}{3}\right\}$ $f(x) = \dfrac{4x-5}{3x-7}$ Prove that f is bijective . Hence find f^{-1}
D	Find bilinear transformation which maps points $2, i, -2$ in Z-plane onto points $1, i, -1$ in W-plane.
E	Construct analytic function $f(z) = u + iv$ where $v = e^x(x\sin y + y\cos y)$
F	A student giving true false test answers a question correctly if he knows the answer and if he does not know the answer then he answers a question on basis of tossing a coin.If probability that student knows the answer is 1/5 then what is the probability that students knows the answer to a correctly

	marked question ?

University of Mumbai
Examination June 2021
Examinations Commencing from 15th June 2021
Program: **Information Technology**
Curriculum Scheme: Rev2016
Examination: SE Semester III

Course Code: ITC302   Course Name: Logic Design

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
Q1.	To work as an Amplifier transistor should operate in which region?
Option A:	Saturation region
Option B:	Cut-off region
Option C:	Active region
Option D:	Inverse-Active region
Q2.	A transistor has a β_{DC} of 240 and a base current, I_B, of 12 μ A. The collector current, I_C, equals:
Option A:	2.8A
Option B:	2.880mA
Option C:	2880mA
Option D:	28.8A
3.	To work as an OFF switch, transistor should operate in which region?
Option A:	Saturation region
Option B:	Cut-off region
Option C:	Active region
Option D:	Inverse-Active region
4.	The ASCII code is basically how many bits ?
Option A:	4 bits
Option B:	7 bits

Option C:	10 bits
Option D:	6 bits
5.	Which of the following are correct equation for half adder
Option A:	Sum= A+B, Carry= AB
Option B:	Sum = A xor B , Carry = AB
Option C:	Sum= A'B', Carry = A'B
Option D:	Sum = AB, Carry = A+B'
6.	Can a Multiplexer be used to implement logic of Encoder?
Option A:	Yes
Option B:	No
Option C:	Sometimes
Option D:	Depends on the number of inputs
7.	$(A + A \cdot B) = ?$
Option A:	0
Option B:	1
Option C:	A
Option D:	AB
8.	Which of the following could be used to implement given expression, Sum = $\sum$m (1,2,4,7)
Option A:	Encoder
Option B:	Priority Encoder
Option C:	Decoder
Option D:	Subtractor
9.	7483 IC could be used to implement which of the following
Option A:	Multiplexer circuit
Option B:	Decimal to Octal converter

Option C:	4 bit parallel Adder
Option D:	XOR gate
10.	Hexadecimal of $(1287)_{10}$?
Option A:	$(4F7)_H$
Option B:	$(4F6)_H$
Option C:	$(4E9)_H$
Option D:	$(577)_H$
11.	If both the inputs are high(i.e. 1), what will be the output using NAND gate
Option A:	1
Option B:	0
Option C:	Could be 1 or 0
Option D:	Invalid output
12.	Which of the following is also known as Data selector.
Option A:	Dencoder
Option B:	Encoder
Option C:	DeMultiplexer
Option D:	Multiplexer
13.	**F(A,B,C,D)=∑(1,3,4,11,12,13,14,15) could be implemented using which of the following circuits**
Option A:	8X1 multiplexer
Option B:	16X1 multiplexer
Option C:	4 bit parallel adder
Option D:	1X4 demultiplxer
14.	Combinational circuit that establish the priority of competing inputs by outputting a binary code representing the highest-priority active input is called
Option A:	Select encoder
Option B:	Network Encoder

Option C:	Linear encoder
Option D:	Priority encoder
15.	The states of output in sequential circuits depends on
Option A:	Past output states
Option B:	Present input states
Option C:	Present input as well as past output
Option D:	Past output and past inputs
16.	Following flip flop is used to eliminate race around condition
Option A:	S R Flip flop
Option B:	Master Slave J K Flip flop
Option C:	J K Flip flop
Option D:	T Flip flop
17.	What is the preset condition for a ring shift counter?
Option A:	All FFs set to 1
Option B:	All FFs cleared to 0
Option C:	A single 0, the rest 1
Option D:	A single 1, the rest 0
18.	A decade counter skips which states
Option A:	binary states 1000 to 1111
Option B:	binary states 0000 to 0011
Option C:	binary states 1010 to 1111
Option D:	binary state 1111
19.	A package in VHDL consists of
Option A:	Commonly used architectures
Option B:	Commonly used tools
Option C:	Commonly used syntax and variables

Option D:	Commonly used data types and subroutines
20.	Which expression correctly represents architectural data flow of half subtractor
Option A:	DIFF <= A xor B; Borrow <= (not A) and B;
Option B:	DIFF <= A or B; Borrow <= (not A) and B;
Option C:	DIFF <= A xnor B; Borrow <= (not A) and B;
Option D:	DIFF <= A and B; Borrow <= (not A) and B;

Q2. (20 Marks)	Solve any Two Questions out of Three 10 marks each
A	Explain Input & output characteristics of BJT.
B	Convert SR Flip flop to JK and T Flip Flop
C	Solve the given equation using K-maps. $f(w,x,y,z) = \sum m (0,2,5,7,8,10,13,15) + d(4)$ Realize the solved equation using logic gates.

Q3. (20 Marks)	Solve any Two Questions out of Three 10 marks each
A	Explain the working of 4 bit bidirectional shift register
B	Convert $(2AB.7)_H$ into Decimal, Binary, Octal number, BCD, Gray and Excess-3 Code.
C	Explain with diagram, how can we implement a full adder using 2 half adders.

Examinations Commencing from ------ June 2021
Program: **Information Technology**
Curriculum Scheme:2016 (Keep the required)
Examination: SE Semester III
Course Code:ITC303 and Course Name:Data structure 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 one of the following is the process of inserting an element in the stack?
Option A:	Insert
Option B:	Push
Option C:	Pop
Option D:	Delete
2.	When the user tries to delete the element from the empty stack then the condition is said to be a ____
Option A:	Underflow
Option B:	Overflow
Option C:	Garbage collection
Option D:	Full
3.	Which of the following is not the application of stack?
Option A:	A parentheses balancing program
Option B:	Tracking of local variables at run time
Option C:	Compiler Syntax Analyzer
Option D:	Data Transfer between two asynchronous process
4.	When we say an algorithm has a time complexity of O(n), what does it mean?
Option A:	The algorithm has 'n' nested loops.
Option B:	The computation time taken by the algorithm is proportional to n.
Option C:	The algorithm is 'n' times slower than a standard algorithm.
Option D:	There are 'n' number of statements in the algorithm.
5.	The amount of memory needs to run to completion is known as _____
Option A:	Space complexity
Option B:	worst case
Option C:	Time complexity
Option D:	Best case
6.	____is the minimum number of steps that can be executed for the given parameters.
Option A:	Average case
Option B:	Worst case
Option C:	Time complexity
Option D:	Best case

7.	In the worst case the time required to search an element in a linked list of length n is?
Option A:	O(n)
Option B:	O(log2 n)
Option C:	O(1)
Option D:	O(n2)
8.	The data structure linked list is?
Option A:	Random access structure
Option B:	Sequential access structure
Option C:	Random and sequential both type of structure
Option D:	Other type of data structure but neither random nor sequential type structure
9.	Which type of linked list contains a pointer to the next as well as the previous node in structure?
Option A:	Singly linked list
Option B:	Doubly Linked Lists
Option C:	Circular linked list
Option D:	Priority linked list
10.	A type of queue, where insertion is allowed from both ends and deletion is allowed from only one end is called as?
Option A:	Input restricted double ended queue
Option B:	Output restricted double ended queue
Option C:	Priority queue
Option D:	Circular queue
11.	In a normal queue, insertion is done at?
Option A:	Rear
Option B:	Front
Option C:	Back
Option D:	Top
12.	How many address pointer(s) do we need to change while deleting the last node of the queue implemented using a singly linked list?
Option A:	0
Option B:	1
Option C:	2
Option D:	3
13.	After creating max-heap of the given sequence which element will be at a[7] i.e. last position in array. 87,66,10,23,45,16,72,55
Option A:	16
Option B:	45
Option C:	10
Option D:	23
14.	Depth first traversal make use of which data structure
Option A:	Tree

Option B:	DQ
Option C:	queue
Option D:	Stack
15.	Which is important property Minimum cost spanning tree satisfies
Option A:	Cycle freeness.
Option B:	Closed loops
Option C:	Weighted closed loop
Option D:	Unweighted cycle
16.	What is a almost complete binary tree?.
Option A:	Each node has exactly zero or two children
Option B:	A binary tree, which is completely filled, with the possible exception of the bottom level, which is filled from right to left
Option C:	A tree In which all nodes have degree 2
Option D:	A binary tree, which is completely filled, with the possible exception of the bottom level, which is filled from left to right
17.	Which of the following statements is not true about breadth-first search (BFS) in an undirected graph starting at a vertex v?
Option A:	BFS identifies all vertices reachable from v.
Option B:	Using an adjacency list instead of an adjacency matrix can improves the worst case complexity to O(n + m
Option C:	BFS cannot be used to check for cycles in the graph
Option D:	BFS can be used to identify the furthest vertex from v in any graph, in terms of number of edges.

18.	An undirected graph G has 100 nodes and the minimum degree of any vertex is 3. Which of the following is the most precise statement we can make about m, the number of edges in G?
Option A:	m is at least 200
Option B:	m is at least 150
Option C:	m is at least 300
Option D:	m is at least 100
19.	What is necessary condition for binary search
Option A:	Input should be sorted
Option B:	Input can be random
Option C:	Input should be random
Option D:	Input can be sorted
20.	Let the keys 75,12,8,62,83,91,15 be hashed to a hash table of size 10 using a hash function h(x) = x mod 10. How many collisions shall occur during the hashing process
Option A:	2
Option B:	1

Option C:	3
Option D:	0

Q2. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	What is stack ADT. Write an algorithm to implement a stack using an array.
B	Show with example what is collision and what are ways to handle collisions?
C	Explain the working of a double ended queue with its operations: insert, delete, display, empty, full. Proper diagrammatic representations of operations as mentioned above, are also expected.

Q3. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	What is recursion? Explain it with an example. Also state the advantages and disadvantages of Recursion.
B	Write an algorithm for Quick sort . And comment on its complexity
C	Explain what is a circular linked list along with its operations: traversing, searching, insertion and deletion. Proper diagrammatic representations are also expected. Also, write two real world applications of it.

University of Mumbai
Examination 2020 under cluster 7 (Lead College: SSJCOE)
Examinations Commencing from 15th June 2021
Program: **Information Technology**
Curriculum Scheme: Rev2016
Examination: SE Semester III

Course Code: ITC304   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.	While mapping the relationship sets, a separate relation is created for which type of cardinality?
Option A:	one to many
Option B:	many to many
Option C:	one to one
Option D:	many to one
2.	Which of the following statement is false regarding DBMS?
Option A:	Integrity constraints can be easily incorporated
Option B:	Security problems can be tackled effectively
Option C:	It is difficult to access the data using DBMS
Option D:	Concurrent access by multiple users is possible
3.	In Physical data independence one can _____
Option A:	modify the physical schema without changing logical schema
Option B:	modify the physical schema without changing view level schema
Option C:	modify the logical schema without changing physical schema
Option D:	modify the logical schema without changing view level schema
4.	Weak Entity set
Option A:	Do not have sufficient attributes
Option B:	Do not have partial key
Option C:	Do not have sufficient attributes to form primary key
Option D:	Do not have attributes at all
5.	In ER Model with three entities Person, Employee and Customer, a Person can be either Employee or Customer. This represents which constraint on Specialization?
Option A:	Disjoint
Option B:	Overlapping
Option C:	Total
Option D:	Partial
6.	Which of the following is benefit of using ER Model?
Option A:	Reduce data
Option B:	Increase number of attributes
Option C:	Exploring alternatives
Option D:	Exploring Product and process

7.	In ER Diagram, Derived Attributes are represented by
Option A:	Ellipse
Option B:	Double Ellipse
Option C:	Dashed Ellipse
Option D:	Dotted Ellipse
8.	Which of the following operation provides all possible combinations of the tuples from the left and right-side relations, as the output –
Option A:	Inner Join
Option B:	Cartesian Product
Option C:	Left Outer Join
Option D:	Set Difference (Minus)
9.	There are two relations named PG_Students and Instructors There are PG_Students who are Instructors as well as who are not Instructors. It is needed to find out PG_Students who are NOT Instructors, which is the most suitable operation to get this result –
Option A:	Set Difference or Minus
Option B:	Cartesian Product
Option C:	Union
Option D:	Intersection
10.	Which of the following statement is TRUE about the Normalization process –
Option A:	It considers common Tuples
Option B:	It's based on Functional Dependency/Primary Keys
Option C:	It increases the Anomalies
Option D:	It increases the Redundancy
11.	SQL command to remove data from table is _____
Option A:	drop table <tablename>
Option B:	delete table <tablename>
Option C:	drop from <tablename>
Option D:	delete from <tablename>
12.	If every non-key attribute is functionally dependent on the primary key, the relation will be in
Option A:	1NF
Option B:	2NF
Option C:	3NF
Option D:	BCNF
13.	Group by is used to group the tuples of a relation based on an attribute or group of attribute. It is always combined with _____
Option A:	where clause
Option B:	aggregation function
Option C:	in clause
Option D:	wild card operator
14.	Which of the following statement is TRUE, in respect of 3NF (Third Normal Form) and BCNF (Boyce-Codd Normal Form) –

Option A:	Both have identical constraints
Option B:	3NF is more stringent than BCNF
Option C:	BCNF is more stringent than 3NF
Option D:	3NF and BCNF are independent of each other
15.	The char datatype in SQL stores
Option A:	Fixed length string
Option B:	Variable length String
Option C:	Any length string
Option D:	Do not store string
16.	Which of the following statement is incorrect?
Option A:	The select clause is used to list the attributes desired in the result of a query.
Option B:	The from clause is a list of the relations to be accessed in the evaluation of the query.
Option C:	The select clause do not allow use of any special character
Option D:	The where clause is a predicate involving attributes of the relation in the
17.	Which of the following query is correct?
Option A:	Select avg(sal), company_name from works where company_name='SBI'
Option B:	Select avg(sal), company_name from works group by company_name
Option C:	Select avg(sal), company_name from works having company_name='SBI'
Option D:	Select avg(sal) from works having company_name='SBI'
18.	Hash Indices
Option A:	Are based on a sorted ordering of the values.
Option B:	Are based on numerical values only
Option C:	Are based on string type of values only
Option D:	Are based on a uniform distribution of values across a range of buckets.
19.	Sparce Index
Option A:	Impose more space for insertion and deletion
Option B:	Impose more overhead on insertions and deletions
Option C:	Requires Massive space
Option D:	Requires Less Space
20.	In hashing, overflow handling by providing overflow bucket is called as
Option A:	Overflow chaining
Option B:	Open Hashing
Option C:	Linear Probing
Option D:	Dynamic Hashing

Q2	
A	**Solve any Two** **5 marks each**
i.	Explain levels of abstraction.
ii.	Explain aggregate functions in SQL.
iii.	Explain Sparce and Dense index with example.
B	**Solve any One** **10 marks each**
i.	Draw ER diagram for Hospital Management System
ii.	Consider a relation as: CAR-SALE(Car #, Date-sold,salesman#,commission%,discount-amt) Assume that {Car#,salesman#} is the primary key. Additional dependencies are : Date-sold -> Discount-amt Salesman# ->commission% Based on the given primary key, is this relation in 1NF, 2NF or 3NF? Why or Why not? How would you successively normalize it completely?

Q3	
A	**Solve any Two** **5 marks each**
i.	Explain how various types of attributes are mapped while converting ER to relational schema.
ii.	Explain 3NF and BCNF with example.
iii.	Explain Specialization and generalization.
B	**Solve any One** **10 marks each**
i.	Explain any five relational algebra operators
ii.	Consider a relation given below and answer the queries: Location (LocationId, RegionalGroup) Department (DeptId,Name, LocationId) Employee(EmpId, LastName, FirstName, MiddleName, JobId, ManagerId, HireDate, Salary, Commission, DeptId) Queries: 1. List out first name, last name, salary, commission for all employees 2. List out the employees who are working in department 'Sales' 3. Display the employee who got the maximum salary. 4. Give all employees of 'Sales' department 20% rise 5. Write a view on above relation.

University of Mumbai
Examination June 2021
Examinations Commencing from 15th June 2021
Program: **Information Technology**
Curriculum Scheme: R2016
Examination: SE IT Semester III
Course Code: ITC305   Course Name: _Principles of Ccommunication

Time: 2 hour   Max. Marks: 80

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QP3

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The range of microwave frequency more easily passed by the atmosphere than the others is called as
Option A:	gyro frequency range
Option B:	Critical frequency
Option C:	Window
Option D:	Resonance in the atmosphere
2.	Distances near skip distance should be used for sky wave propagation
Option A:	to avoid tilting
Option B:	to prevent sky wave and upper ray interference
Option C:	to avoid faraday effect
Option D:	so as to exceed the critical frequency
3.	If the bit rate is 1200 bps and there are 4 bits for signal element then baud rate is
Option A:	4800
Option B:	1200
Option C:	400
Option D:	300
4.	Most modern MODEMs use _____for digital to analog modulation.
Option A:	ASK
Option B:	FSK
Option C:	PSK

Option D:	QAM
5.	The biggest disadvantage of PCM is
Option A:	its inability to handle analog signals
Option B:	the high error rate which its quantizing noise introduces
Option C:	its incompatibility with TDM
Option D:	the large bandwidths that are required for it
6.	Companding is used
Option A:	to overcome quarantining noise in PCM
Option B:	in PCM transmitters, to allow amplitude limited in the receivers
Option C:	to protect small signals in PCM from quantizing distortion
Option D:	in PCM receivers, to overcome impulse noise
7.	The modulation system inherently most noise-resistant is
Option A:	SSB, suppressed-carrier
Option B:	Frequency modulation
Option C:	pulse-position modulation
Option D:	pulse-code modulation
8.	Quantizing noise occurs in
Option A:	time-division multiplex
Option B:	frequency division multiplex
Option C:	pulse-code modulation
Option D:	pulse-width modulation
9.	In pulse width modulation,
Option A:	Synchronization is not required between transmitter and receiver
Option B:	Amplitude of the carrier pulse is varied
Option C:	Instantaneous power at the transmitter is constant
Option D:	Width of the carrier remains constant
10.	Calculate the minimum sampling rate to avoid aliasing when a continuous time

	signal is given by x(t) = 5 cos 400πt
Option A:	100 Hz
Option B:	200 Hz
Option C:	400 Hz
Option D:	250 Hz
11.	The spectrum of the sampled signal may be obtained without overlapping only if
Option A:	fs ≥ 2fm
Option B:	fs < 2fm
Option C:	fs > fm
Option D:	fs < fm
12.	One of the following is an indirect way of generating FM. This is the
Option A:	Reactance FET modulator
Option B:	Varactor diode modulator
Option C:	Armstrong modulator
Option D:	Reactance bipolar transistor modulator
13.	A carrier is simultaneously modulated by 2 sine waves with modulation indices of 0.3 and 0.4 . The total modulation index is
Option A:	1
Option B:	1.2
Option C:	0.5
Option D:	0.7
14.	The difference between phase and frequency modulation
Option A:	is purely theoretical because they are the same in practice
Option B:	is too great to make the two system compatible
Option C:	lies in the poorer audio response of phase modulation
Option D:	lies in the different definitions of the modulation index
15.	AM is used for broadcasting because
Option A:	It is more noise immune than other

Option B:	It requires less transmitting power
Option C:	It avoids receiver complexity
Option D:	It is less costly
16.	The modulation index of AM is changed from 0 to 1. The transmitted power is
Option A:	unchanged
Option B:	halved
Option C:	doubled
Option D:	increase by 50 percent
17.	If the carrier of 100 percent modulated AM is suppressed . the percentage power saving is
Option A:	50
Option B:	150
Option C:	100
Option D:	66.66
18.	If the plate supply voltage for the plate modulated class C amplifier is V.The max plate cathode voltage could be as high as
Option A:	4V
Option B:	3V
Option C:	2V
Option D:	1V
19.	One of the advantages of the base modulation over collector modulation of a transistor class C amplifier is
Option A:	the lower modulating power required
Option B:	higher power output per transistor
Option C:	better efficiency
Option D:	better linearity
20.	Indicate the false statement. the square of the thermal noise voltage generated by the resistor is proportional to its
Option A:	its temperature

Option B:	its resistance
Option C:	Boltzmann's constant
Option D:	Bandwidth over which is is measured

Q2	**Solve any Two Questions out of Three 10 marks each**
A	*Draw the block diagram of analog communication system and explain each block in brief.*
B	*What are sources of noises ? classify and explain various noises that affect communication.*
C	*Draw the block diagram of superhetrodyne receiver and explain each block in brief.*

Q3	**Solve any Two Questions out of Three 10 marks each**
A	*Differentiate between PAM,PWM & PPM (Atleast 5 proper points).*
B	*Explain adaptive delta modulation with suitable figures*
C	*Explain ground wave and sky wave propagation in detail ?*

University of Mumbai
Examination 2021 under cluster __ (Lead College: _)
Examinations Commencing from 10th April to 17th April 2021
Program: Information Technology
Curriculum Scheme: Rev 2019
Examination: SE Semester III
Course Code: ITC301 and Course Name: Engineering Mathematics III
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 Laplace Transform of $t.e^{at}$
Option A:	$\dfrac{1}{s}$
Option B:	$\dfrac{1}{(s-a)^2}$
Option C:	$\dfrac{1}{(s+a)^2}$
Option D:	$\dfrac{1}{s^2}$
2	Find $L\left(\dfrac{e^{-t}\sin t}{t}\right)$
Option A:	$\cot^{-1}(s+1)$
Option B:	$\tan^{-1}(s+1)$
Option C:	$\tan^{-1}(s-1)$
Option D:	$\cot^{-1}s$
3	Given $f(t)=\dfrac{\sin t}{t}$, find $L\{f'(t)\}$
Option A:	$s\cot^{-1}s$
Option B:	$s\cot^{-1}s+1$
Option C:	$\tan^{-1}s-1$
Option D:	$s\cot^{-1}s-1$
4	Find the Laplace transform of $\displaystyle\int_0^t \dfrac{\sin u}{u}du$
Option A:	$\dfrac{1}{s}\tan^{-1}s$
Option B:	$\cot^{-1}s$
Option C:	$\dfrac{1}{s}\cot^{-1}s$
Option D:	$\tan^{-1}s$

5	Find $L^{-1}\left[\dfrac{s+2}{s^2+4s+7}\right]$
Option A:	$e^{-2t}.\cos\sqrt{3}t$
Option B:	$e^{-2t}.\cos\sqrt{2}t$
Option C:	$e^{-2t}.\cos^2 t$
Option D:	$e^{-2t}.\sin\sqrt{3}t$
6	Find $L^{-1}\left[\dfrac{3s+4}{s^2+16}\right]$
Option A:	$4.\sin 4t + \cos 4t$
Option B:	$\cos 4t + \sin 3t$
Option C:	$3.\cos 4t + \sin 4t$
Option D:	$\sin 3t + \cos 4t$
7	Find the Inverse Laplace transform of $\dfrac{1}{s.(s+a)}$
Option A:	$\dfrac{1+e^{-at}}{a}$
Option B:	e^{-at}
Option C:	$e^{-at}+1$
Option D:	$\dfrac{1-e^{-at}}{a}$
8	If $L\{f_1(t)\}=F_1(s)$ and $L\{f_2(t)\}=F_2(s)$ then by Convolution theorem $L^{-1}\left[F_1(s)*F_2(s)\right]$
Option A:	$\displaystyle\int_0^\infty f_1(u)\cdot f_2(t-u)\,du$
Option B:	$\displaystyle\int_0^t f_1(u)\cdot f_2(u)\,du$
Option C:	$\displaystyle\int_0^t f_1(u)\cdot f_2(t-u)\,du$
Option D:	$\displaystyle\int_0^\infty f_1(u)\cdot f_2(u)\,du$
9	In half range *sine* Fourier series, we assume the function to be
Option A:	Odd function
Option B:	Even function
Option C:	Can't be determined
Option D:	Can be anything

10	The Fourier co-efficient a_n for the function $f(x) = x^2$ in $(0, 2\pi)$ is given by
Option A:	$\dfrac{n}{4\pi}$
Option B:	$\dfrac{3\pi}{n^2}$
Option C:	$\dfrac{4\pi}{n}$
Option D:	$\dfrac{3\pi}{n^3}$
11	If $f(x) = \cos x$ defined in $(-\pi, \pi)$ then the value Fourier coefficient b_n is
Option A:	0
Option B:	π
Option C:	$\dfrac{\pi}{(n^2 - 1)}$
Option D:	$\dfrac{2\pi}{(n^2 - 1)}[(-1)^n - 1]$
12	If $f(z) = e^z$ is an analytic function, then real part is given by
Option A:	$e^x \cos y$
Option B:	$\cos y$
Option C:	$-e^x \sin y$
Option D:	$\sin y$
13	A function $u(x, y)$ is harmonic if and only if,
Option A:	$u_{xx} + u_{yy} = 0$
Option B:	$u_x + u_y = 0$
Option C:	$u_{xy} + u_{yx} = 0$
Option D:	$u_x - u_y = 0$
14	If $f(z)$ is an analytic and $\lvert f(z) \rvert$ is constant, then $f(z)$ is
Option A:	Harmonic
Option B:	constant
Option C:	orthogonal
Option D:	conjugate
15	A random variable X has probability distribution with E(X)=1.5, E(X²)=3 then then variance is
Option A:	0.75
Option B:	1.5
Option C:	3
Option D:	5.25

16	A continuous random variable X has the probability density function $f(x) = kx^2$, $0 \le x \le 2$. Determine k
Option A:	$\dfrac{5}{8}$
Option B:	$\dfrac{2}{8}$
Option C:	$\dfrac{8}{3}$
Option D:	$\dfrac{3}{8}$
17	If X_1 has mean 4 and variance 9 and X_2 has mean -2 variance 4, and the two are independent, find $V(2X_1 + X_2 - 3)$
Option A:	3
Option B:	41
Option C:	14
Option D:	36
18	The limits for coefficient of correlation are
Option A:	$-1 \le r \le 2$.
Option B:	$-1 \le r \le 0$.
Option C:	$-1 \le r \le 1$.
Option D:	$0 \le r \le 1$.
19	If $b_{yx} = 0.7764$, $b_{xy} = 1.2321$ then coefficient of correlation
Option A:	0.9781
Option B:	0.6291
Option C:	1.2307
Option D:	0.0023
20	If the tangent of the angle made by the line of regression of y on x is 0.6 and $\sigma_y = 2\sigma_x$, find the correlation coefficient between x and y.
Option A:	$r = 0.25$
Option B:	$r = 0.15$
Option C:	$r = 0.2$
Option D:	$r = 0.3$

Subjective / Descriptive questions

Q2 (20 Marks)	Solve any Four out of Six. 5 marks each
A	Find the Laplace transform of $\cos t.\cos 2t.\cos 3t$
B	Using convolution theorem find the Inverse Laplace transform of $\dfrac{s^2}{\left(s^2+a^2\right)^2}$
C	Find the Fourier expansion of $f(x)=x+x^2$; $-\pi \le x \le \pi$ and $f(x+2\pi)=f(x)$
D	Find k & then $E(X)$, if X has the probability density function $$f(x)=\begin{cases} kx(2-x), & 0\le x\le 2, k>0 \\ 0, & otherwise \end{cases}$$
E	Find an analytic function $f(z)$ whose imaginary part is $e^{-x}\left(y\sin y+x\cos y\right)$
F	Obtain the rank correlation coefficient from the following data X : 10, 12, 18, 18, 15, 40 Y : 12, 18, 25, 25, 50, 25

Q3 (20 Marks)	Solve any Four out of Six. 5 marks each
A	By using Laplace transform, evaluate $\displaystyle\int_0^\infty e^{-t}\left(\dfrac{\cos 3t-\cos 2t}{t}\right).dt$
B	Find the inverse Laplace transform of $\tan^{-1}\left(\dfrac{2}{s^2}\right)$
C	Find the orthogonal trajectory of the family of curves $x^3 y-xy^3=c$
D	A random variable X has the following probability function X : 1 2 3 4 5 6 7 $P(X=x)$: k $2k$ $3k$ k^2 k^2+k $2k^2$ $4k^2$ Find i) k and ii) $P(X<5)$
E	Obtain the expansion of $f(x)=x(\pi-x)$; $0<x<\pi$ as a half-range cosine series.
F	Fit a straight line of the form $y=a+bx$ to the following data & estimate the value of y for $x=3.5$ x : 0 1 2 3 4 y : 1 1.8 3.3 4.5 6.3

University of Mumbai
Examination 2020 under cluster 7(Lead College: SSJCOE)
Examinations Commencing from 15th June 2021 to 24th June 2021

Program: **Information Technology**
Curriculum Scheme: Rev 2019
Examination: SE Semester III
Course Code: ITC302 and Course Name: Data Structure and Analysis

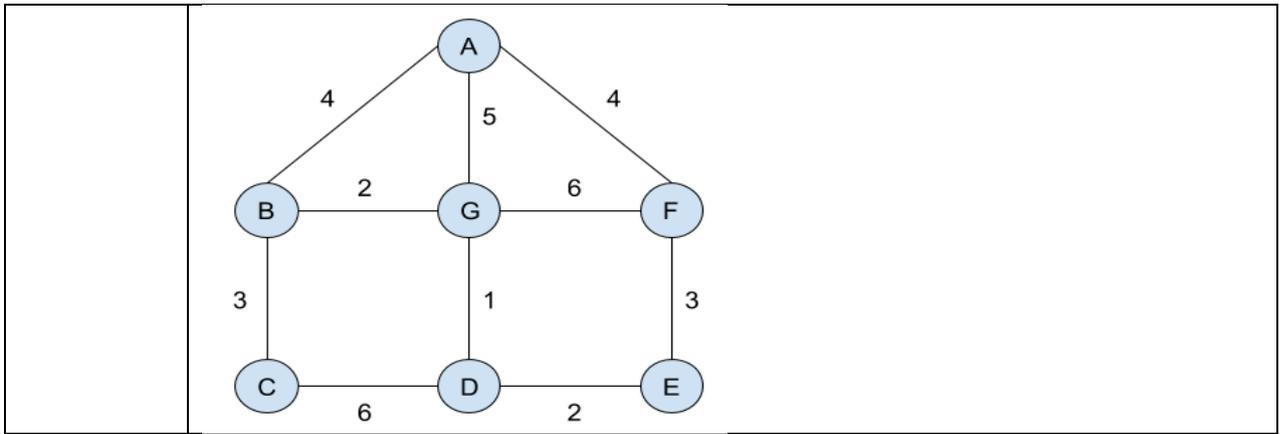Time: 2 hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Given two statements: (i) Insertion of an element should be done at the last node in a circular linked list. (ii) Deletion of an element should be done at the last node in a circular linked list.
Option A:	Both are True
Option B:	Both are False
Option C:	First is True and second is False
Option D:	First is False and second is True
2.	To free which of the following list, traversing through the entire list is not necessary?
Option A:	Priority list
Option B:	Singly linked list
Option C:	Doubly linked list
Option D:	Both Singly linked list and Doubly linked list
3.	Stack cannot be used to?
Option A:	Evaluate an arithmetic expression in postfix form
Option B:	Implement recursion
Option C:	Convert a given arithmetic expression infix form to its equivalent postfix form
Option D:	Allocate resources (like CPU) by the operating system
4.	Which of the following is useful in implementing quick sort?
Option A:	stack
Option B:	graph
Option C:	array
Option D:	queue
5.	AVL Tree takes _____ time to perform insertion and deletion operation.
Option A:	$O(n)$
Option B:	$O(n^2)$
Option C:	$O(\log_2 n)$
Option D:	$O(n\log_2 n)$
6.	What is the Preorder Traversal of a Binary tree if its Inorder traversal is DBEAC and Postorder traversal is DEBCA?
Option A:	ABEDC
Option B:	ABDEC

Option C:	DACBE
Option D:	CABDE
7.	What is the height of a constructed Binary Search Tree if elements 56, 12, 20, 22, 85, 73, 87 are inserted in an empty Binary Search tree as per given order?
Option A:	6
Option B:	2
Option C:	4
Option D:	3
8.	The number of nodes in Full Binary Tree at level L are:
Option A:	2^L-1
Option B:	2^L
Option C:	2^L+1
Option D:	L+1
9.	A connected graph is the one which
Option A:	cannot be partitioned without removing an edge
Option B:	contains at least 3 loops
Option C:	does not contain a cycle
Option D:	is not simple
10.	In breadth first search, if the branching factor of the graph is 'b' and the depth of the graph is 'd', then the space complexity is
Option A:	O(b^d)
Option B:	O(b+d-1)
Option C:	O(b*d)
Option D:	O(b+d)
11.	If in a directed graph, there exists a path between each pair of its vertices, then it is called
Option A:	strongly connected
Option B:	weakly connected
Option C:	asymmetric graph
Option D:	Hamiltonian graph
12.	int fact(int n) { if(n==0) return 1; else return n*fact(n-1); } in this code if main() calls fact(4) then how many times a recursive call will be made?
Option A:	6
Option B:	5
Option C:	4
Option D:	3
13.	Which of the methods traverses the free block list and allocates a memory block, from the free blocks, that is largest in size?
Option A:	Free fit
Option B:	First fit
Option C:	Best fit

Option D:	Worst fit
14.	Which of the following methods will suffer from external fragmentation?
Option A:	Allocating the first free block that is large enough to fulfill the request
Option B:	Traversing the whole free memory list and allocating the block which is closest in size of memory requested
Option C:	Allocating the free block largest in size
Option D:	Allocating the block in the multiple of fixed size
15.	In the best case of the linear search algorithm, how many comparisons will be made, in case the data set contains N elements?
Option A:	0
Option B:	1
Option C:	N-1
Option D:	N
16.	If the data set is {123, 12, 23, 22, 54, 56, 45}, and storage size is 7, where indexing starts from 1 then in hashing with "truncation by left 1", how many collisions will occur?
Option A:	0
Option B:	1
Option C:	2
Option D:	3
17.	If the data set is {123, 12, 23, 22, 54, 56, 45}, after the first iteration what will be the updated data set in the quick sort algorithm if pivot is considered as the last element?
Option A:	{12, 23, 22, 45, 54, 56, 123}
Option B:	{12, 23, 22, 45, 123, 54, 56}
Option C:	{12, 22, 23, 45, 54, 56, 123}
Option D:	{12, 23, 22, 45, 56, 54, 123}
18.	What is Postfix Expression of given Infix Expression L+(M/(A-B)*C)?
Option A:	LMAB-C/*+
Option B:	LMAB-/C*+
Option C:	LMAB-/C+*
Option D:	LMAB-C+/*
19.	Heap can also be used to implement _____
Option A:	Stack
Option B:	Priority Queue
Option C:	Double Ended Queue
Option D:	An ascending order Array
20.	What is time required to find out the degree of any vertex in Undirected Graph G with n vertices and e edges and G is represented by the Adjacency Matrix?
Option A:	$O(n^2)$
Option B:	$O(n+e)$
Option C:	$O(n)$
Option D:	$O(e)$

Q2	**Total 20 marks.**
Q2A	**Solve any Two, 5 marks each, total 10 marks.**
i.	Explain the Quick sort algorithm along with a working example.
ii.	Write Inorder Traversal, Preorder Traversal and Postorder Traversal sequence for given binary tree by giving its algorithm.
iii.	Solve stepwise to convert the expression to Prefix notation. (x*y)+(z+((a+b-c)*d))- i*(j/k)
Q2B	**Solve any One, 10 marks each, total 10 marks.**
i.	Explain what is a Circular linked list along with its operations: traversing, searching, insertion and deletion. Proper diagrammatic representations are also expected. Also, write two real world applications of it.
ii.	Define an AVL Tree. Construct an AVL tree for the following dataset: 23, 28, 32, 11, 6, 16, 30, 20, 17, 12, 4, 5, 9 Mention the rotations, if any, at each step.

Q3	**Total 20 marks.**
Q3A	**Solve any Two, 5 marks each, total 10 marks.**
i.	Generate a Huffman Tree for the string **BBAEDAFCBA**. At the end specify the Huffman code for each character in the given string. Specify how much memory bits are saved from the original, if 8 bits per character are required to store the string in original format.
ii.	With example, explain how the Binary Buddy System in the storage management allocates free memory blocks upon request and keeps track of free blocks after the process frees allocated memory block.
iii.	What Collision in hashing with an example? Explain the methods to resolve collision. What is Quadratic Probing with an example?
Q3B	**Solve any One, 10 marks each, total 10 marks.**
i.	Explain the working of priority queue with its operations: insert, delete, display, empty, full. Proper diagrammatic representations of operations as mentioned above, are also expected. Also, write two applications (algorithms) where priority queue data structure is used.
ii.	Write Prim's algorithm and Kruskal's algorithm to find Minimum Spanning Tree (MST). Also for the given graph below, find the MST using Prim's algorithm and Kruskal's algorithm, both. Specify the cost at each step, and total weight.

A

4 5 4

B 2 G 6 F

3 1 3

C 6 D 2 E

University of Mumbai
Examination June 2021
Examinations Commencing from 15th June to 24th June 2021
Program: **Information Technology**
Curriculum Scheme: Rev2019
Examination: SE (DSE) Semester III

Course Code:ITC303   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.	Considering the constraints of generalization and specialization the constraints of disjoints and completeness is usually
Option A:	independent
Option B:	dependent
Option C:	not calculated
Option D:	undefined
2.	Every weak entity set can be converted into strong entity set by
Option A:	Using generalization
Option B:	adding appropriate attribute
Option C:	Using aggregation
Option D:	Using Specialization
3.	In an ER diagram simple attributes are represented by ------ and derived attributes are represented by ------.
Option A:	ellipse, dashed ellipse
Option B:	dashed ellipse, double ellipse
Option C:	ellipse, double ellipse
Option D:	dashed ellipse, ellipse
4.	In relation schema of binary relationship set with one to one mapping cardinality, the primary key is created Using
Option A:	Primary Keys of both participating entity sets
Option B:	Primary key of entity set pointing towards one side
Option C:	Primary key of entity set pointing towards many side
Option D:	Primary key of any one participating entity set
5.	Cardinality represents
Option A:	Number of constraints
Option B:	Number of tuples.
Option C:	Number of tables
Option D:	Number of attributes
6.	Consider R1 and R2 as input relations.The relational algebra operation -------- produces the relation that has the attributes of R1 and R2 in it.
Option A:	Cartesian product
Option B:	Difference

Option C:	Intersection
Option D:	Product
7.	Which operation on relation X produces relation Y, such that Y contains only selected tuples of X
Option A:	projection
Option B:	intersection
Option C:	selection
Option D:	union
8.	If E1 and E2 are relational algebra expressions. Then which of the following is not a relational algebra expression?
Option A:	E1 / E2
Option B:	E1 X E2
Option C:	E1 U E2
Option D:	E1 - E2
9.	Using Relational Algebra the query that finds customers, who have a balance below 1000 is
Option A:	Π Customer_name(σ balance <1000(Deposit))
Option B:	σ Customer_name(Π balance <1000(Deposit))
Option C:	Π Customer_name(σ balance <1000(Borrow))
Option D:	σ Customer_name(Π balance <1000(Borrow))
10.	In relational algebra, intersection is_____ operator and rename is _____operator .
Option A:	unary , unary
Option B:	binary , unary
Option C:	binary , binary
Option D:	unary , binary
11.	which of the following displays the unique values of the column? SELECT _____ dept_name FROM instructor;
Option A:	All
Option B:	From
Option C:	Distinct
Option D:	Name
12.	Which operator test column for the absence of data?
Option A:	EXISTS operator
Option B:	NOT operator
Option C:	IS NULL operator
Option D:	LIKE operator
13.	Which of the following statements contains an error ?
Option A:	Select empid where empid = 1009 and lastname = 'GELLER';
Option B:	Select empid from emp;
Option C:	Select empid from emp where empid = 10006;
Option D:	Select * from emp where empid = 10003;

14.	SELECT course_id FROM physics_fall_2009 WHERE building= 'Watson'; Here the tuples are selected from the view. Which one denotes the view.
Option A:	Course_id
Option B:	Watson
Option C:	Building
Option D:	physics_fall_2009
15.	In SQL,------ creates a virtual relation .
Option A:	Function
Option B:	Procedure
Option C:	View
Option D:	Cursor
16.	In SQL, for adding new attribute A with domain D to an existing relation r, which of the following command is used ?
Option A:	alter table r add A
Option B:	alter table r add A D
Option C:	update table r add A
Option D:	update table r add A D
17.	B in BCNF stands for-
Option A:	Bouston
Option B:	Bold
Option C:	Back
Option D:	Boyce
18.	Third Normal Form has the requirement of-
Option A:	Transitive Dependency
Option B:	Multivalued Dependency
Option C:	Trivial Functional Dependency
Option D:	Non-Trivial Functional Dependency
19.	Which normal form has the requirement: Every non-prime attribute is fully functionally dependent on every key of R.
Option A:	1NF
Option B:	2NF
Option C:	3NF
Option D:	BCNF
20.	The notation A-> B is used to denote
Option A:	Non-transitive dependency
Option B:	Transitive dependency
Option C:	Functional dependency
Option D:	Reflexive dependency

Q2 (20 Marks)	Solve any Four out of Six 5 marks each
A	Design an ER diagram for education databases that contains information about an inhouse company education training scheme. The relevant relations are course(course_no, title) offering(course_no, offer_no, off_date, location) teacher(coure_no, offer_no, emp_no) enrolment(course_no, off_no, stud_no, grade) employee(emp_no, emp_name, job) student(stud_no, stud_name, ph_no)
B	Explain with example any two Fundamental Operations in Relational Algebra.
C	What is JOIN? Differentiate between Left and Right outer join with examples.
D	Consider the following relations for a book club: Members(Member-Id, Name, Designation, Age) Books(Book-Id , Booktitle, BookAuthor, Bookpublisher, Bookprice) Reserves(Member-Id, Book-Id, Date) Write SQL queries for following statements. (i) Find the names of members who are professors older than 50 years. (ii) List the titles of books reserved by professors.
E	Explain the following. i) DCL ii) DML
F	Define Boyce-Codd normal form. How does it differ from 3NF?

Q3. (20 Marks)	Solve any Four out of Six 5 marks each
A	Differentiate Strong and weak entities .
B	Explain Generalization & specialization with suitable examples.
C	Explain the following Relational algebra operations with suitable examples. (i)Set Difference (ii) Division
D	What are aggregate functions in SQL? Explain any two with examples.
E	Explain with example any two integrity constraints in SQL .
F	What is Normalization ? Justify its need.

University of Mumbai
Examination 2020 under cluster 7 (Lead College: SSJCOE)
Examinations Commencing from 15th June 2021 to 24th June 2021

Program: **Information Technology**
Curriculum Scheme: Rev-2019

Examination: SE   Semester III
Course Code: ITC303   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.	In the architecture of a database system external level is the_____level
Option A:	conceptual
Option B:	physical
Option C:	logical
Option D:	view
2.	___is not an Schema.
Option A:	Database Schema
Option B:	Physical Schema
Option C:	Logical Schema
Option D:	Critical Schema
3.	An entity set that does not have sufficient attributes to form a primary key is called _____.
Option A:	strong entity set
Option B:	weak entity set
Option C:	simple entity set
Option D:	primary entity set
4.	Considering the constraints of generalization and specialization the constraints of disjoints and completeness is usually
Option A:	independent
Option B:	dependent
Option C:	not calculated
Option D:	undefined
5.	Cardinality is termed as
Option A:	Number of tuples.
Option B:	Number of tables
Option C:	Number of attributes.
Option D:	Number of constraints.

6.	Which operation of relation X produces Y, such that Y contains only selected attributes of X ?
Option A:	projection
Option B:	intersection
Option C:	difference
Option D:	union
7.	Using Relational Algebra the query that finds customers, who have a balance of over 1000 is
Option A:	Π Customer_name(σ balance >1000(Deposit))
Option B:	σ Customer_name(Π balance >1000(Deposit))
Option C:	Π Customer_name(σ balance >1000(Borrow))
Option D:	σ Customer_name(Π balance >1000(Borrow))
8.	SELECT * FROM employee WHERE salary>10000 AND dept_id=101; Which of the following fields are displayed as output?
Option A:	Salary,dept_id
Option B:	Employee
Option C:	Salary
Option D:	All the field of employee relation
9.	Which of the following statements contains an error ?
Option A:	Select * from emp where empid = 10003;
Option B:	Select empid from emp where empid = 10006;
Option C:	Select empid from emp;
Option D:	Select empid where empid = 1009 and lastname = 'GELLER';
10.	SELECT course_id FROM physics_fall_2009 WHERE building= 'Watson'; Here the tuples are selected from the view. Which one denotes the view.
Option A:	Course_id
Option B:	Watson
Option C:	Building
Option D:	physics_fall_2009
11.	Which of the following creates a virtual relation for storing the query?
Option A:	Function
Option B:	Procedure
Option C:	View
Option D:	Cursor
12.	Which operator test column for the absence of data?
Option A:	EXISTS operator
Option B:	NOT operator
Option C:	IS NULL operator
Option D:	LIKE operator

13.	Which Normal form has the requirement of atomic attribute?
Option A:	2 NF
Option B:	3 NF
Option C:	BCNF
Option D:	1 NF
14.	A functional dependency of the form A→ B is trivial if –
Option A:	$B \subseteq B$
Option B:	$B \subseteq A$
Option C:	$A \subseteq B$
Option D:	$A \subseteq A$
15.	Which process is performed by the normalization to remove data redundancy from relations?
Option A:	Merge relations into one
Option B:	Add new columns in existing relations
Option C:	Remove columns from existing relations
Option D:	Decompose relations into smaller relations
16.	Which normal form has the requirement: Every non-prime attribute is fully functionally dependent on every key of R.
Option A:	1NF
Option B:	2NF
Option C:	3NF
Option D:	BCNF
17.	What is the requirement of the Atomicity property of Transaction?
Option A:	Execute operations completely
Option B:	Execute all operations or none at all
Option C:	Execute operations partially
Option D:	Execute some operations only
18.	Which component of DBMS handles the database consistency?
Option A:	Transaction Manager
Option B:	Authorization & Integrity manager
Option C:	Concurrency-control manager
Option D:	Buffer Manager
19.	Which component of DBMS handles the grant of locks on data items?
Option A:	Transaction Manager
Option B:	Concurrency-control manager
Option C:	File Manager
Option D:	Buffer Manager
20.	Which of the following systems is responsible for ensuring isolation?
Option A:	Recovery system
Option B:	Atomic system
Option C:	Concurrency control system
Option D:	Compiler system

Q2 (20 Marks)	Solve any Four out of Six 5 marks each
A	Discuss the advantages of DBMS over the File system.
B	Define derived attribute. State the need with suitable example.
C	Explain the following Relational algebra operations withsyntax and query. (i)Set Intersection (ii) Union.
D	Define (i) DDL (ii) DML. Illustrate each with a suitable example.
E	Consider the following relation. | A	B	C	Tuple#
---	---	---	---
10	b1	C1	#1
10	b2	C2	#2
11	b4	C1	#3
12	b3	C4	#4
13	b1	C1	#5
14	b3	C4	#6	 Given the previous state, which of the following dependencies may hold in above relation?If dependency cannot hold explain why by specifying the tuples that cause the violation. 1)A->B 2)B->C .
F	Draw and explain transaction state diagrams.

Q3 (20 Marks)	Solve any Four out of Six 5 marks each
A	Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. Convert this E-R diagram into a schema.
B	Differentiate view and conflict serializability.
C	What are different types of Join? Explain any two with examples.
D	What is Functional Dependency?Define different types of it.
E	Consider the following relations for a book club: Members(Member-Id, Name, Designation, Age) Books(Book-Id , Book Title, BookAuthor, Bookpublisher, Book Price) Reserves(Member-Id, Book-Id, Date) Write SQL queries for following statements. (i) Find the names of members who are professors older than 50 years.(ii) List the titles of books reserved by professors.
F	Justify the need of DBMS in Banking and Airlines.

University of Mumbai
Examination 2021 under cluster 7(Lead College: SSJCOE)
Examination Commencing from 15th June 2021 to 24th June 2021

Program: **Information Technology**
Curriculum Scheme: Rev2019
Examination: SE Semester III (DSE)
Course Code: ITC304 and Course Name: Principle of Communication

Time: 2 hour   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	What is the upper frequency of a signal with a bandwidth of 10MHz, if the lower frequency limit is 54MHz?
Option A:	64MHz
Option B:	48MHz
Option C:	84MHz
Option D:	48Hz
2.	Which of the following has a minimum wavelength?
Option A:	Gamma rays
Option B:	Blue light
Option C:	Infrared rays
Option D:	Microwave
3.	Medium which sends information from source to receiver is called _____
Option A:	Transmitter
Option B:	Transducer
Option C:	Loudspeaker
Option D:	Channel
4.	What is the wavelength of a signal with a frequency of 150MHz?
Option A:	10m
Option B:	2m
Option C:	5m
Option D:	20m
5.	Which one of the following channels has higher data rates as compared to the other wired communication channels?
Option A:	Coaxial cable channel
Option B:	Shielded Twisted pair cable channel
Option C:	Optical fiber channel
Option D:	Unshielded Twisted pair cable channel
6.	Thermal noise is also called as
Option A:	Johnson Noise
Option B:	Partition Noise
Option C:	Flicker Noise
Option D:	Solar Noise

7.	Which of the following is one of the types of Internal Noise?
Option A:	Atmospheric Noise
Option B:	Industrial Noise
Option C:	Extraterrestrial Noise
Option D:	Thermal Noise
8.	Periodic signal is……
Option A:	The signals which change with time
Option B:	The signals which change with frequency
Option C:	The signals that repeat itself over a fixed frequency
Option D:	The signal that repeats itself in time
9.	An amplifier has a noise figure of 10 dB. What is the Noise Factor?
Option A:	1
Option B:	10
Option C:	100
Option D:	1000
10.	White noise has _____ power spectral density.
Option A:	Constant
Option B:	Variable
Option C:	Flickering
Option D:	Fluctuating
11.	Which one of the following is not the Analog modulation system?
Option A:	PAM
Option B:	FM
Option C:	PWM
Option D:	PCM
12.	A broadcast radio transmitter radiates 5kW power when the modulation percentage is 60%. What is the carrier power?
Option A:	10.75kW
Option B:	4.237kW
Option C:	1kW
Option D:	8kW
13.	The modulation index of AM is defined as---
Option A:	The ratio of amplitudes of the modulating and carrier wave
Option B:	The ratio of amplitudes of the carrier and modulating wave
Option C:	The ratio of frequencies of the modulating and carrier wave
Option D:	The ratio of frequencies of the carrier and modulating wave
14.	The Intermediate Frequency of the Super Heterodyne receiver is………. [Where f_o is the Local oscillator frequency and f_s is the RF amplifier frequency)
Option A:	f_o-f_s
Option B:	f_sxf_o
Option C:	f_s+f_o
Option D:	f_o/f_s

15.	The artificial boosting of higher modulating frequencies is called as…….
Option A:	De-emphasis
Option B:	Pre-emphasis
Option C:	Diagonal clipping
Option D:	Negative peak clipping
16.	A carrier is frequency modulated with a sinusoidal signal of 2kHz resulting in a maximum frequency deviation of 5 kHz. Find the bandwidth of the modulated signal.
Option A:	10 kHz
Option B:	20 kHz
Option C:	14 kHz
Option D:	28 kHz.
17.	The frequency deviation of FM is……
Option A:	$m_f \times f_m$
Option B:	$f_c + f_m$
Option C:	m_f / f_m
Option D:	f_c / f_m
18.	The Bandwidth of DSBFC AM is…….
Option A:	$4f_m$
Option B:	$2f_m$
Option C:	$3f_m$
Option D:	f_m
19.	The Intermediate frequency used for AM receiver is…..
Option A:	455 MHz
Option B:	455 KHz
Option C:	455 Hz
Option D:	905 KHz
20.	The ability of a receiver to reject unwanted signal is called……..
Option A:	Fidelity
Option B:	Amplification
Option C:	Selectivity
Option D:	Sensitivity

Q2 (20 Marks)	Solve any Two Questions out of Three 10 marks each
A	(i) Derive the Friiss formula. (ii) For three cascaded amplifier stages, each with noise figure of 3 dB and power gain of 10 dB, determine the overall noise figure(in dB).
B	(i) Derive the expression of AM. (ii) A sinusoidal carrier has amplitude of 10V and a frequency of 100 kHz. It is amplitude modulated by a sinusoidal voltage of amplitude 3V and

	frequency 500 Hz. Modulated voltage is developed across 75 Ohms resistance. Write the equation for the modulated wave.
C	Explain the working of Ratio detector and compare its performance with Foster Seeley Discriminator.

Q3 **(20 Marks)**	**Solve any Two Questions out of Three 10 marks each**
A	State and prove the time shifting property and frequency shifting property of the Fourier Transform.
B	Explain Super heterodyne receiver with neat block diagram and compare its performance with TRF receiver.
C	A 25 MHz carrier is modulated by a 400 Hz audio sine wave. If the carrier voltage is 4V and maximum deviation is 10 KHz. Write the equation of modulated wave for FM. If the modulating frequency is now changed to 2 KHz, all else remaining constant , derive the new equation for FM.

University of Mumbai
Examination 2020 under cluster 7(Lead College: SSJCOE)
Examinations Commencing from 15th June 2021 to 24th June 2021
Program: **Information Technology**
Curriculum Scheme: Rev2019
Examination: SE Semester-III
Course Code: ITC 304 and Course Name: Principle of Communication

Time: 2 hour   Max. Marks: 80

==

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	What is the upper frequency of a signal with a bandwidth of 10MHz, if the lower frequency limit is 54MHz?
Option A:	64MHz
Option B:	48MHz
Option C:	84MHz
Option D:	48Hz
2.	Which one of the following channels has higher data rates as compared to the other wired communication channels?
Option A:	Coaxial cable channel
Option B:	Shielded Twisted pair cable channel
Option C:	Optical fiber channel
Option D:	Unshielded Twisted pair cable channel
3.	Which one of the following is not the Analog modulation system?
Option A:	PAM
Option B:	FM
Option C:	PWM
Option D:	PCM
4.	An amplifier has a noise figure of 3 dB. What is its equivalent temperature?
Option A:	600^0K
Option B:	300^0K
Option C:	400^0K
Option D:	500^0K
5.	The expression for the rms value of the thermal noise voltage is--------
Option A:	kTB
Option B:	Sqrt(4kTBR)
Option C:	4kTB
Option D:	4kTRB
6.	Which one of the following is one of the types of Internal Noise?
Option A:	Atmospheric Noise

Option B:	Industrial Noise
Option C:	Extraterrestrial Noise
Option D:	Thermal Noise
7.	A broadcast radio transmitter radiates 5kW power when the modulation percentage is 60%. What is the carrier power?
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Option B:	The ratio of amplitudes of the carrier and modulating wave
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Option D:	The ratio of frequencies of the carrier and modulating wave
9.	The Intermediate Frequency of the Super Heterodyne receiver is………. [Where f_o is the Local oscillator frequency and f_s is the RF amplifier frequency)
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Option B:	f_sxf_o
Option C:	f_s+f_o
Option D:	f_o/f_s
10.	The artificial boosting of higher modulating frequencies is called as…….
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Option B:	Pre-emphasis
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Option D:	Negative peak clipping
11.	A carrier is frequency modulated with a sinusoidal signal of 2kHz resulting in a maximum frequency deviation of 5 kHz. Find the bandwidth of the modulated signal.
Option A:	10 kHz
Option B:	20 kHz
Option C:	14 kHz
Option D:	28 kHz.
12.	The frequency deviation of FM is……
Option A:	m_f x f_m
Option B:	f_c+f_m
Option C:	m_f / f_m
Option D:	f_c / f_m
13.	Aliasing error occurs when…..
Option A:	f_s=2f_m
Option B:	f_s=4f_m
Option C:	f_s<2f_m
Option D:	f_s>2f_m

14.	The Step size varies in one of the following modulation systems.
Option A:	Pulse Code Modulation
Option B:	Delta Modulation
Option C:	Adaptive Delta Modulation
Option D:	Pulse Amplitude Modulation
15.	Which one of the following is not the essential operation in PCM transmitter?
Option A:	Sampling
Option B:	Quatizing
Option C:	Encoding
Option D:	Decoding
16.	The Inter symbol interference and its effects on various communication systems are studied by using……
Option A:	Modulator
Option B:	Demodulator
Option C:	Comparator
Option D:	Eye Pattern
17.	The cross talk is severe in one of the following techniques
Option A:	Frequency Division Multiplexing
Option B:	Time Division Multiplexing
Option C:	Amplitude Modulation
Option D:	Pulse Amplitude Modulation.
18.	Noise immunity is low in one of the following modulation techniques
Option A:	BASK
Option B:	BPSK
Option C:	BFSK
Option D:	QPSK
19.	The redistribution or modulation of energy within a wave front, when it passes near the edges of an opaque object is defined as………..
Option A:	Reflection
Option B:	Refraction
Option C:	Diffraction
Option D:	Interference
20.	In which of the following propagation, the waves travel along the surface of the earth?
Option A:	Sky Wave Propagation
Option B:	Space Wave Propagation
Option C:	Ground Wave Propagation
Option D:	Tropospheric Scatter Propagation

Q2. **(20 Marks)**	**Solve any Two Questions out of Three 10 marks each**

A	Derive the expression for Friss formula for two stage cascade Amplifier. For three cascaded amplifier stages, each with noise figure of 3 dB and power gain of 10dB, determine the overall noise figure.
B	Derive the mathematical expression for Amplitude modulation and also draw the waveforms for m<1, m>1 and m=1.
C	Explain the generation of PPM signal with neat block diagram and also compare PPM with PAM and PWM.

Q3. **(20 Marks)**	**Solve any Two Questions out of Three 10 marks each**
A	Draw and explain the Foster seeley discriminator with neat diagram.
B	Explain BASK Generation and Detection with neat block diagram and waveforms.
C	Explain the principle of Sky wave propagation and its layers and also explain Virtual height.

University of Mumbai
Examination 2021 under cluster 7 (Lead College: SSJCOE)
Examinations Commencing from 15th June 2021 to 24th June 2021
Program: **Information Technology**
Curriculum Scheme: Rev2019
Examination: DSE (Reduced Syllabus) (REV-2019 'C' Scheme) KT.
Course Code: ITC305 and Course Name: Paradigms and Computer Programming Fundamentals
Time: 2 hour   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following is **NOT** a correct syntax for a type signature of a Haskell function ?
Option A:	sort :: [a] -> [a]
Option B:	sort :: Ord [a] -> Ord [a]
Option C:	sort :: (Num a, Ord a) => [a] -> [a]
Option D:	sort :: Ord a => [a] -> [a]
2.	Following Image 1 shows predicates defined in two distinct prolog files KB1 and KB2 Which of the following statements is true about the above two Kbs

```
KB-1:
edge(a,b).
edge(b,c).
path(X, X).
path(X, Y) :- edge(Z, Y), path(X, Z).

KB-2:
edge(a,b).
edge(b,c).
path(X, Y) :- path(X, Z),edge(Z, Y).
path(X, X).
```

Image 1

Option A:	Query path(a,a) will evaluate as true in both KBs
Option B:	Query path(a,a) will evaluate as false in both KBs
Option C:	Query path(a,a) will evaluate as true in KB-1 and false in KB-2
Option D:	Query path(a,a) will evaluate as true in KB-1 and will not terminate in KB-2

3.	_____ is the process of associating names to a much complicated programming fragment, so that it (the programming fragment) can be thought in terms of its functionality or purpose rather than how actually the functionality is carried out.
Option A:	Recursion
Option B:	Abstraction
Option C:	Repetition
Option D:	Inclusion
4.	Object lifetimes generally correspond to one of three principal storage allocation mechanism. Which of the following is **not** a principal storage allocation mechanism.
Option A:	Static
Option B:	Random Access
Option C:	Stack
Option D:	Heap
5.	Following Image 2 shows a knowledge base. takes(sujay, ME201). takes(sujay, ITC305). takes(abhay, ME302). takes(abhay, ITC305). classmates(X, Y) :- takes(X, Z), takes(Y, Z). Image 2 Which of the following is correct re-declaration of predicate "**classmate**" that will never result in attributing a student to be his/her own classmate. e.g. we do not want the query **"classmates(sujay, sujay)"** to evaluate as **true**.
Option A:	No change in 'classmates' predicate declaration is required.
Option B:	This can't be achieved by only changing the predicate 'classmates'.
Option C:	New declaration of 'classmates' will be: classmates(X, Y) :- takes(X, Z), takes(Y, Z), X \= Y.
Option D:	New declaration of 'classmates' will be: classmates(X, Y) :- X \= Y, takes(X, Z), takes(Y, Z).
6.	In Prolog,backward chaining search strategy starts with ____
Option A:	existing clauses

Option B:	goal
Option C:	first clauses
Option D:	last clause
7.	Translation of high-level language to assembly or machine language is the job of a system program known as a _____.
Option A:	compiler.
Option B:	converter
Option C:	processor
Option D:	composer
8.	Consider following Haskell Function is loaded in ghci session:

```
myFun t mylist = do
 if (mylist == [])
 then t
 else myFun (t + (head mylist)) (tail mylist)
```

If we provide input **myFun 3 [2,5,4,5,6]** at prelude what is the expected output

Option A:	25
Option B:	[24]
Option C:	24
Option D:	[25]
9.	Haskell prelude functions like map, foldl and foldr are examples of _____.
Option A:	Currying function
Option B:	Higher order function
Option C:	Anonymous function
Option D:	polymorphism
10.	Image 3 shows the haskell code.

```
mySelect :: (a-> Bool) -> [a] -> [a]
mySelect _ [] = []
mySelect f (a : ab) = if f a then a : mySelect f ab else mySelect f ab
main :: IO ()
```

	Which of the following options represents correct output when main is executed?
Option A:	[20, 21, 22, 23, 24, 26, 27, 28, 29, 30] [25]
Option B:	[20, 21, 22, 23, 24, 26, 27, 28, 29, 30] 25
Option C:	[21, 22, 23, 24, 26, 27, 28, 29] [25]
Option D:	20, 21, 22, 23, 24, 26, 27, 28, 29, 30 25
11.	Data types like Arrays, Object and Records are referred to as
Option A:	Context types
Option B:	Composite Types
Option C:	Numeric types
Option D:	User defined Types
12.	Functional Programming finds its roots in _____.
Option A:	Turing Theory
Option B:	Lambda Calculus
Option C:	Post Hypothesis
Option D:	Kleene Theory
13.	When object is strictly defined with its type and if it enforces strong typing at compile time then language is known as_____
Option A:	Statically typed language
Option B:	Dynamically typed language
Option C:	Poorly typed language

Option D:	Run time language
14.	Which of the following is not true about Guards?
Option A:	Provides multiple statements for different conditions
Option B:	Guards of a function evaluate from bottom to top
Option C:	If no guards are true, none of the definitions are used
Option D:	Makes the code more readable
15.	Which is **NOT** one of the unification rules in prolog.
Option A:	A constant unifies only with itself.
Option B:	Two structures unify if and only if they have the same predicate name and the same arity, and the corresponding arguments unify recursively.
Option C:	A variable unifies with anything. If the other thing has a value, then the variable is instantiated. If the other thing is an uninstantiated variable, then the two variables are associated in such a way that if either is given a value later, that value will be shared by both.
Option D:	It is sufficient to consider that two structures unify each other when they have the same predicate name and the same arity.
16.	Which is the most suitable paradigm to choose to implement the following case: "In a large warehouse, autonomous robots need to transport and place pallets of inventory from one location to another" ?
Option A:	Functional
Option B:	Logical
Option C:	Scripting
Option D:	Concurrent
17.	In logic Programming axioms are written in a standard form known as a _____
Option A:	Data clause
Option B:	Program Clause
Option C:	Horn Clause
Option D:	Error Clause
18.	Which one of the ollowing query would return true/yes for the given prolog KB ?

	mango(alphonso,1000). vegetable(cabbage,40). fruit(alphonso,1000).
Option A:	?- mango(alphonso,1000).
Option B:	?- mango('alphonso',1000).
Option C:	?- mango(A,1000).
Option D:	?- mango(1000,alphonso).
19.	Which is **NOT** a type class in Haskell.
Option A:	Show
Option B:	Read
Option C:	Bounded
Option D:	Binding
20.	ArithmeticException is thrown in which of the following cases of executions?
Option A:	Divide by zero
Option B:	Divide by one
Option C:	Divide by float
Option D:	Divide by double

Q2.	Solve any Four out of Six 5 marks each

A	Write prolog code to complete following tasks: (Solve any 2)
	   a. To find the length of the list of student names.
	   b. To find if a number is present in a number list
	   c. To sum all elements in the list
	Clearly show with example how to query your prolog KB to complete specific operation.

B	Which are important factors to be considered, while making a choice of a programming language ?
C	What is a guard expression? Give an example and explain how to implement a tail function using guard expression in haskell.
D	Describe the difference between forward chaining and backward chaining. Which is used in Prolog by default?
E	Explain concept of polymorphism in haskell with an example.
F	Explain static scoping rules for programming languages that support nested subroutines

Q3.	Solve any Four out of Six	5 marks each
A	Which principal storage allocation mechanism used to manage an object's space?	
B	Explain features of Functional Programming Languages.	
C	Name and explain use of any 5 list processing function in haskell's prelude library.	
D	Briefly describe the process of resolution and unification in logic programming with example.	
E	Explain how Prolog differs from imperative languages in its handling of arithmetic.	
F	Describe different parameter passing modes.	

University of Mumbai
Examination 2020 under cluster 7 (Lead College: SSJCOE)
Examinations Commencing from 15th June 2021 to 24th June 2021
Program: **Information Technology**
Curriculum Scheme: Rev2019
Examination: SE Semester III
Course Code: ITC305 and Course Name: Paradigms and Computer Programming Fundamentals
Time: 2 hour   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following is **NOT** a correct syntax for a type signature of a Haskell function ?
Option A:	sort :: [a] -> [a]
Option B:	sort :: Ord [a] -> Ord [a]
Option C:	sort :: (Num a, Ord a) => [a] -> [a]
Option D:	sort :: Ord a => [a] -> [a]
2.	Following Image 1 shows predicates defined in two distinct prolog files KB1 and KB2 Which of the following statements is true about the above two KBs KB-1: edge(a,b). edge(b,c). path(X, X). path(X, Y) :- edge(Z, Y), path(X, Z). KB-2: edge(a,b). edge(b,c). path(X, Y) :- path(X, Z),edge(Z, Y). path(X, X). Image 1
Option A:	Query path(a,a) will evaluate as true in both KBs
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Option C:	Query path(a,a) will evaluate as true in KB-1 and false in KB-2
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3.	_____ is the process of associating names to a much complicated programming fragment, so that it (the programming fragment) can be thought in terms of its functionality or purpose rather than how actually the functionality is carried out.
Option A:	Recursion

Option B:	Abstraction
Option C:	Repetition
Option D:	Inclusion
4.	Wrapping data and it's functionality into a single entity is known as _____.
Option A:	Abstraction
Option B:	Encapsulation
Option C:	Polymorphism
Option D:	Modularity
5.	Following Image 2 shows a knowledge base. Which of the following is correct re-declaration of predicate "**classmate**" that will never result in attributing a student to be his/her own classmate. e.g. we do not want the query **"classmates(sujay, sujay)"** to evaluate as **true**. takes(sujay, ME201). takes(sujay, ITC305). takes(abhay, ME302). takes(abhay, ITC305). classmates(X, Y) :- takes(X, Z), takes(Y, Z). Image 2
Option A:	No change in 'classmates' predicate declaration is required.
Option B:	This can't be achieved by only changing the predicate 'classmates'.
Option C:	New declaration of 'classmates' will be: classmates(X, Y) :- takes(X, Z), takes(Y, Z), X \= Y.
Option D:	New declaration of 'classmates' will be: classmates(X, Y) :- X \= Y, takes(X, Z), takes(Y, Z).
6.	A concurrent system is _____ when more than one task can be physically active at simultaneously, but does not require more than one processor to be physically separated.
Option A:	Parallel
Option B:	Sequential
Option C:	Natural
Option D:	Consecutive

7.	Translation of high-level language to assembly or machine language is the job of a system program known as a _____.
Option A:	compiler
Option B:	converter
Option C:	processor
Option D:	composer
8.	Synchronization is _____ in the message-passing model in order to synchronize more than one process.
Option A:	explicit
Option B:	implicit
Option C:	not guaranteed
Option D:	not possible
9.	Which of the following statements is FALSE about scripting languages?
Option A:	Scripting languages don't generally require the declaration of types for variables.
Option B:	Most scripting languages perform extensive run-time checks to make sure that values are never used in inappropriate ways
Option C:	Some scripting languages even store numbers as strings, so calculations may not always be what you expect, although most auto-converting if needed.
Option D:	Scripting languages do not handle the type errors and require the programmer to check for these errors if they require to.
10.	The Haskell the Type class concept is an example of _____ and type variables concept is an example of _____ .
Option A:	parametric polymorphism, ad hoc polymorphism
Option B:	binding, scoping
Option C:	aliasing, polymorphism
Option D:	classes, types
11.	Data types like Arrays, Object and Records are referred to as
Option A:	Context types
Option B:	Composite Types
Option C:	Numeric types
Option D:	User defined Types

12.	Functional Programming finds its roots in _____.
Option A:	Turing Theory
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13.	When object is strictly defined with its type and if it enforces strong typing at compile time then language is known as_____
Option A:	Statically typed language
Option B:	Dynamically typed language
Option C:	Poorly typed language
Option D:	Run time language
14.	Why would a class be declared as abstract?
Option A:	So that it can serve as a template for derived classes.
Option B:	The class has no independent state and behaviour and can't be instantiated.
Option C:	So that it cannot be inherited from.
Option D:	Because it has no abstract methods.
15.	Which is **NOT** one of the rules that define the unification process in logical languages.
Option A:	A constant unifies only with itself.
Option B:	Two structures unify if and only if they have the same predicate name and the same arity, and the corresponding arguments unify recursively.
Option C:	A variable unifies with anything. If the other thing has a value, then the variable is instantiated. If the other thing is an uninstantiated variable, then the two variables are associated in such a way that if either is given a value later, that value will be shared by both.
Option D:	It is sufficient to consider that two structures unify each other when they have the same predicate name and the same arity.
16.	Which is the most suitable paradigm to choose to implement the following case: "In a large warehouse, autonomous robots need to transport and place pallets of inventory from one a select location to another" ?
Option A:	Fractional
Option B:	Logical

Option C:	Scripting
Option D:	Concurrent
17.	A shell script is a _____.
Option A:	sequence of commands
Option B:	sequence of functions
Option C:	sequence of patterns
Option D:	sequence of data records
18.	Which of the statements is **TRUE** in a protected inheritance in c++?
Option A:	Private members of the base class become protected members of the derived class
Option B:	Protected members of the base class become public members of the derived class
Option C:	Public members of the base class become protected members of the derived class
Option D:	Protected derivation does not affect private and protected members of the derived class
19.	Which is **NOT** a Type Class in Haskell.
Option A:	Show
Option B:	Read
Option C:	Bounded
Option D:	Binding
20.	ArithmeticException is thrown in which of the following cases of executions?
Option A:	Divide by zero
Option B:	Divide by one
Option C:	Divide by float
Option D:	Divide by double

Q2.	**Solve any Four out of Six** **5 marks each**
A	List and explain different problem domains where we can make use of scripting languages.
B	Which are important factors to be considered, while making a choice of a programming language ?
C	What is pattern matching? How does scripting languages utilise the power of pattern matching?
D	What is Polymorphism? Explain different programming constructs that make use of the concept of polymorphism in any object oriented programming language.

E	What is currying? Define a haskell function "**add3**" that adds 3 inputs provided to it. Define a curried version of this function named "**sumplus1000**" that adds 1000 to its two inputs.
F	Explain synchronization. How can it be implemented by spinning and blocking?

Q3.	Solve any Four out of Six 5 marks each
A	Which principles of storage allocation mechanism used to manage an object's space?
B	Discuss six principal options used to create thread of control in concurrent programs.
C	Define a haskell function named "addUs" that adds 2 input numbers. Using this function as a building block, define a Haskell function "multiplyUs" that multiplies two input numbers. The multiplyUs function should cater to following requirements: 1. Inputs may be signed numbers e.g. "multiplyUs (-2) * (3)" should result in "-6" and "multiplyUs (-2) * (-6)" should result in "12" 2. It should use guard expressions and recursion. 3. No need to write the main function to do user interaction writing definition for "addUs" and "multiplyUs" is sufficient.
D	What are clauses, terms, and structures in Prolog? What are facts, rules, and queries ? (Note: Give examples for each)
E	What are constructors and destructors? Explain with help of example the order of calling of constructors amongst inherited classes.
F	Describe different parameter passing modes for subroutines.