K. J. Somaiya Institute of Engineering and Information Technology
Sion, Mumbai - 400022
NAAC Accredited Institute with 'A' Grade
NBA Accredited 3 Programs
(Computer Engineering, Electronics & Telecommunication Engineering and Electronics Engineering)
Permanently Affiliated to University of Mumbai

EXAMINATION TIME TABLE (JANUARY 2021)

PROGRAMME - S.E. (Computer) (REV. -2016) (Choice Based)

SEMESTER - III

Days and Dates	Time	Course Code	Paper
08 January 2021	12:30 p.m. to 02:30 p.m.	CSC301	APPLIED MATHEMATICS-III
11 January 2021	12:30 p.m. to 02:30 p.m.	CSC302	DIGITAL LOGIC DESIGN AND ANALYSIS
13 January 2021	12:30 p.m. to 02:30 p.m.	CSC303	DISCRETE MATHEMATICS
15 January 2021	12:30 p.m. to 02:30 p.m.	CSC304	ELECTRONIC CIRCUITS AND COMMUNATION FUNDAMENTALS
18 January 2021	12:30 p.m. to 02:30 p.m.	CSC305	DATA STRUCTURES

Important Note: ● Change if any, in the time table shall be communicated on the college web site.

Mumbai
20th December, 2020.

Principal

University of Mumbai

Examination 2020 under cluster __ (Lead College: _____)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: SE Semester: III

Course Code: CSC301 and Course Name: Applied 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.	Find $L^{-1}\left(\frac{s-7}{(s-7)^2-5^2}\right)$
Option A:	$e^{7t}\cos 5t$
Option B:	$e^{7t}\cosh 5t$
Option C:	$e^{-7t}\,cos\,5t$
Option D:	$e^{7t}\,sinh\,5t$
2.	If $f(z)=u+iv$ is analytic then which of the following is false
Option A:	$f(z)$ satisfies CR equations
Option B:	u and v are harmonic functions
Option C:	$u_{xx}+u_{yy}=0\ and\ v_{xy}+v_{yy}=0$
Option D:	$u\ and\ v$ are harmonic conjugates of each other
3.	Find the inverse Z-transform of $\frac{z}{z^2+7z+10}$
Option A:	$\frac{1}{3}(-2)^n-\frac{1}{3}(-5)^n$
Option B:	$\frac{1}{3}(-2)^n+\frac{1}{3}(-5)^n$
Option C:	$\frac{1}{3}(-2)^n+\frac{1}{3}(5)^n$
Option D:	$\frac{1}{3}(2)^n-\frac{1}{3}(5)^n$
4.	Find the Laplace Transform of $(\sin 2t-\cos 2t)^2$
Option A:	$\frac{1}{s}-\frac{4s}{s^2+4^2}$
Option B:	$\frac{1}{s}-\frac{4}{s^2-4^2}$
Option C:	$\frac{1}{s}-\frac{4}{s^2+4^2}$
Option D:	$\frac{1}{s}-\frac{4s}{s^2-4^2}$
5.	Determine the constants a,b,c if $f(z)=x^2+2axy+by^2+i(cx^2+2dxy+y^2)$ is analytic
Option A:	$a=1,b=1,c=-1,d=1$

Option B:	$a=-1, b=-1, c=-1, d=1$
Option C:	$a=1, b=-1, c=-1, d=-1$
Option D:	$a=1, b=-1, c=-1, d=1$
6.	Inverse Laplace Transform of $\tan^{-1}\frac{1}{s}$ is
Option A:	$\frac{1}{2t}\sin t$
Option B:	$\frac{1}{t}\sin 2t$
Option C:	$-\frac{1}{t}\sin 2t$
Option D:	$t\sin\frac{t}{2}$
7.	The Z-transform of $f(k)=7^k\ ,\ k\geq 0$ is
Option A:	$\frac{1}{1-(\frac{7}{z})}\ \lvert z\rvert>7$
Option B:	$\frac{2}{1-(\frac{7}{z})}\ \lvert z\rvert>7$
Option C:	$\frac{1}{1+(\frac{7}{z})}\ \lvert z\rvert>7$
Option D:	$\frac{1}{3-(\frac{7}{z})}\ \lvert z\rvert>7$
8.	Find $L(e^{3t}\cosh 5t)$
Option A:	$\frac{s-3}{(s-3)+5^2}$
Option B:	$\frac{s+5}{(s+3)+3^2}$
Option C:	$\frac{s+3}{(s+3)^2-5^2}$
Option D:	$\frac{s-3}{(s-3)^2-5^2}$
9.	The inverse Z- transform of F(z)= $\frac{1}{z+a}$ is
Option A:	$\{(-a)^{1-k}\}, \lvert z\rvert>a, k\geq 1$
Option B:	$\{(a)^{k-1}\}, \lvert z\rvert>a, k\geq 1$
Option C:	$\{(-a)^{k+1}\}, \lvert z\rvert>a, k\geq 1$
Option D:	$\{(-a)^{k-1}\}, \lvert z\rvert>a, k\geq 1$
10.	Find the Inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$
Option A:	$-\frac{1}{6}e^{-t}-\frac{4}{3}e^{2t}-\frac{7}{2}e^{3t}$
Option B:	$-\frac{1}{6}e^{-t}+\frac{4}{3}e^{2t}+\frac{7}{2}e^{3t}$

Option C:	$-\frac{1}{6}e^{t}-\frac{4}{3}e^{-2t}+\frac{7}{2}e^{-3t}$
Option D:	$-\frac{1}{6}e^{-t}-\frac{4}{3}e^{2t}+\frac{7}{2}e^{3t}$
11.	If x and y are not dependent then the value of b_{yx} is
Option A:	1
Option B:	0
Option C:	Any positive value
Option D:	∞
12.	Find the fixed points of $\frac{2z+6}{z+7}$
Option A:	6,1
Option B:	-6,1
Option C:	6,-1
Option D:	-6,-1
13.	Coefficients of regression are
Option A:	Independent of change of origin and change of scale
Option B:	Independent of change of scale but not of change of origin.
Option C:	Independent of change of origin but not of change of scale.
Option D:	Depend on both change of scale and on the change of origin.
14.	Find Laplace transform of $\frac{e^{-t}}{t}\sin t$
Option A:	$\frac{1}{s}\cot^{-1}(s-1)$
Option B:	$\cot^{-1}(s+1)$
Option C:	$2\cot^{-1}(s+1)$
Option D:	$\frac{2}{s}\cot^{-1}(s+1)$
15.	In Fourier series for $f(x)=\begin{cases}\cos x\,, -\pi<x<0\\ \sin x\,,\ 0<x<\pi\end{cases}$
Option A:	$a_1=0$
Option B:	a_1 is not defined
Option C:	$a_1=\frac{1}{2}$
Option D:	$a_1=-\frac{1}{\pi}$
16.	In the Fourier series expansion of $f(x)=e^{\alpha x}, \alpha\neq 0$ in $(0,2\pi)$ what is the value of a_3
Option A:	$\frac{1-e^{2\pi}}{10\pi}$
Option B:	$\frac{1+e^{-2\pi}}{10\pi}$
Option C:	$\frac{1-e^{-2\pi}}{10\pi}$

Option D:	$\frac{1+e^{2\pi}}{10\pi}$
17.	Find the Inverse Laplace transform of $\frac{3(s^2-1)^2}{2s^5}$
Option A:	$\frac{3}{2}-\frac{3}{2}t^2+\frac{1}{16}t^4$
Option B:	$\frac{3}{2}-\frac{3}{2}t^2-\frac{1}{16}t^4$
Option C:	$-\frac{3}{2}+\frac{3}{2}t^3+\frac{1}{16}t^4$
Option D:	$\frac{3}{2}-\frac{3}{2}t^3+\frac{1}{16}t^4$
18.	Which of the following is true
Option A:	Correlation coefficient is dependent on change of scale and change of origin
Option B:	Correlation coefficient is dependent on change of origin but not change of origin
Option C:	Correlation coefficient is independent of change of scale but not of change of origin
Option D:	Correlation coefficient is independent of change of scale and change of origin
19.	Evaluate $\int_0^\infty e^{-5t}\delta(t-3)\,dt$
Option A:	e^{-s}
Option B:	e^{-15s}
Option C:	e^{15s}
Option D:	1
20.	Which type of functions can be expanded as a Fourier series?
Option A:	Any periodic function with period $2l$.
Option B:	Any periodic function satisfying Dirichlet's conditions.
Option C:	Any function satisfying Dirichlet's conditions and Parseval's identity.
Option D:	Any periodic function.

Q2	**Solve any Four out of Six** **5 marks each**
A	Calculate Spearman's coefficient of rank correlation for the following data.

X:	53	98	95	81	75	61	59	55
Y:	47	25	32	37	30	40	39	45

B	Find Laplace transform of $\int_0^t \frac{1-e^{-au}}{u}\,du$
C	Using convolution theorem evaluate $L^{-1}\left[\frac{1}{s}\log\left(\frac{s+3}{s+4}\right)\right]$
D	Obtain half-range sine series for $f(x)=x(2-x)$ in $0 < x < 2$.
E	Find the analytic function whose imaginary part is $u=x^2-y^2-5x+y+2$
F	Find the Z-transform of $\left\{\left(\frac{1}{3}\right)^{\lvert k\rvert}\right\}$

Q3	**Solve any Four out of Six** **5 marks each**
A	Determine the constants a, b, c, d if $f(z)=x^2+2axy+by^2+i(cx^2+2dxy+y^2)$ is analytic.

<table>
<tr><td>B</td><td>If $\int_0^{\infty} e^{-2t} \sin(t+\alpha)\cos(t-\alpha)dt = \frac{3}{8}$, find α.</td></tr>
<tr><td>C</td><td>Find a half range cosine series for $f(x) = e^x,\ 0 < x < 1$.</td></tr>
<tr><td>D</td><td>Find $L^{-1}\frac{e^{-3s}}{(s+4)^3}$</td></tr>
<tr><td>E</td><td>Find the inverse z transform of $Z^{-1}\left\{\frac{1}{z-1}\right\}$, $|z| < 1$.</td></tr>
<tr><td>F</td><td>Fit a straight line to the following data
<table>
<tr><td>Year x</td><td>1951</td><td>1961</td><td>1971</td><td>1981</td><td>1991</td></tr>
<tr><td>Production y:</td><td>10</td><td>12</td><td>8</td><td>10</td><td>15</td></tr>
</table></td></tr>
</table>

University of Mumbai

Examination 2020 under cluster __ (Lead College: _____)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC301and Course Name: Applied Mathematics-III

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	C
Q3.	A
Q4	C
Q5	D
Q6	B
Q7	A
Q8.	D
Q9.	D
Q10.	D
Q11.	B
Q12.	B
Q13.	C
Q14.	B
Q15.	C
Q16.	C
Q17.	A
Q18.	D
Q19.	B
Q20.	B

University of Mumbai

Examination 2020 under cluster IV (Lead College: Pillai College of Engg)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC302 and Course Name: Digital Logic Design 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.	Convert $(42.65625)_{10}$ number into equivalent binary number system
Option A:	101010.10100
Option B:	111010.10101
Option C:	101010.10101
Option D:	101110.10101
2.	Convert $(1011011.0010110)_2$ number into equivalent hexa-decimal number system
Option A:	$(6B.2C)_{16}$
Option B:	$(5B.2C)_{16}$
Option C:	$(5B.3C)_{16}$
Option D:	$(5B.2E)_{16}$
3.	Convert the given $(9)_{10}$ number into equivalent Gray code
Option A:	1001
Option B:	1010
Option C:	1101
Option D:	1111
4.	Perform following subtraction using 1's complement. Eg $(4)_{10}$-$(6)_{10}$
Option A:	0010
Option B:	1101
Option C:	1100
Option D:	0011
5.	Perform following subtraction using 15's complement. Eg $(2F6)_{16}$-$(1AD)_{16}$
Option A:	$(137)_{16}$
Option B:	$(147)_{16}$
Option C:	$(149)_{16}$
Option D:	$(159)_{16}$
6.	Perform following BCD addition. (57)+ (26)
Option A:	82
Option B:	71
Option C:	83

Option D:	73
7.	Find universal gates from given options
Option A:	NAND & NOT
Option B:	NOR & NOT
Option C:	Only NOT
Option D:	NAND & NOR
8.	Find the reduced form of equation using Boolean laws. Eg (A'B+A'+AB)'
Option A:	A'B
Option B:	AB'
Option C:	(AB)'
Option D:	AB
9.	Define Demorgan's theorem
Option A:	(A.B)'=A'+B' & (A+B)'=A'.B'
Option B:	(A+B)'=A'.B'
Option C:	(A.B)'=A'+B'
Option D:	A'.B = A.B'
10.	Simplify using K map F (ABCD)= Σm (0,2,8,10)
Option A:	AB
Option B:	CD
Option C:	B'D'
Option D:	BD
11.	Find equation for carry of full adder
Option A:	AC+BC+AB
Option B:	BC+AB
Option C:	AC+BC
Option D:	AC+BC+AB'
12.	No of select lines required for 16 input lines of multiplexers
Option A:	3
Option B:	4
Option C:	5
Option D:	2
13.	What is drawback of SR flip flop
Option A:	Forbidden state
Option B:	Race around condition
Option C:	Slow in operation
Option D:	Required Clock signal
14.	Define race around condition is
Option A:	Toggling of f/f output
Option B:	Disabled state of f/f
Option C:	Enabled state of f/f
Option D:	Forbidden state

15.	What is use of preset pin
Option A:	To reset f/f
Option B:	To set f/f
Option C:	To enable f/f
Option D:	To start the f/f
16.	What is excitation table of f/f
Option A:	The minimum outputs that are necessary to generate a particular next state
Option B:	The minimum inputs that are necessary to generate a particular next state
Option C:	The minimum inputs that are necessary to generate a particular previous state
Option D:	The minimum outputs that are necessary to generate a particular previous state
17.	In T f/f when input is given logic one then Qn+1 is
Option A:	1
Option B:	0
Option C:	Qn
Option D:	Qn’
18.	Which shift register operates in all four mode of operations ie SISO,SIPO,PISO,PIPO
Option A:	Left Shift Register
Option B:	Right Shift Register
Option C:	Universal Shift Register
Option D:	Bidirectional Shift Register
19.	Which of the following VHDL design units contain the description of the circuit
Option A:	Configuration
Option B:	Architecture
Option C:	Library
Option D:	Entity
20.	If we compare CMOS logic families with TTL Logic Families, CMOS logic has_
Option A:	Higher speed of operation
Option B:	Smaller speed of operation
Option C:	Higher power dissipation
Option D:	Smaller physical size

Q2	**Solve any Four out of Six** **5 marks each**
A	Develop Hamming code for message bits 1010
B	Simply given expression using K maps F (ABCD)= Σm (1,3,7,11,15)+d(0,2,5)
C	Design Full Adder using NAND gates only
D	Write Short note on Priority Encoder
E	Convert JK f/f into D f/f
F	Write short note on VHDL

Q3.	
A	**Solve any Two** **5 marks each**
i.	Explain Race around condition
ii.	Implement given function using 8:1 Multiplexer F (ABCD)= Σm (0,1,3,6,9,11,12,13,15)
iii.	Compare TTL and CMOS logic families
B	**Solve any One** **10 marks each**
i.	Simplify using Quine Mc Clusky method F (ABCD)= Σm (0,1,3,7,8,9,11,15)
ii.	Design 3 bit synchronous down counter using suitable flip-flop

University of Mumbai

Examination 2020 under cluster IV (Lead College: Pillai College of Engg)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC302 and Course Name: Digital Logic Design and Analysis

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	B
Q3.	C
Q4	B
Q5	C
Q6	C
Q7	D
Q8.	B
Q9.	A
Q10.	C
Q11.	A
Q12.	B
Q13.	A
Q14.	A
Q15.	B
Q16.	B
Q17.	D
Q18.	C
Q19.	B
Q20.	D

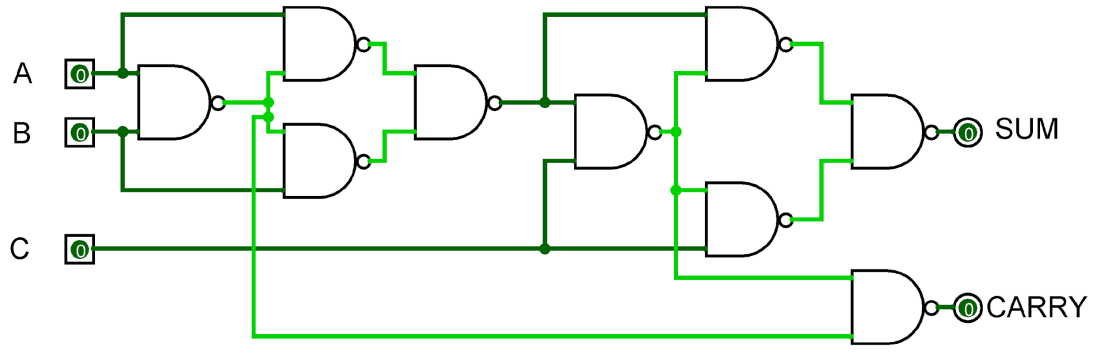
Q2

A. Develop Hamming code for message bits 1010

Find number of parity bits for given message bits	1M
Write Hamming code formula	2M
Find value of parity bits	2M
Final Hamming code With even parity: 1011010	1M
Draw suitable kmap	1M
Put minterms and don't care terms in Kmap	1M
Grouping of the minterms	1M
Write Final reduced given expression : A'B'+CD OR A'D+CD	1M
Implement using gates	1M

B. Simply given expression using K maps
F (ABCD)= Σ m (1,3,7,11,15)+d(0,2,5)

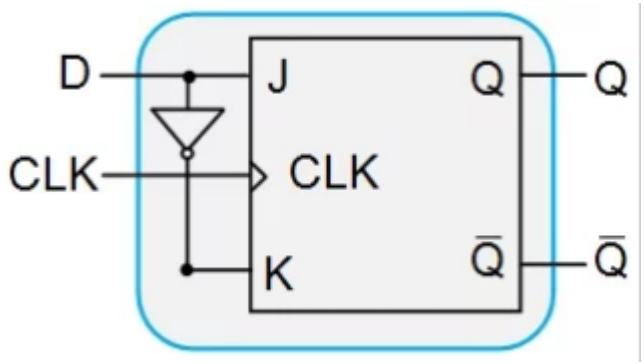
C. Design Full Adder using NAND gates only

Write truth table of full adder	1M
Using K map get equations for sum and carry Sum: A ⊕ B ⊕ C Carry: A'C+BC+A'B	2M
Implement using NAND Gate 	2M

D. Write Short note on Priority Encoder

Circuit Diagram	2M
Truth table	2M
Description of Priority encode	1M

E. Convert JK f/f into D f/f

Conversion table	2M
Equation for D input in terms of JK input	2M
Final Circuit diagram 	1M

F. Write short note on VHDL

Introduction of VHDL	1M
Features of VHDL	2M
VHDL modelling styles	2M

Q3.

A.

i] Explain Race around condition

Problem faced in JK flip-flop toggling of output.	1M
Assuming previous state, when J & K = 1show how out put toggles for one clock cycle	2M
Solution to race around condition	2M

ii] Implement given function using 8:1 Multiplexer

F (ABCD)= Σm (0,1,3,6,9,11,12,13,15)

Truth table of given expression	1M
New output column with 3 variable input	2M
Circuit implementation	2M

iii] Compare TTL and CMOS logic families

5 parameters of comparison : Power dissipation ,Basic gate used, propagation delay ,fan out, noise immunity	5M

B. Simplify using Quine Mc Clusky method

F (ABCD)= Σm (0,1,3,7,8,9,11,15)

Reduction table stepwise	2M
Prime implicant chart & final expression Y= B'C'+ CD	2M
Implementation	1M

C. Design 3 bit synchronous down counter using suitable flip-flop

Identify No of flip-flops required using formula	1M
Draw state table	1M
Get equations for f/f inputs	1M
Final Circuit diagram	2M

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC303 and Course Name: Discrete Mathematics

Time: 2 hour Max. Marks: 80

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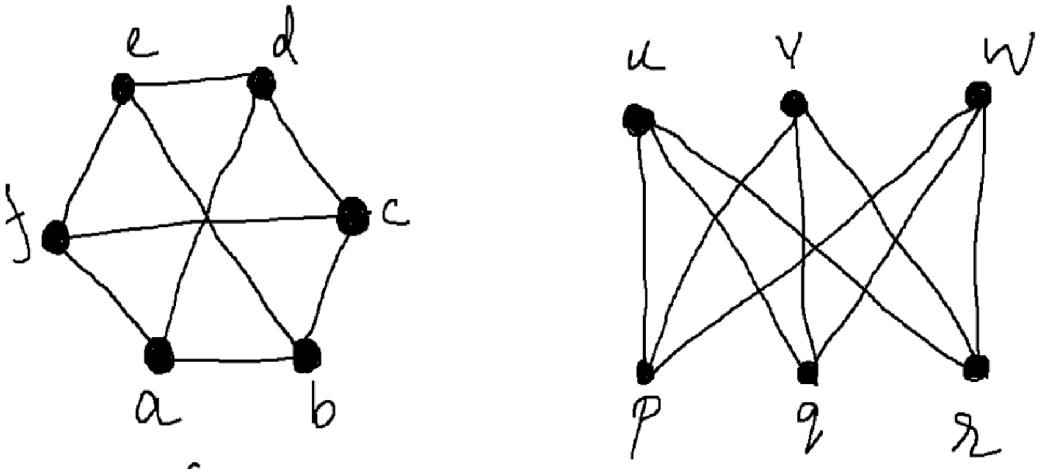
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Consider sets A and B with cardinalities m and n respectively. How many elements will the Cartesian Product of A and B have?
Option A:	m^n
Option B:	nm
Option C:	$(2m)^n$
Option D:	m+n
2.	Which equation would best describe the symmetric difference operation A ⊕ B?
Option A:	A ⊕ B = (A ∪ B) – (A · B)
Option B:	A ⊕ B = A + B – 2(A · B)
Option C:	A ⊕ B = (A · B) - (A ∪ B)
Option D:	A ⊕ B = A + B – (A · B)
3.	The logical statement (~p) □ (~p) is
Option A:	A Tautology
Option B:	A Contradiction
Option C:	A Contingency
Option D:	Its truth value depends on the value of p
4.	Which of the following statements can be categorized as propositions? 1. 1 + 2 = 4 2. X+2=7 3. Mumbai is the capital of India 4. What is the time? 5. Read Carefully 6. 6 > 10
Option A:	1, 3 and 5 only
Option B:	2, 4 and 6 only
Option C:	1, 3 and 6 only
Option D:	2, 4 and 5 only
5.	For two propositions p and q, when will the operation p ↔ q return a true value?
Option A:	When both p and q have the same truth values
Option B:	When both p and q have the same false values
Option C:	When p is true and q is false

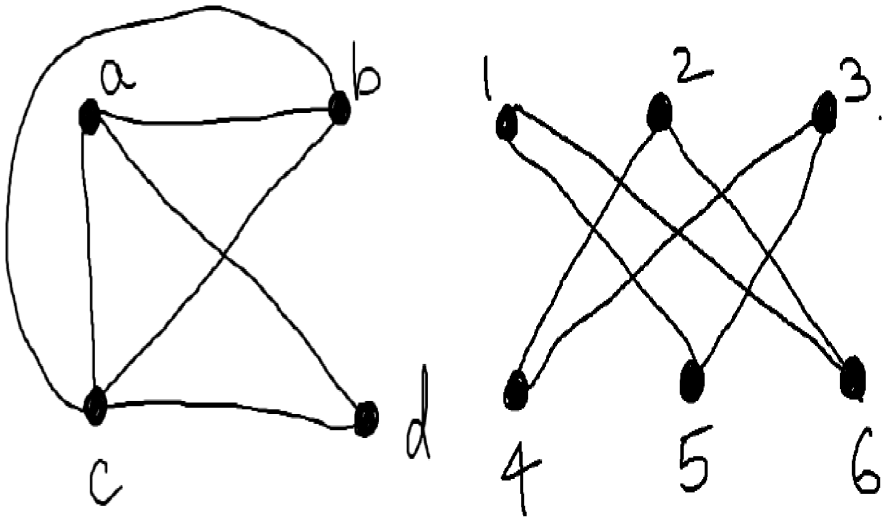
Option D:	When p is false and q is true
6.	If P(x) is a predicate such that "P(x): x is a word without vowels", for which of the following predicate values, does P(x) return a true value?
Option A:	P(true)
Option B:	P(false)
Option C:	P(rhythm)
Option D:	P(fathom)
7.	A relation of divisibility on the set of positive divisors of n, where n is any positive integer, is always
Option A:	An Equivalence Relation
Option B:	An Isomorphic Relation
Option C:	A Irreflexive relation
Option D:	A Partial Ordered Relation
8.	Given a Relation R on set A = {2,3,5,6,8,9,10} such that aRb iff **"a+b is odd".** Such a relation will always be
Option A:	Reflexive
Option B:	Symmetric
Option C:	Transitive
Option D:	Partial Ordered
9.	Let R be an equivalence relation on Z defined by xRy iff |x-y| is divisible by 4. Which of the following is not an equivalence class of R?
Option A:	{.....-12,-8,-4,0,4,8,....}
Option B:	{.....,-10,-6,-2,2,6,10,14,.....}
Option C:	{.....,-7-3,1,5, 9, 13, ...}
Option D:	{..... ,-13,-9, -5, -1, 1, 5, 9, 13,.....}
10.	If f(x) = x + 9 and g(x) = x^2 + 3, what is x^2 + 18x + 84?
Option A:	(f o f)(x)
Option B:	(g o g)(x)
Option C:	(f o g)(x)
Option D:	(g o f)(x)
11.	Let A be a set containing 3 elements. The maximum number of Relations possible on set A are
Option A:	128
Option B:	256
Option C:	512
Option D:	1024
12.	If 7 numbers are selected from 1 to 15, how many selections will have the same sum
Option A:	557
Option B:	559
Option C:	561
Option D:	563

13.	Consider a standard 6-sided die and a coin. How many results are possible if we want to Roll the die and toss the coin
Option A:	8
Option B:	12
Option C:	36
Option D:	64
14.	For the linear homogeneous recurrence relation $a_n = 8a_{n-1} -21a_{n-2} + 18a_{n-3}$, the roots are
Option A:	All 3 roots are distinct and real
Option B:	All 3 roots are repeated and real
Option C:	1 distinct root, 2 repeated roots, all real
Option D:	1 imaginary root, 2 real roots
15.	Consider a network of 50 terminals to be connected. How many connections would be needed if each terminal is connected to 14 other terminals?
Option A:	450
Option B:	350
Option C:	400
Option D:	500
16.	What is true about Euler Path/Circuit? I. It is a path or circuit that traverses every vertex of the graph exactly once. II. It is a path or circuit that traverses every edge of the graph exactly once. III. For a Euler path every vertex needs to have an even degree. IV. For a Euler circuit every vertex needs to have an even degree. V. If a graph has exactly 2 vertices of odd degree, there in an Euler Path in the graph
Option A:	I, III and IV only
Option B:	II, IV and V only
Option C:	I, III and V only
Option D:	II, III and IV only
17.	If the algebraic structure (S,*) is Monoid, which of the following statements is true?
Option A:	* is associative and every element belonging to S has an unique inverse element that also belongs to S
Option B:	* is associative, S has an unique identity element, and every element belonging to S has an unique inverse element that also belongs to S
Option C:	A mono identity element exists for S
Option D:	* is associative and S has an unique identity element
18.	Any set G = {0,1,2…. N-1} is a group under
Option A:	Addition Modulo N
Option B:	Multiplication Modulo N
Option C:	Both Addition and Multiplication Modulo N
Option D:	It depends on the value of N

19.	Consider the (2,6) encoding function given as follows: e(00) = 000000, e(01) = 011110 e(10) = 101010 e(11) = 111000. What is the minimum distance of this function?
Option A:	4
Option B:	3
Option C:	2
Option D:	1
20.	Consider the parity check encoding function e: B^3 □ B^4. What will be the code generated for 011?
Option A:	0111
Option B:	0110
Option C:	1001
Option D:	1000

Q2	**Solve any Four out of Six** **5 marks each**
A	Find number of integers between 1 to 1000 which are: i. Divisible by 2 or 3 or 5 ii. Divisible by 3 but not by 2 or 5
B	Let A={1,2,3,4,5} and R and S be two equivalence relations defined on A given by: R= {(1,1),(1,2),(2,1),(2,2),(3,3),(3,4),(4,3),(4,4),(5,5)} and S= {(1,1), (2,2), (3,3), (4,4), (4,5), (5,4), (5,5)} Find the smallest equivalence relation containing both R and S. Also find the partition of A that it produces.
C	Using laws of logic prove that (~p ∧ (p ∨ q)) □q is a tautology
D	How many four digit numbers can be formed from the digits 1,2,3,4,5,6,7 if none of the digits are repeated? How many of them would be greater than 4000?
E	Are the following graphs isomorphic? Justiy your answer. 
F	Show that the set D30 under divisibility is a Lattice? Is it also a distributive lattice? Justify your answer.

Q3.	**Solve any Four out of Six** **5 marks each**

A	Using Mathematical Induction, show that the product of 3 consecutive natural numbers is always a multiple of 3
B	Let R be a relation on set of integers Z such that R = {(a,b) / a-b is divisible by m} where m is any positive integer. Show that R is an equivalence relation.
C	Let f,g,h be functions on real numbers R defined as follows: f(x) = 2x+5, g(x) = 5x + 3, h(x) = 3x Find: i. fog ii. gof iii. g o h iv. f o g o h v. g o f o h
D	Do the following graphs have Euler as well as Hamiltonian Path/Circuit? Justify your answer and give the corresponding paths 
E	Let $H = \begin{bmatrix} 0 & 1 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ be a parity check matrix. Determine the (2,5) group code function.
F	Given the set of Real Numbers R, show that the binary operation a * b = a + b +2 over R forms a Group. Does it also form an Abelian Group?

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE)

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC303 and Course Name: Discrete Mathematics

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	C
Q3.	A
Q4	C
Q5	A
Q6	C
Q7	D
Q8.	B
Q9.	D
Q10.	D
Q11.	C
Q12.	B
Q13.	B
Q14.	C
Q15.	B
Q16.	B
Q17.	D
Q18.	A
Q19.	C
Q20.	B

Q2	**Solve any Four out of Six**
A	Solve using concepts of Principle o
B	4 marks for finding transitive closu 1 mark for the partition
C	Full marks to be given only if pr methods used give marks according
D	Use counting principles. 3 marks fo
E	Full marks to be given only if the graphs are given.
F	Hasse Diagram, GLB and LUB tabl Marks to be distributed for lattice p

Q3	**Solve any Four out of Six**
A	Full marks to be given only if Basis Step, Induction hypothesis an
B	Prove that relation is reflexive, sym condition
C	1 mark each for the sub questions
D	Mention the conditions if Euler or H paths.
E	Full marks to be given only if e(00)
F	The following conditions need to be i. Closure property ii. Associativity iii. Find identity element e iv. Find equation for invers v. Commutative property f

University of Mumbai

Examination 2020 under cluster __ (Lead College: _____)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: ___**SE**_____

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC304

Course Name: _Electronic Circuits and Communication Fundamentals ___

Time: 2 hour Max. Marks: 80

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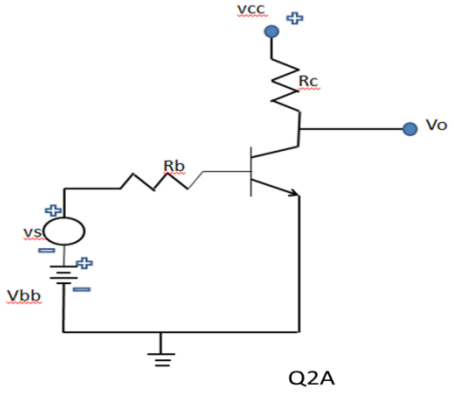
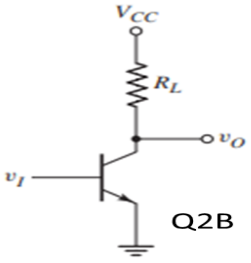
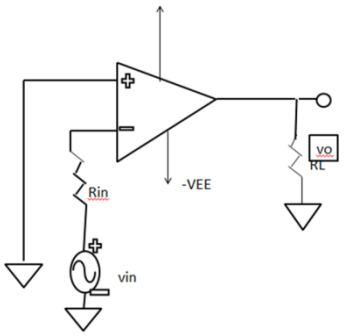
Q1.(40 marks)	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	For the operating point (20v ,5.6mA)of CE configuration the maximum load current and V_{CEmax} is
Option A:	7mA and 10V
Option B:	6mA and 12V
Option C:	5.6mA and 20V
Option D:	3mA and 15V
2.	The region of operation of operation if IC=6mA,βV_{CEO}=15Vand PCMax=42mW
Option A:	Saturation region
Option B:	Active Region
Option C:	Cut-off region
Option D:	Linear Region
3.	The transistor has in Common Emitter configuration has βDC=150,VCC=10V and VBB=5V RC=100Ωand RB=10KΩ. What are the values of IB and IC respectively.
Option A:	430µA,64.5mA.
Option B:	330µA,20mA
Option C:	20µA,30mA
Option D:	430µA,60mA
4.	The values of β_{DC} and $\beta_{AC}$when Ic=1mA,IB=60µA and V_{CE}=8V and I_C=14mA ,IB=70µAand V_{CE}=3V are
Option A:	12and 12
Option B:	10 and 0.013
Option C:	8and 16
Option D:	17and0.0013
5.	For fixed bias configuration with Rc,R_B of values 2,2K and 240K β=50 and V_{CC}=+12V V_{CEO} and I_{CEO} are
Option A:	1.2mA and 12V

Option B:	2.3mA and 6.83V
Option C:	12mA and 12V
Option D:	3.8mA and 7V
6.	The circuit having Vcc=20V RC and RE=2k Ω and 1 kΩ, the value of ICsat is
Option A:	3.64mA
Option B:	1.20mA
Option C:	5mA
Option D:	6.67mA
7.	The output characteristics of CE configuration are described by I_{Cmax}=8mA V_{CEQ}=20V and I_{BQ}=40μA, the Q point will have coordinates
Option A:	20V,8mA
Option B:	10V,6μA
Option C:	10V and 4mA
Option D:	4V ,4mA
8.	The 6.8V zener diode is specified to have Vz=6.8V at I_Z=5mA r_z=20Ω.The supply voltage is nominally 10V but can vary by ±1 V with R= 0.5KΩ and I_{ZK}=0.2mA ,then line regulation is
Option A:	28mV/V
Option B:	38.5mV/V
Option C:	20mV/V
Option D:	5mV/V
9.	For class B push pull amplifier with current mirror diodes R1 and R2 are 430Ω RL=150Ω Vcc=20V ideal peak output voltage and ideal peak currents are
Option A:	20V and 133mA
Option B:	10V and 100mA
Option C:	30V and 120mA
Option D:	20V and 20mA
10.	Determine the voltage at the base of the transistor, the resonant frequency, and the peak to-peak value of the output signal voltage for the class C amplifier described by L=220μH and C= 630pf in the output circuit activated by input signal of 1V A C signal
Option A:	0v,400kHz and 10V
Option B:	-1.1V,200kHz and 15V
Option C:	-2V, 100Hz and 12V
Option D:	-2.1V,411kHz and 30V
11.	A certain class A power amplifier delivers 5 W to a load with an input signal power of 100 mW. The power gain is
Option A:	100
Option B:	50
Option C:	250
Option D:	10

12.	The output of a certain two-supply class B push-pull amplifier has a VCC of 20 V. If the load resistance is 50Ω the value of Ic(sat) is
Option A:	5mA
Option B:	0.4A
Option C:	4ma
Option D:	40mA
13.	The resonant frequency of lead – lag circuit with the values R1=R2=6.2kΩ and C1=C2=0.02μF
Option A:	2kHz
Option B:	15kHz
Option C:	30kHz
Option D:	1.3kHz
14.	The difference amplifier has two input signal V1=20mVat the inverting terminal and V2=10mv at the non inverting terminal the out difference signal will be of magnitude and phase of with R1=1KΩ and Rf= 10kΩ
Option A:	V0=90mV
Option B:	V0=90mV with shift of 90^0
Option C:	VO= 20mV with no phase shift
Option D:	VO= 90mV with phase shift of 180^0
15.	The probabilities of finding the information on the channels are 0.2 ,0.3 ,the information rate will be
Option A:	1
Option B:	1.22
Option C:	-1.22
Option D:	0.3
16.	The aliasing effect in PCM is caused due to
Option A:	Overlapping of the signals
Option B:	Cross over of the signals
Option C:	Bandwidth effect
Option D:	Gain Reduction
17.	The amplitude modulated signal has various modulation indices as m_1 ,m_2 ,m_3 …….m_n the total modulation index is
Option A:	m_n
Option B:	$\sqrt{m_n^2}$
Option C:	$\sqrt{m_1^2} + \sqrt{m_2^2}$ ……$\sqrt{m_n^2}$
Option D:	
18.	A tuned circuit of an oscillator in a simple AM transmitter employs a 50μH coil and 1nF capacitor.If the oscillator output is modulated by audio frequencies up to 10kHz the frequency range occupied by the sidebands
Option A:	100kHz
Option B:	50kHz
Option C:	250kHz

Option D:	712kHz
19.	In frequency modulation the modulating signal frequency is 100KHz and frequency deviation is 15kHz , the bandwidth occupied the FM signal is
Option A:	1000kHz
Option B:	100kHz
Option C:	2300kHz
Option D:	2500kHz
20.	In digital modulation the modulating signal frequency is 34kHz the minimum frequency required for sampling the signal will be
Option A:	34kHz
Option B:	68kHz
Option C:	120kHz
Option D:	100kHz

Q2 (20 marks)	**Solve any Four out of Six** **5 marks each**
A	Find the small signal voltage gain of bipolar transistor circuit shown in figure Q2a , The transistor and circuit parameter are β=100 Vcc=12v V_{BE} =0.7V R_C=6kΩ and R_B= 50kΩ and V_{BB}=1.2V  Q2A
B	Find the required power rating, current and voltage of power amplifier shown in Figure Q2B using common emitter configuration and circuit parameters are RL=8Ω and Vcc=24V.  Q2B
C	Discuss in brief the working of colpitt oscillator with circuit diagram
D	Find the output voltage for the inverting amplifier having gain AV= -10 Rin=1kΩ and R_L=10KΩshown in figure Q2D When input voltage i Vin=2mVdc ii Vin= -50μV peak sine wave

	
E	Discuss the working of Voltage series feedback amplifier using non inverting amplifier op amp 741 with circuit diagram
F	The probabilities of information are 0.2,0.3,0.4,0.1 Calculate the entropy and the Information rate.

Q3. (20 marks)	
A	**Solve any Two** **5 marks each**
i.	Derive the mathematical model of Frequency modulation scheme.
ii.	Discuss with circuit diagram the adaptive Delta Modulation method
iii.	Define multiplexing and compare TDM and FDM .Which is the better scheme for multiplexing for transmitting signal on single channel and why?
B	**Solve any One** **10 marks each**
i.	A certain transmitter radiates 9kW with un modulated carrier and 10.25W when carrier is modulated with a sinusoidal modulating signal. Calculate the modulation index, percentage of modulation. If another sine wave, corresponding to 40% modulation is transmitted simultaneously, determine the total radiated power.
ii.	Define the terms a. Selectivity b. Sensitivity c. Fidelity d. Image frequency and its rejection Draw the waveform of a. Amplitude modulation b. Frequency modulation .

University of Mumbai

Examination 2020 under cluster __ (Lead College: _____)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: __**SE**_____

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: _CSC304____ and Course Name: Electronic Circuits and Communication Fundamentals ____

Time: 2 hour Max. Marks: 80

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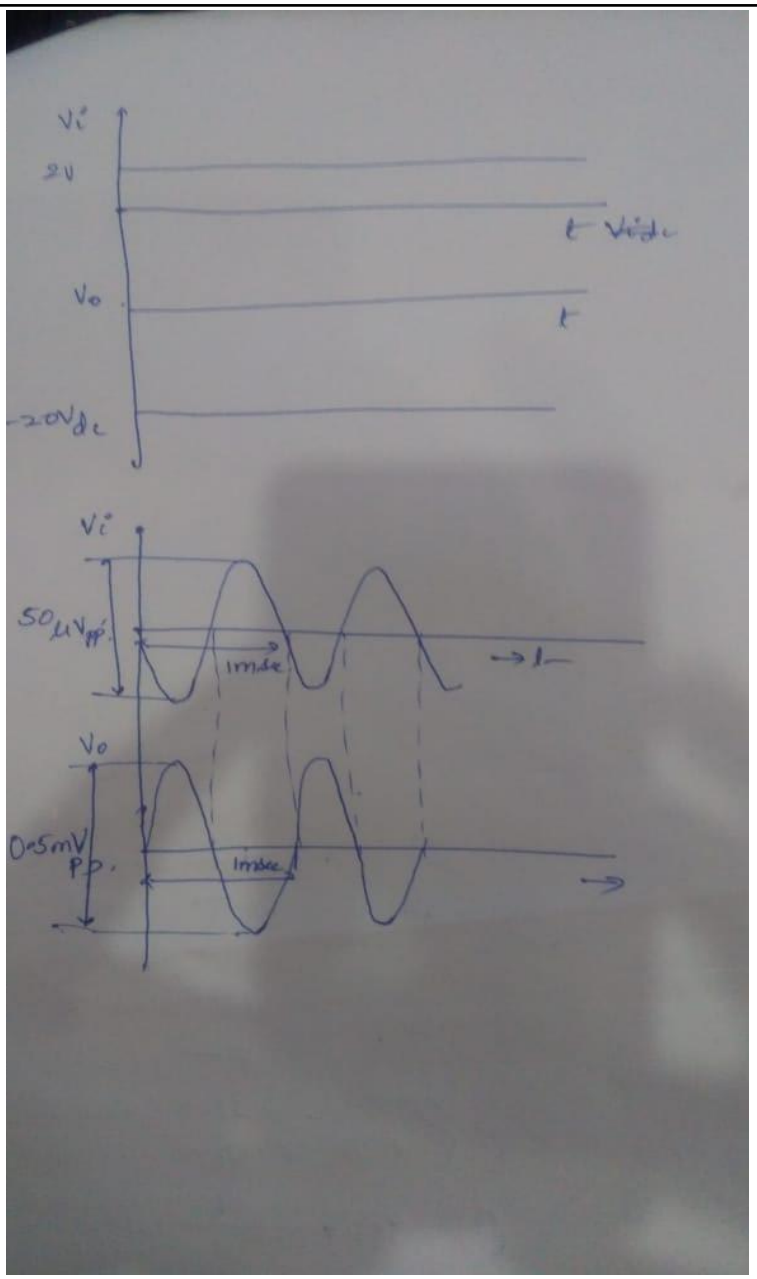
Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	B
Q3.	B
Q4	D
Q5	B
Q6	D
Q7	C
Q8.	B
Q9.	A
Q10.	D
Q11.	B
Q12.	D
Q13.	D
Q14.	B
Q15.	C
Q16.	A
Q17.	D
Q18.	D
Q19.	C
Q20.	B

Subjective ECCF

CSC304

Answer key

Q2	A	r_π=2,6kΩ g_m= 38.5mA/V Av= -11.4	
Q2	B	Power rating =18W Current flowing in power Amplifier =1.5mA Voltage measured in power Amplifier =12V	

Q2	D	 Vi 2V t Vidc Vo t -20Vdc Vi 50μVpp. 1m/div t Vo 0.5mV pp. 1m/div	

Q3	B i	$\frac{m^2}{2} = \frac{P_t}{P_c} - 1 = \frac{10.125}{9} - 1$ $= 1.125 - 1 = 0.125$ $\Rightarrow m^2 = 0.250$ $\therefore m = 0.50$ For the second part, the total modulation index will be $m_t = \sqrt{m_1^2 + m_2^2} = \sqrt{0.5^2 + 0.4^2} = \sqrt{0.41} = 0.64$ $P_t = P_c \left(1 + \frac{m_t^2}{2}\right) = 9\left(1 + \frac{0.64^2}{2}\right) = 10.84\,kW$	
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University of Mumbai

Examination 2020 under cluster 04 (Lead College: Pillai COE)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC305 and Course Name: Data Structures

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 Separation of data structures and their operations from the implementation of the data structures in memory and functions is called _____ .
Option A:	Data Abstraction
Option B:	Data bifurcation
Option C:	Data extraction
Option D:	Data encapsulation
2.	Which data structure can be used suitably to solve the Tower of Hanoi problem?
Option A:	Queue
Option B:	Stack
Option C:	Priority Queue
Option D:	Tree
3.	The postfix form of the expression is (A+B) * (C*D-E) * F/G is
Option A:	AB+CD*E-FG/**
Option B:	AB+CD*E-*F*G/
Option C:	AB+CD*E-F**G/
Option D:	AB+CDE*-*F*G/
4.	A Circular queue is empty if
Option A:	front=rear-1
Option B:	rear=front-1
Option C:	front=rear+1
Option D:	rear=front
5.	A lady wants to visit some places. He starts from a vertex and then wants to visit every place connected to this vertex and so on. Which algorithm should she use?
Option A:	Breadth First Search
Option B:	Depth First Search
Option C:	Prim's Algorithm
Option D:	Kruskal's Algorithm
6.	The Deque in which deletion is allowed at one end is called
Option A:	Priority Queue
Option B:	Output restricted Deque

Option C:	Input restricted Deque
Option D:	Circular Queue
7.	Recursion is considered to be memory-intensive because
Option A:	Recursive functions tend to declare many local variables.
Option B:	Previous function calls are still open when the function calls itself and the activation records of these previous calls still occupy space on the call stack.
Option C:	Many copies of the function code are created.
Option D:	It requires large data values.
8.	A structure that points to the structure of same data type is called
Option A:	pointer of structure
Option B:	struct
Option C:	Cross referential structure
Option D:	Self-Referential Structure
9.	How many pointers are contained as data members in the nodes of a circular, doubly linked list of integers with five nodes?
Option A:	5
Option B:	8
Option C:	10
Option D:	15
10.	Binary Search can be categorized into which of the following?
Option A:	Brute Force technique
Option B:	Divide and conquer
Option C:	Greedy algorithm
Option D:	Dynamic programming
11.	To create a linked list, we can allocate space and make something point to it, by writing: struct node *pointer-variable; Which of the following statement will correctly allocate the space
Option A:	pointer-variable= malloc(sizeof(struct node));
Option B:	pointer-variable = malloc(sizeof(struct struct node));
Option C:	pointer-variable = alloc(sizeof(struct node));
Option D:	pointer-variable = alloc(sizeof(*struct node));
12.	Linked lists are best suited
Option A:	Scenario1: If the size of the structure and the data in the structure are constantly changing
Option B:	Scenario2: For relatively permanent collections of data
Option C:	Both the scenarios
Option D:	None of the two scenarios
13.	Which of the following statement is false?
Option A:	The length of a path is one less than the no. of nodes in the path
Option B:	Children of the same parent is said to be siblings
Option C:	The height of a node in a tree is the length of the longest path from the node to leaf

Option D:	The total number of nodes in a tree is called its degree.
14.	What is the correct order, to traverse a non-empty binary tree in preorder 1. Traverse the left subtree in post order 2. Visit the root 3. Traverse the right subtree in post order
Option A:	1,2,3
Option B:	2,3,1
Option C:	2,1,3
Option D:	3,2,1
15.	The technique that builds a linked list of all items whose keys hash to the same values is:
Option A:	Chaining
Option B:	Addressing
Option C:	Resolving
Option D:	Hashing
16.	The method one uses to replace the node being deleted by the rightmost node in its left sub tree or left most node in its right sub tree. What does the above statement (algorithm segment) intend to do?
Option A:	Deleting a node from a binary search tree, if deleting node is a leaf node.
Option B:	Deleting a node from a binary search tree, if deleting node has both a left and a right child.
Option C:	Deleting a node from a binary tree if the deleting node has one child.
Option D:	Deleting a node from an AVL, if deleting node has both a left and a right child.
17.	In an AVL tree, at what condition the balancing is to be done? 1) balance factor greater than 1 2) balance factor less than 1 3) balance factor equal to 2.
Option A:	1 and 3
Option B:	1 and 2
Option C:	2 and 3
Option D:	1,2 and 3
18.	The basic idea behind Huffman coding is to
Option A:	compress data by using fewer bits to encode fewer frequently occurring characters
Option B:	expand data by using fewer bits to encode more frequently occurring characters
Option C:	compress data by using fewer bits to encode more frequently occurring characters
Option D:	compress data by using more bits to encode more frequently occurring characters
19.	Dag refers to
Option A:	Distributed acyclic graph
Option B:	Denoted acyclic graph
Option C:	Directed acyclic graph
Option D:	Double Acyclic Graph
20.	The function that transforms a key into a is called a hash function.
Option A:	Key index

Option B:	Data Table
Option C:	Table index
Option D:	Record

Q2.	
A	**Solve any Two** **5 mark each**
i.	Define Data Structure. Differentiate linear and non-linear data structures with example
ii.	What is a graph? Explain methods to represent graph
iii.	Describe Tries with an example.
B	**Solve any One** **10 mark each**
i.	What is Hashing? Hash the following data in a table of size 10 using linear probing and quadratic probing. Also find the number of collisions. 63, 82, 94, 77, 53, 87, 23, 55, 10, 44
ii.	Explain Double Ended Queue. Write a C program to implement Double Ended Queue

Q3.	
A	**Solve any Two** **5 mark each**
i.	What is expression tree? Derive an expression tree for (a+(b*c))/((d-e)*f)
ii.	What are different ways to represent graphs in memory?
iii.	What are various operations possible on data structures?
B	**Solve any One** **10 mark each**
i.	Write a C program to convert infix expression to postfix expression.
ii.	Explain Huffman Encoding with suitable example

University of Mumbai

Examination 2020 under cluster 04 (Lead College: Pillai COE)

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: SE Semester III

Course Code: CSC305 and Course Name: Data Structures

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	B
Q3.	A
Q4	D
Q5	A
Q6	B
Q7	B
Q8.	D
Q9.	C
Q10.	B
Q11.	A
Q12.	A
Q13.	D
Q14.	C
Q15.	A
Q16.	B
Q17.	D
Q18.	C
Q19.	C
Q20.	C