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 $L^{-1}\left\{\log\left(\dfrac{s+a}{s+b}\right)\right\}$
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

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
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.	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
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.	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.	

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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]
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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
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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.	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.
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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	
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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 ?

Option D:	Run time language
14.	Which of the following is not true about Guards?
Option A:	Provides multiple statements for different conditions
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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: ITC 304 and Course Name: Principle of Communication

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.	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?
Option A:	10.75kW
Option B:	4.237kW
Option C:	1kW
Option D:	8kW
8.	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
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)
Option A:	$f_o - f_s$
Option B:	$f_s x f_o$
Option C:	$f_s + f_o$
Option D:	f_o / f_s
10.	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
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)

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?
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Option D:	The ratio of frequencies of the carrier and modulating wave
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Option A:	$f_o - f_s$
Option B:	$f_s \times f_o$
Option C:	$f_s + f_o$
Option D:	f_o / f_s

15.	The artificial boosting of higher modulating frequencies is called as.......
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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 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 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

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 $L^{-1}[F_1(s)*F_2(s)]$
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 $|f(z)|$ 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 $f(x) = kx^2$, $0 \leq x \leq 2$. 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:	$-1 \leq r \leq 2$.
Option B:	$-1 \leq r \leq 0$.
Option C:	$-1 \leq r \leq 1$.
Option D:	$0 \leq r \leq 1$.
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 $e^{-x}(y\sin y+x\cos y)$
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 $\displaystyle\int_0^\infty e^{-t}\left(\frac{\cos 3t-\cos 2t}{t}\right).dt$
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

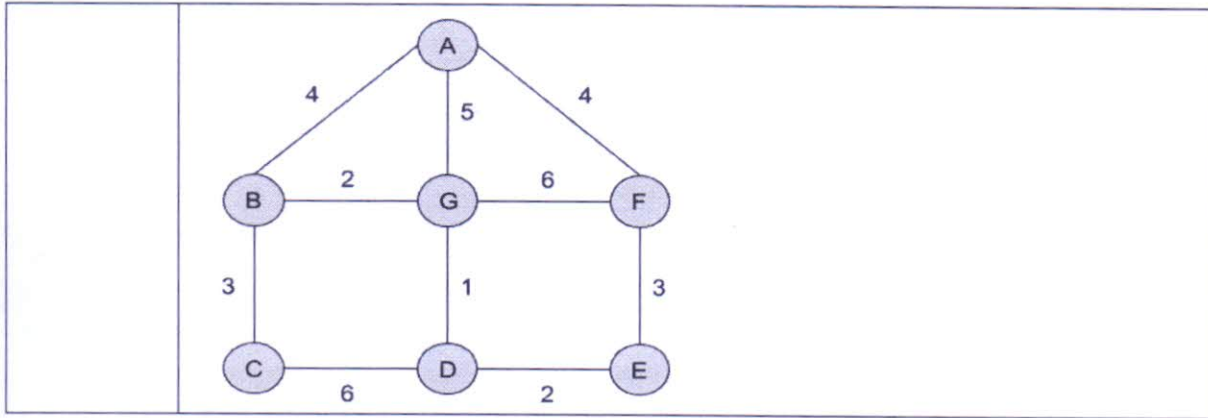| Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Given two statements: (i) Insertion of an element should be done at the last node in a circular linked list. (ii) Deletion of an element should be done at the last node in a circular linked 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.

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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 ?*