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 (JUNE 2021)

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

SEMESTER - V

Days and Dates	Time	Course Code	Paper
Wednesday, June 16, 2021	11.30 a.m to 1.30 p.m	CSC501	Microprocessor
Friday, June 18, 2021	11.30 a.m to 1.30 p.m	CSC502	Database Management System
Monday, June 21, 2021	11.30 a.m to 1.30 p.m	CSC503	Computer Network
Wednesday, June 23, 2021	11.30 a.m to 1.30 p.m	CSC504	Theory of Computer Science
Friday, June 25, 2021	11.30 a.m to 1.30 p.m	CSDLO5011	Elective I: Multimedia System
Friday, June 25, 2021	11.30 a.m to 1.30 p.m	CSDLO5012	Elective I: Advance Operating System
Friday, June 25, 2021	11.30 a.m to 1.30 p.m	CSDLO5013	Elective I: Advance Algorithm

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

PRINCIPAL

Mumbai
20th May 2021

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: **Rev2016**

Examination: **TE Semester V**

Course Code: **CSC501** and Course Name: **Microprocessor**

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In order to choose both even and odd memory bank what values does $\overline{BHE}$ and A_0 should hold
Option A:	$\overline{BHE}$ =0, A_0 =0
Option B:	$\overline{BHE}$ =1, A_0 =0
Option C:	$\overline{BHE}$ =0, A_0 =1
Option D:	$\overline{BHE}$ =1, A_0 =1
2.	The_____ input enables the command output pins on the 8288.
Option A:	address enable
Option B:	command enable
Option C:	control enable
Option D:	data enable
3.	Which values of QS_0 and QS_1 denotes that instruction queue is empty?
Option A:	QS_0 =0, QS_1 =0
Option B:	QS_0 =1, QS_1 =0
Option C:	QS_0 =0, QS_1 =1
Option D:	QS_0 =1, QS_1 =1
4.	The peripheral clock signal is of the crystal or EFI input frequency.
Option A:	one sixth
Option B:	one third
Option C:	one fourth
Option D:	almost same
5.	Which instruction converts Signed Byte to Signed Word
Option A:	CWD
Option B:	CBW
Option C:	CDW
Option D:	CBD
6.	TEST instruction internally does which operation?
Option A:	AND
Option B:	OR
Option C:	NOT

Option D:	XOR
7.	POP instruction _____ the stack pointer
Option A:	increments
Option B:	decrements
Option C:	either increments or decrements
Option D:	neither increment nor decrement
8.	PUSHF instruction
Option A:	Push 16 bit number of flag register into stack
Option B:	Push the 16 bit destination into stack
Option C:	Push 8 bit number of flag register into stack
Option D:	Push the 8 bit destination into stack
9.	After 8 bit multiplication, the result is stored by default in which register?
Option A:	AL
Option B:	AH
Option C:	AX
Option D:	DX
10.	Programmable Interrupt Controller is ……
Option A:	8255
Option B:	8257
Option C:	8259
Option D:	8237
11.	ICW3 will be programmed if _____
Option A:	SNGL = 0 in ICW1
Option B:	SNGL = 1 in ICW1
Option C:	SNGL = 0 in ICW2
Option D:	SNGL = 1 in ICW2
12.	Control register is selected in 8255 when
Option A:	A_1=1 A_0=1
Option B:	A_1=0 A_0=0
Option C:	A_1=0 A_0=1
Option D:	A_1=1 A_0=0
13.	In BSR mode of 8255, only _____ bits are used for set or reset.
Option A:	PORT A
Option B:	PORT C
Option C:	PORT B
Option D:	Control word
14.	Control Word Register of 8253
Option A:	Cannot be read/written
Option B:	Cannot be Written
Option C:	Can be read
Option D:	Cannot be read

15.	The value 0 of BCD bit in control word format of 8253 denotes
Option A:	Binary Counter 16 bits
Option B:	BCD counter
Option C:	Decimal Counter
Option D:	No operation
16.	Each channel of 8257 can transfer data up to ….
Option A:	512 kb
Option B:	128 kb
Option C:	16 kb
Option D:	1024 kb
17.	Paging is enabled in 80386 DX by setting
Option A:	PG=0
Option B:	PG=1
Option C:	PE=0
Option D:	PE=1
18.	Granularity Bit is _____ for segment length is page granular
Option A:	3
Option B:	2
Option C:	0
Option D:	1
19.	BTB denotes
Option A:	Branch Target Buffer
Option B:	Buffer Target Branch
Option C:	Bridge Target Buffer
Option D:	Branch Target Bridge
20.	Which is true according to U and V pipeline in Pentium
Option A:	U pipe can execute any instruction
Option B:	U pipe can execute only simple instruction
Option C:	V pipe can execute any instruction
Option D:	U and V can execute complex instructions

Q2	**Solve any Four out of Six** **5 marks each**
A	Explain de-multiplexing of Address/Data Bus in 8086.
B	What is Mixed Language Programming? Illustrate with example.
C	Sketch the Interrupt structure of 8086 and describe.
D	State BSR mode of 8255 in detail.
E	Enumerate the operating modes of 80386.
F	How flushing of pipeline problem is minimized in Pentium Architecture.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Describe the Maximum Mode of 8086 in detail.
B	Summarize the Addressing modes of 8086 with example.

C	Draw and explain cascading of three 8259 ICs with 8086 microprocessor based system.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: **Rev2016**

Examination: **TE Semester V**

Course Code: **CSC501** and Course Name: **Microprocessor**

Time: 2 hour Max. Marks: 80

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

Q2	**Solve any Four Questions out of Six** **05 marks each**
A	Explain de-multiplexing of Address/Data Bus in 8086. Explanation : 02 marks Diagram :03 marks
B	What is Mixed Language Programming? Illustrate with example.

	Explanation : 03 marks Example program :02 marks
C	Sketch the Interrupt structure of 8086 and describe. Explanation : 03 marks Diagram :02 marks
D	State BSR mode of 8255 in detail. Explanation : 03 marks CWR format :02 marks
E	Enumerate the operating modes of 80386. Explanation : 05 marks
F	How flushing of pipeline problem is minimized in Pentium Architecture. Explanation : 05 marks

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Describe the Maximum Mode of 8086 in detail. Explanation : 06 marks Diagram : 04 marks
B	Summarize the Addressing modes of 8086. Explanation : 05 marks Examples: 05 marks
C	Cascading of 8259 ICs Explanation : 04 marks Diagram :06 marks

University of Mumbai

Examination 2020 under cluster _4_ (Lead College: _Pillai)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: **CSC502** and Course Name: **Database Management System** ___

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Derived attribute means
Option A:	Attribute can be divided into smaller subparts
Option B:	Attribute that are not divisible
Option C:	Attribute which have different number of values for a entity
Option D:	Value of the attribute can be determined from the other attribute value
2.	Create a new relation and include foreign key attribute refer to the primary key attribute of participating entity type is which type of mapping?
Option A:	Mapping of binary M:N relationship type
Option B:	Mapping of binary 1:1 relationship type
Option C:	Mapping of binary 1:N relationship type
Option D:	Mapping of binary N:1 relationship type
3.	It is a virtual table through which a selective portion of the data from one or more tables can be seen
Option A:	Trigger
Option B:	View
Option C:	Normalization
Option D:	Transaction
4.	Which of the following are not components of the DBMS architecture?
Option A:	Query Optimizer
Option B:	Transaction manager
Option C:	File manager
Option D:	Entity relationship model
5.	A relation is in ___iff in every non-trival functional dependency X Y , X is a super key
Option A:	Normalization
Option B:	Transaction
Option C:	3NF
Option D:	BCNF
6.	For the following given database, identify the correct result for the given SQL query Employee(eid, ename, street, city)

	Works(eid, cid, salary) Company(cid, cname, city) Query: Display name of the employee who has highest salary. SQL query : Select ename from employee where eid in(select eid from Works where salary in(select max(salary) from Works));
Option A:	It generates an error because of use of nested subquery.
Option B:	It executes but does not give the correct result.
Option C:	It executes and gives the correct result.
Option D:	It generates an error because of pairwise comparison.
7.	Select the name of employee, dname from tables employee and department join on common attribute dno where employee address and department location is same.
Option A:	$\Pi_{ename}\ \sigma_{(Emp.dno=Dept.dno}$ (Emp x Dept))
Option B:	$\Pi_{ename,dname}\ \sigma_{(Emp.dno=Dept.dno\ \wedge\ (Emp.address = Dept.location)}$ (Emp x Dept)
Option C:	$\sigma_{(Emp.dno=Dept.dno\ \wedge\ (Emp.address = Dept.location)}\ \Pi_{dname}$ (Emp x Dept)
Option D:	$\Pi_{ename,dname}\ \sigma_{(Emp.address = Dept.location)}$ (Emp x Dept)
8.	___ protocol has a growing phase, where all the locks are being acquired by the transaction; and the second phase is shrinking, where the locks held by the transaction are being released.
Option A:	Lock based protocol
Option B:	Timestamp based protocol
Option C:	Two phase lock protocol
Option D:	Strict two phase locking
9.	DDL and DML command is used to delete records from the table
Option A:	DROP & DELETE
Option B:	TRUNCATE & DELETE
Option C:	UPDATE & DROP
Option D:	ALTER & TRUNCATE
10.	R (A,B,C,D,E) and dependency A B B E and C D relation R is in which normalform?
Option A:	1NF
Option B:	2NF
Option C:	3NF
Option D:	BCNF
11.	Schedule S1:R1(A) W1(A) R2(A) W2(A) R1(B) W1(B) R2(B) W2(B) is_____
Option A:	Conflict serializable
Option B:	Non conflicting serializable
Option C:	Both Conflict and View serializable
Option D:	Non view serializable
12.	R (A ,B ,C, D, E, F, G, H) and dependency AB C A DE B F and F GH

	relation R is in which normal form?
Option A:	BCNF
Option B:	3NF
Option C:	2NF
Option D:	1NF
13.	For the following given database ,write SQL queries Employee(eid, ename, street, city) Works(eid, cid, salary) Company(cid, cname, city) Find the total number of employees working in the company where cname= ‘ TCS’.
Option A:	select count(eid) from employee where cid in (select cid from Company where cname='TCS');
Option B:	select count(eid) from employee where eid in(select eid from Works);
Option C:	select count(eid) from employee where eid in(select eid from Works where cid in (select cid from Company where cname='TCS'));
Option D:	select count(eid) from employee where eid in(select eid from Works where cid in (select cid from Company));
14.	Consider the join of a relation R with a relation S. If K has m tuples and S has n tuples, then the maximum and minimum sizes of the join respectively are:
Option A:	m+n and m-n
Option B:	m+n and 0
Option C:	mn and 0
Option D:	mn and m+n
15.	Student (ssn, name, subject, dob); Course(cid, name, dept); Enroll(ssn, cid, sem, grade) Find the ssn and student name who enrolled for the course id=101; SQL query for this is i) select ssn , name from student where ssn in (select ssn from enroll where cid =101); and ii) select student.ssn, name from student,enroll where student.ssn=enroll.ssn and cid=101;
Option A:	SQL query i) and ii) both queries are not correct
Option B:	SQL query i) and ii) both queries are correct
Option C:	SQL query i) is correct but ii) is not correct
Option D:	SQL query i) is not correct but ii)is correct
16.	Which of the following is not a function of DBA?
Option A:	Storage structure and Access method definition
Option B:	Approving data access
Option C:	Schema definition
Option D:	Use of user interface of database applications

17.	Which one of the following is correct notation in E-R diagram?
Option A:	Entities are oval
Option B:	Relationships are rectangle
Option C:	Attributes are diamonds
*Option D:	Weak entities are double rectangle
18.	Using Relational Algebra the query that finds name of employees, who have age over 50 years
Option A:	Π employee_name(σ age >50 (employee))
Option B:	σ employee_name(Π age>=50(employee))
Option C:	Π employee_name(Π age>50 (employee))
Option D:	Π age(σ age >50(employee))
19.	___is a special type of integrity constraint that relates two relations & maintains consistency across the relations.
Option A:	Entity Integrity Constraints
Option B:	Domain Integrity Constraints
Option C:	Domain Constraints
Option D:	Referential Integrity Constraints
20.	No other transaction should be able to view any partial result of the actions of a transaction
Option A:	Consistency
Option B:	Isolation
Option C:	Durability
Option D:	Atomicity

subjective/descriptive questions

Q2 (20 Marks)	**Solve any Four out of Six** **5 marks each**
A	Write applications of database system. Draw and explain three-schema architecture.
B	Explain mapping of ER (for strong ,weak entities and M:N cardinality between entities) to relational schema with example.
C	Write a trigger for the particular event and perform action with suitable example
D	What is conflict serializability. Write one example by considering schedule with conflict equivalent and conflict serializable.
E	R (A B C D E) and dependency CE D , D B and C A Identify the relation is in which normal form?
F	Write deadlock- prevention schemes using timestamp concurrency protocol with example.

Q3. (20 Marks)	**Solve any Two Questions out of Three** **10 marks each**
A	department(dnum, dname, dlocation); employee (empid , ename , address, salary, dno) ; i) Display employee id, employee name and department number who are working for 'research' department ii) Display employee id, name and salary of all employees order by salary. iii) Display department number and sum of salary of all departments. iv) Display department number and average salary of the ' R&D' department . v) Update the address of the employee as "Delhi" who is working in the 'Account' department
B	Draw EER diagram and create Relational schema for Library management system. Library contains Books and Magazines. Students, faculties and staff are the members who borrow and return the books/Magazines.. Books have title, author, publication, price and number of books. Magazines have title, publisher, date etc. Library staff keeps track of the members, issue and return data and and fine calculation1.
C	Define 3 NF and Boyce Codd Normal form (BCNF). Consider any relational schema and convert it into BCNF , by considering valid data records.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: __Pillai___)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: _**Computer Engineering**

Curriculum Scheme: Rev 2016)

Examination: TE Semester : V

Course Code: CSC502 and Course Name: Database Management System

Time: 2 hour Max. Marks: 80

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

Solution

Q2 R(A B C D E)
And FD are CE D , D B and C A
Identify the relation is in which normal form?

Solution :

R (A B C D E)
(CE)+ = { C E D B A }

BCNF α β (then α should be super key OR β should be prime attribute) in FD1 CE is SK so first FD is in BCNF

Second FD2 D B (D is not SK OR B is not s prime attribute)

So R is not in BCNF

Transitive dependency is there so R is not in 3NF (FD1 and FD2 ie. CE D and D B)

Third FD3 C A (C is pat of candidate key and A is non prime attribute) So partial dependency
So R is not in 2NF.
So relation R is in 1NF.

Q3 A) department(dnum, dname, dlocation);

employee (empid , ename , address, salary, dno) ;

i) Display employee id, employee name and department number who are working for 'research' department
ii) Display employee id, name and salary of all employees order by salary.
iii) Display department number and sum of salary of all departments.
iv) Display department number and average salary of the ' R&D' department .

v) Update the address of the employee as "Delhi" who is working in the 'Account' department

Solution :

i) select empid, ename,dnum from employee,department where employee.dno=department.dnum and dname=’research’;

ii) select empid,ename,salary from employee order by salary ;

iii) select dno, sum(salary) from employee group by dno;

iv) select dno,avg(salary) from employee group by dno having dno=2;

v) update employee set address=' Delhi' where dno in (select dnum from department where dname=' Account');

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai,New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: CSC503 and Course Name: Computer Networks

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.	Bits are packaged into frames at which layer of the OSI model?
Option A:	Transport
Option B:	Data Link
Option C:	Network
Option D:	Physical
2.	Automatic repeat request error management mechanism is provided by
Option A:	logical link control sublayer
Option B:	media access control sublayer
Option C:	network interface control sublayer
Option D:	application access control sublayer
3.	Start and stop bits used in serial communication for
Option A:	Error Detection
Option B:	Error Correction
Option C:	Synchronization
Option D:	Listening for sender and receiver
4.	In IPv4 protocol, each datagram is handled _____
Option A:	dependently
Option B:	independently
Option C:	priority basis
Option D:	systematically
5.	The sizes of source and destination port address in TCP header are _____ respectively

Option A:	16-bits and 32-bits
Option B:	16-bits and 16-bits
Option C:	32-bits and 16-bits
Option D:	32-bits and 32-bits
6.	The _____ translates internet domain and host names to IP address.
Option A:	routing information protocol
Option B:	network time protocol
Option C:	HTTP
Option D:	Domain name system
7.	UDP and TCP are both _____ layer protocols.
Option A:	Network
Option B:	Data link
Option C:	Session
Option D:	Transport
8.	In Bluetooth, the _____layer is roughly equivalent to the MAC sublayer in LANs.
Option A:	Baseband
Option B:	Radio
Option C:	L2CAP
Option D:	Internet
9.	Header of datagram in IPv4 has _____
Option A:	0 to 20 bytes
Option B:	20 to 60 bytes
Option C:	20 to 80 bytes
Option D:	20 to 40 bytes
10.	An interconnected collection of piconet is called ___
Option A:	Scatternet
Option B:	Micronet
Option C:	Mininet
Option D:	Multinet
11.	Application layer offers _____ service.
Option A:	process to process
Option B:	end to end
Option C:	node to node
Option D:	Packet to packet

12.	Which constructor of Datagram Socket class is used to create a datagram socket and binds it with the given Port Number?
Option A:	Datagram Socket(int port)
Option B:	Datagram Socket()
Option C:	Datagram Socket(int port, Int Address address)
Option D:	Datagram Socket(int address)
13.	_____ cable consists of an inner copper core and a second sheath.
Option A:	twisted-pair
Option B:	coaxial
Option C:	Fiber-optic
Option D:	shielded twisted-pair
14.	All computers are connected to the single backbones. Which topology is that?
Option A:	star
Option B:	bus
Option C:	ring
Option D:	mesh
15.	Transport layer aggregates data from different applications into a single stream before passing it to _____
Option A:	physical layer
Option B:	presentation layer
Option C:	session layer
Option D:	network layer
16.	Each channel in Bluetooth layer is of
Option A:	1MHz
Option B:	2MHz
Option C:	3MHz
Option D:	4MHz
17.	When does the station B send a positive acknowledgement (ACK) to station A in Stop and Wait protocol?
Option A:	only when no error occurs at the transmission level
Option B:	when retransmission of old packet in a novel frame is necessary

Option C:	only when station B receives frame with errors
Option D:	only when station B does not receive the frames
18.	When a host on network A sends a message to a host on network B, which address does the router look at?
Option A:	Port
Option B:	MAC
Option C:	logical
Option D:	physical
19	An endpoint of an inter-process communication flow across a computer network is called _____
Option A:	socket
Option B:	port
Option C:	link
Option D:	system
20.	Which OSI layer allows the transmission and reception of data segments to a session layer in addition to the provision of flow control, sequence numbering and message acknowledgment?
Option A:	Data link layer
Option B:	Session layer
Option C:	Transport layer
Option D:	Application layer

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	List out the different error detection techniques? Explain any one of them.
B	Illustrate OSI reference model in detail with neat diagram.
C	Explain three way handshake techniques in TCP.

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Discuss different types of guided media in detail
B	Explain following protocols- 1) DNS 2)Telnet
C	What is IPV4 Protocol? Explain the header format of IPV4 in detail.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Re2016

Examination:TE Semester :-V

Course Code: CSC503 and Course Name: Computer Engineering

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.	A
Q3.	C
Q4	B
Q5	B
Q6	D
Q7	D
Q8.	A
Q9.	B
Q10.	A
Q11.	B
Q12.	C
Q13.	B
Q14.	B
Q15.	D
Q16.	A
Q17.	A
Q18.	C
Q19.	A
Q20.	C

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: CSC504 and Course Name: Theory of Computer Science

Time: 2 hour Max. Marks: 80

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1.	Which symbol is used to represent a Transition Function of Finite Automata?
Option A:	β
Option B:	δ
Option C:	∑
Option D:	ε
2.	What is the language of Finite Automata?
Option A:	Recursive Language
Option B:	Context-Sensitive Language
Option C:	Regular Language
Option D:	Context-Free Language
3.	Number of states in NFA are
Option A:	Less than or equal to equivalent DFA
Option B:	Less than equivalent DFA
Option C:	Greater than equivalent DFA
Option D:	Greater than or equal to equivalent DFA
4.	What is the correct form of productions in Chomsky Normal Form?
Option A:	A -> aB
Option B:	A - > BC
Option C:	A -> B
Option D:	A -> Ba
5.	The language WCW^R is accepted by-
Option A:	Moore Machine
Option B:	Non-Deterministic Finite Automata
Option C:	Deterministic Finite Automata
Option D:	Pushdown Automata
6.	The transition δ (q1,a,a) = (q_f, ε) of PDA is -
Option A:	Performing delete and pop operation
Option B:	Performing delete operation only
Option C:	Performing pop operation only
Option D:	Performing push operation
7.	What is the language of Turing machine?
Option A:	Regular language
Option B:	Context free language

Option C:	Recursive enumerable language
Option D:	Context sensitive language
8.	What is the limitation of regular grammar?
Option A:	Can generate simple strings
Option B:	Can only describe regular language
Option C:	Can't generate long strings
Option D:	Too difficult to understand
9.	DFA designed to accept strings with no more than 2 a's can accept:
Option A:	a b a b
Option B:	a b a a
Option C:	b a a a
Option D:	a b a b a b a b
10.	The length of Moore machine compared to Mealy machine is:
Option A:	Equal to Mealy machine for given input
Option B:	Smaller than Mealy machine for given input
Option C:	One smaller than Mealy machine for given input
Option D:	One longer than Mealy machine for given input
11.	Derivation process is one which-
Option A:	Parses given string
Option B:	Generates new string
Option C:	Convert string to right linear grammar
Option D:	Convert string to left linear grammar
12.	Language of PDA is:
Option A:	Recursively Enumerable language
Option B:	Regular Language
Option C:	Context sensitive language
Option D:	Context free language
13.	The tuple Σ in Turing machine represents-
Option A:	Tape symbol
Option B:	Output symbol
Option C:	Tape alphabet
Option D:	Input alphabet
14.	A Turing Machine can compute problems which are-
Option A:	Complex
Option B:	Simple
Option C:	Unsolvable
Option D:	Computable
15.	Which of the following languages are most suitable for implement context free languages ?
Option A:	C
Option B:	Perl

Option C:	Assembly Language
Option D:	Compiler language
16.	With reference to the process of conversion of a context free grammar to CNF, the number of variables to be introduced for the terminals are: S->AB0 A->001 B->A1
Option A:	3
Option B:	4
Option C:	2
Option D:	5
17.	Next move function δ of a Turing machine M = (Q, Σ , Γ, δ, q0, B, F) is a mapping
Option A:	δ : Q x Σ --> Q x Γ
Option B:	δ : Q x Γ ---> Q x Σ x {L, R}
Option C:	δ : Q x Σ ---> Q x Γ x {L, R}
Option D:	δ : Q x Γ ---> Q x Γ x {L, R}
18.	Which of the following grammars are in Chomsky Normal Form:
Option A:	S->AB|BC|CD, A->AB B->CD, C->2, D->3
Option B:	S->AB, S->BCA|0|1|2|3
Option C:	S->ABa, A->aab, B->Ac
Option D:	S->ABa, A->AAB, B->Ac
19.	Halting states are of two types. They are:
Option A:	Accept and Reject
Option B:	Reject and Allow
Option C:	Start and Reject
Option D:	Start and Stop
20.	Which of the following relates to Chomsky hierarchy?
Option A:	Regular<CFL<CSL<Unrestricted
Option B:	CFL<CSL<Unrestricted<Regular
Option C:	CSL<Unrestricted<CF<Regular
Option D:	CSL<Unrestricted< Regular<CF

Q2 .	**Solve any Four questions out of Six . 5 marks each**
A	Construct DFA to accept strings that ends with substring 110 for Σ={0,1}
B	Design a Moore machine which counts the occurrence of substring aab in an input string.
C	Give Regular Expressions for i) For all strings over a,b which contains exactly 3 occurrence of b over Σ={a,b} ii) For all strings over 0,1 that starts with 10 and ends with 01
D	Let G be the grammar having the following set of production. S□ ABA,

	A□ aA | bA | ϵ B□ bbb Find LMD and RMD for string “ababbbba”
E	Write Short Note on Chomsky Hierarchy
F	Write Short Note on Post Correspondence Problem

Q3.	**Solve any Two Questions out of Three 10 marks each**
A	Convert the given grammar G to CNF. G: S -> a | aA | B |C , A -> aB | ε , B -> Aa, C -> aCD | a, D -> ddd.
B	Design a Turing Machine for 2’s Compliment of a binary number
C	Design PDA for odd length palindrome let $\Sigma = \{0, 1\},\ L = \{WCW^R\}\ where\ W \in \Sigma^*$

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: CSC504 and Course Name: Theory of Computer Science

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	B
Q5	D
Q6	C
Q7	C
Q8.	B
Q9.	A
Q10.	D
Q11.	B
Q12.	D
Q13.	D
Q14.	D
Q15.	C
Q16.	B
Q17.	D

Q18.	A
Q19.	A
Q20.	A

2A

	0	1
$\rightarrow q_s$	q_0	q_1
0 q_0	q_0	q_1
1 q_1	q_0	q_2
11 q_2	q_3	q_2
110 q_3*	q_0	q_1

2B

	a	b	λ
$\rightarrow q_s$	q_0	q_1	0
a q_0	q_0	q_1	0
b q_1	q_0	q_2	0
aa q_2	q_3	q_2	0
aab q_3	q_0	q_1	1

2C

i a*ba*ba*ba*

ii 10(1+0)*01

2D

S⟶ABA
⟶aABA
⟶abABA
⟶abaABA
⟶ababABA
⟶ababεBA

→ababBA
→abababbbA
→ababbbbaA
→abababbbaε
→abababbba

2E

```
Type 0 known as unrestricted grammar.
Type 1 known as context sensitive grammar.
Type 2 known as context free grammar.
Type 3 Regular Grammar.
```

2F

Post Correspondence Problem is a popular undecidable problem. It is simpler than Halting Problem.

In this problem we have N number of **Dominos** (tiles). The aim is to arrange tiles in such order that string made by Numerators is the same as string made by Denominators.

In simple words, let's assume we have two lists both containing N words, and aim is to find out concatenation of these words in some sequence such that both lists yield same result.

3A

Simplified

S→a/aCD
E--> a
C→aCD/a
D→ddd

CNF

S→a/R_1R_2
E--> a
C→R_1R_2/a
D→R_3R_4
R_1→a
R_2→CD
R_3→d
R_4→R_3R_3

3B

- **Step-1.** First ignore all 0's and 1's and go to right & then if B found go to left.
- **Step-2.** Then ignore all 0's and go left, if 1 found go to left.
- **Step-3.** Convert all 0's into 1's and all 1's into 0's and go to left & if B found go to right and **stop the machine.**

3C

$\delta(q0, a, Z) = (q0, aZ)$
$\delta(q0, a, a) = (q0, aa)$
$\delta(q0, b, Z) = (q0, bZ)$
$\delta(q0, b, b) = (q0, bb)$
$\delta(q0, a, b) = (q0, ab)$
$\delta(q0, b, a) = (q0, ba)$
$\delta(q0, c, a) = (q1, a)$
$\delta(q0, c, b) = (q1, b)$
$\delta(q1, b, b) = (q1, \varepsilon)$
$\delta(q1, a, a) = (q1, \varepsilon)$
$\delta(q1, \varepsilon, Z) = (qf, Z)$

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester: V

Course Code: CSDLO5011 and Course Name: Multimedia System

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 two marks each. (40 marks)**
1.	There are _____ main elements in multimedia.
Option A:	Four
Option B:	Five
Option C:	Eight
Option D:	Seven
2.	The text color in a presentation should contrast with the color.
Option A:	CPU
Option B:	Frame
Option C:	Stack
Option D:	Background
3.	Images included in many software titles are called _____.
Option A:	Clipart
Option B:	Popups
Option C:	.jpg files
Option D:	.tiff files
4.	MP3 is in which of the following MPEG standards?
Option A:	MPEG1
Option B:	MPEG2
Option C:	MPEG3
Option D:	MPEG21
5.	RLE stand for
Option A:	Run Length Encoding
Option B:	Run Line Encoding
Option C:	Reverse Length Encoding
Option D:	Return length Encoding
6.	Block size in block preparation step of JPEG compression is
Option A:	4 X 4
Option B:	8 X 8
Option C:	16 X 16
Option D:	64 X 64
7.	H.261 Video bit stream contains
Option A:	2 Layers

Option B:	5 Layers
Option C:	4 Layers
Option D:	No Layers
8.	MIDI is a/an
Option A:	Protocol
Option B:	Device
Option C:	LAN
Option D:	WAN
9.	Multimedia means the use of more than one _____ in communication.
Option A:	File
Option B:	Number
Option C:	Media
Option D:	sound system
10.	A smaller version of an image is called a:
Option A:	Clipart
Option B:	Bitmap
Option C:	portable network graphic
Option D:	Thumbnail
11.	What does Avi stand for
Option A:	Audio for voice on internet
Option B:	Audio voice interleaved
Option C:	Audio video interleaved
Option D:	Adapted video for internet
12.	MPEG stands for
Option A:	Motion Picture Express Group
Option B:	Motion Picture Expert Group
Option C:	Motion Picture Export Group
Option D:	Motion Picture Enhancement group
13.	MMF means
Option A:	Mutimedia System
Option B:	Mutimedia Messaging Services
Option C:	Mutimedia Messaging System
Option D:	Multimedia Services
14.	Conversion of a analog waves to a digital format called
Option A:	Echo
Option B:	Sampling
Option C:	Frequency
Option D:	Sound forge
15.	The multimedia element that makes object move is called _____.
Option A:	Audio
Option B:	Video

Option C:	Graphic
Option D:	Animation
16.	The process of planning your multimedia presentation is known as a:
Option A:	Design
Option B:	Storyboard
Option C:	Development
Option D:	Layout
17.	PAL is a/an
Option A:	Digital video standard
Option B:	Analog Video Standard
Option C:	Audio File standard
Option D:	Text File standard
18.	What is JPEG?
Option A:	Joint- Photographic Experts Group
Option B:	Joint – Picture Experts Group
Option C:	Joint- Photographic Execution Group
Option D:	Joint- Picture Execution Group
19.	How many color depth results in the images looks murky?
Option A:	<225
Option B:	<8
Option C:	<16
Option D:	<256
20.	Which compression provides some loss of quality?
Option A:	Lossy
Option B:	Object – based
Option C:	Cel – based
Option D:	Loss less

Q2.	**Solve any Four out of Six (5 marks each)**
A	Differentiate between RTF and TIFF
B	Explain in brief the different redundancies in images.
C	What is an authoring system? Why it is needed?
D	Differentiate between the Gray and Color image.
E	Discuss the characteristics of Sound wave and their digital representation.
F	Differentiate between the Multimedia Database and Normal Database

Q3.	**Solve any Two Questions out of Three (10 marks each)**
A	Discuss the importance of Steganography. Explain the working of LSB with an example.
B	Why quality of service is important in network communication for multimedia data. Discuss the protocols to achieve the quality.
C	Differentiate the different audio compression techniques. Justify DPCM performs better compression the PCM with suitable example.

University of Mumbai

Examination 2020 under cluster 4(Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester: V

Course Code: CSDLO5011 and Course Name: Multimedia System

Time: 2 hours Max. Marks: 80

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

University of Mumbai

Examination 2020 under cluster 4(Lead College: PCE, New Panvel)

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

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester: V

Course Code: CSDLO5011 and Course Name: Multimedia System

Time: 2 hours Max. Marks: 80

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Q2	**Solve any Four out of Six (5 marks each)**
A	Differentiate between RTF and TIFF

Name	RTF	TIFF
Full name	Rich Text Format	Tagged Image File Format
File extension	.rtf	.tiff, .tif
MIME	text/rtf, application/rtf	image/tiff, image/tiff-fx
Developed by	Microsoft	Adobe Systems
Type of format	Document file format	Image file format
Introduction	The Rich Text Format (often abbreviated RTF) is a proprietary document file format with published specification developed by Microsoft Corporation for cross-platform document interchange with Microsoft products. Most word processors are able to read and write some versions of RTF.	TIFF is a computer file format for storing raster graphics images, popular among graphic artists, the publishing industry and photographers. The TIFF format is widely supported by image-manipulation applications, by publishing and page layout applications, and by scanning faxing, word processing, optical character recognition an other applications.
Technical details	Unlike many word processing formats, RTF code can be human-readable: when an RTF file is viewed as a plain text file, the contained ASCII text is legible. The formatting code is not too distracting nor counter-intuitive, provided that the document's creator kept formatting concise.	A TIFF file, for example, can be a container holding JPEG (lossy) and PackBits (lossless) compressed images. A TIFF also can include a vector-based clipping path (outlines, croppings, image frames). The ability to store image data a lossless format makes a TIFF file a useful image archive
Associated programs	WordPad, LibreOffice, Microsoft Word.	Microsoft Windows Photo Viewer, Corel PaintShop, GIMP ACDSee, Adobe Photoshop
Sample file	sample.rtf	sample.tiff

B	Explain in brief the different redundancies in images.

	• **Coding Redundancy:**
	  ◦ Coding redundancy is associated with the representation of information.
	  ◦ The information is represented in the form of codes.
	  ◦ If the gray levels of an image are coded in a way that uses more code symbols than absolutely necessary to represent each gray level then the resulting image is said to contain coding redundancy.
	• **Inter-pixel Spatial Redundancy:**
	  ◦ Interpixel redundancy is due to the correlation between the neighboring pixels in an image.
	  ◦ That means neighboring pixels are not statistically independent. The gray levels are not equally probable.
	  ◦ The value of any given pixel can be predicated from the value of its neighbors that is they are highly correlated.
	  ◦ The information carried by individual pixel is relatively small. To reduce the interpixel redundancy the difference between adjacent pixels can be used to represent an image.
	• **Inter-pixel Temporal Redundancy:**
	  ◦ Interpixel temporal redundancy is the statistical correlation between pixels from successive frames in video sequence.
	  ◦ Temporal redundancy is also called interframe redundancy. Temporal redundancy can be exploited using motion compensated predictive coding.
	  ◦ Removing a large amount of redundancy leads to efficient video compression.
	• **Psychovisual Redundancy:**
	  ◦ The Psychovisual redundancies exist because human perception does not involve quantitative analysis of every pixel or luminance value in the image.
	  ◦ It's elimination is real visual information is possible only because the information itself is not essential for normal visual processing.

C	What is an authoring system? Why it is needed? An **authoring system** is a program that has pre-programmed elements for the development of interactive multimedia software titles. ... Generally **authoring systems** provide many graphics, much interaction, and other tools educational software **needs**. It generally takes about 1/8th the time to develop an interactive multimedia project, such as a CBT (Computer Based Training) program, in an authoring system as opposed to programming it in compiled code. This means 1/8 the cost of programmer time and likely increased re-use of code (assuming that you pass this project's code to the next CBT project, and they use a similar or identical authoring system). However, the content creation (graphics, text, video, audio, animation, etc.) is not generally affected by the choice of an authoring system; any production time gains here result from accelerated prototyping, not from the choice of an authoring system over a compiled language.
D	Differentiate between the Gray and Color image. **Grayscale** is 8-bit while **color** is 24-bit. But some **colour images** are 8 bits per pixel, eg **images** with a pallette. And some greyscale **images** are 24 bits per pixel (one channel of 24 bits, or 3 equal channels of 8 bits).
E	Discuss the characteristics of Sound wave and their digital representation. **Sound** is a longitudinal **wave** which consists of compressions and rarefactions travelling through a medium. **Sound wave** can be described by five **characteristics**: Wavelength,

	Amplitude, Time-Period, Frequency and Velocity or Speed. The minimum distance in which a **sound wave** repeats itself is called **its** wavelength.
F	Differentiate between the Multimedia Database and Normal Database. A **Multimedia database** (**MMDB**) is a collection of related for multimedia data. The multimedia data include one or more primary media data types such as text, images, graphic objects (including drawings, sketches and illustrations) animation sequences, audio and video.) A **database** is a collection of information that is organized so that it can be easily accessed, managed and updated. Computer **databases** typically contain aggregations of data records or files, containing information about sales transactions or interactions with specific customers.

Q3.	**Solve any Two Questions out of Three (10 marks each)**
A	Discuss the importance of Steganography. Explain the working of LSB with an example. The purpose of **steganography** is covert communication to hide a message from a third party. This differs from cryptography, the art of secret writing, which is intended to make a message unreadable by a third party but does not hide the existence of the secret communication. The **Least Significant Bit** (**LSB**) **steganography** is one such technique in which **least significant bit** of the image is replaced with data bit. As this method is vulnerable to **steganalysis** so as to make it more secure we encrypt the raw data before embedding it in the image.
B	Why quality of service is important in network communication for multimedia data. Discuss the protocols to achieve the quality. Quality of service is important for real-time streaming multimedia applications such as voice over IP, multiplayer online games and IPTV, since these often require fixed bit rate and are delay sensitive. Quality of service is especially important in networks where the capacity is a limited resource, for example in cellular data communication. A network or protocol that supports QoS may agree on a traffic contract with the application software and reserve capacity in the network nodes, for example during a session establishment phase. During the session it may monitor the achieved level of performance, for example the data rate and delay, and dynamically control scheduling priorities in the network nodes. It may release the reserved capacity during a tear down phase. A best-effort network or service does not support quality of service. An alternative to complex QoS control mechanisms is to provide high quality communication over a best-effort network by over-provisioning the capacity so that it is sufficient for the expected peak traffic load. The resulting absence of network congestion reduces or eliminates the need for QoS mechanisms. QoS is sometimes used as a quality measure, with many alternative definitions, rather than referring to the ability to reserve resources. Quality of service sometimes refers to the level of quality of service, i.e. the guaranteed service quality.[3] High QoS is often confused with a high level of performance, for example high bit rate, low latency and low bit error rate. QoS is sometimes used in application layer services such as telephony and streaming video to describe a metric that reflects or predicts the subjectively experienced quality. In this context, QoS is the acceptable cumulative effect on subscriber satisfaction of all imperfections affecting the service. Other terms with similar meaning are the quality of experience (QoE), mean opinion score (MOS), perceptual speech quality measure (PSQM) and perceptual evaluation of video quality (PEVQ). See also Subjective video quality.

C	Differentiate the different audio compression techniques. Justify DPCM performs better compression the PCM with suitable example.

S.NO	PCM	DPCM
1.	PCM stands for Pulse Code Modulation.	While DPCM stands for Differential Pulse Code Modulation.
2.	In PCM, feedback is not provided.	While in DPCM, feedback is provided.
3.	It has good signal to noise ration.	While it has moderate signal o noise ratio.
4.	It is less efficient than DPCM.	While it is more efficient than PCM.
5.	For transmission channel, PCM needs high bandwidth(B).	Whereas DPCM needs less bandwidth(B) than PCM.
6.	PCM is complex than DPCM in terms of complexity.	While DPCM is simple in terms of complexity.
7.	In PCM, seven bits are transmitted per eight sample.	In DPCM, four bits are transmitted per six sample.
8.	In PCM, for transmitting bits rate varies from fifty five to sixty four.	While in DPCM, for transmitting bits rate varies from thirty two to forty eight.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: CSDLO5012 and Course Name: Advanced Operating Systems

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.	Which of the following is not a function of operating system?
Option A:	Program execution
Option B:	Accounting and CPU Utilization
Option C:	Memory Management
Option D:	Virus Protection
2.	The process control subsystem is responsible for the following except
Option A:	Process synchronization
Option B:	Inter process communication
Option C:	Retrieving data for users
Option D:	Process scheduling
3.	The file subsystem has following structure. Except:
Option A:	The boot block
Option B:	The process table
Option C:	The super block
Option D:	The inode list
4.	The kernel caches the data in the buffer pool according to
Option A:	Least Recently Used Algorithm
Option B:	First in First Out Algorithm
Option C:	Optimal Used Algorithm
Option D:	Least Frequently Used Algorithm
5.	Which of the following algorithm is used to assign new inodes?
Option A:	Ialloc
Option B:	Iget
Option C:	Namei
Option D:	Getblk
6.	What is the ready to run, swapped state of a process?
Option A:	The process is executing in user mode
Option B:	The process is ready to run, but the swapper must swap the process into main memory before the kernel can schedule it to execute
Option C:	The process is not executing but is ready to run as soon as the kernel schedules it
Option D:	The process is sleeping, and the swapper has swapped the process to secondary storage to make room for other processes in main memory

7.	Which of the following describe the state of a process?
Option A:	Per process region table
Option B:	The region table
Option C:	The process table
Option D:	The segment table
8.	The consists of the process text, data, stack, and shared data regions
Option A:	Memory level context
Option B:	Register context
Option C:	System-level context
Option D:	User-level context
9.	The kernel allocates a new region during following system calls except:
Option A:	Fork
Option B:	Exec
Option C:	Exit
Option D:	Shmat
10.	In process state transition, Created is the start state for all processes except process
Option A:	1
Option B:	0
Option C:	2
Option D:	3
11.	A directory is a file whose data is a sequence of entries, each consisting of
Option A:	Inode number and file name
Option B:	File type, file name and file size
Option C:	File type, file name and i-node
Option D:	File type and i-node
12.	Which of the following is a design issue in distributed system structure?
Option A:	Threads
Option B:	Reliability & fault tolerance
Option C:	Global knowledge
Option D:	Processor scheduling
13.	Following are the distributed computing models except
Option A:	Client server model
Option B:	Minicomputer model
Option C:	Workstation Model
Option D:	Processor Pool Model
14.	Which of the following is not based on the vicinity and accessibility of the main memory to the processors?
Option A:	UMA
Option B:	NUMA
Option C:	NORMA

Option D:	SISD
15.	All runnable tasks of an application are scheduled on the processors simultaneously by
Option A:	Smart scheduling
Option B:	Affinity based scheduling
Option C:	Gang Scheduling
Option D:	Co-scheduling algorithm
16.	Which of the following is not a major cause of performance degradation in multiprocessor systems?
Option A:	Preemption inside spinlock controlled critical section
Option B:	Fault tolerance
Option C:	Context switching overhead
Option D:	Cache corruption
17.	Which of the following is not a structure of multiprocessor operating systems?
Option A:	The processor pooled model
Option B:	The separate supervisor configuration
Option C:	The master slave configuration
Option D:	The symmetric configuration
18.	The real time operating system
Option A:	Gives same priority to all processes
Option B:	Serves a task by its deadline period
Option C:	Does process scheduling only once
Option D:	Does not require a Kernel
19.	iOS stands for
Option A:	Internetwork operating system
Option B:	Internet operating system
Option C:	iphone operating System
Option D:	Intra operating system
20.	In Which of the following the applications and services run on a distributed network using virtualized resources?
Option A:	Distributed computing
Option B:	Soft computing
Option C:	Parallel computing
Option D:	Cloud computing

Q2. (20 Marks)	**Solve any Four out of Six** **5 marks each**
A	List various design approaches of an Operating System. Explain any two of them in detail.
B	Describe the structure of buffer header. Discuss any one scenario that kernel may follow to allocate a disk block.
C	Explain process table and U area in detail.
D	Explain various distributed computing models in detail.
E	Based on whether a memory location can be directly accessed by a processor or not, explain tightly coupled and loosely coupled systems.
F	What are the characteristics of real time operating system?

Q3. (20 Marks)	
A	**Solve any Two out of Three** **5 marks each**
i.	What is a superblock? Elaborate on its structure and role in operating system.
ii.	Explain access, location, concurrency and fault transparency.
iii.	Explain various issues in processor scheduling in detail.
B	**Solve any One out of Two** **10 marks each**
i.	With the help of neat diagram discuss the process states and state transitions with respect to Unix OS.
ii.	Explain the architecture of android along with its main components in detail.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: CSDLO5012 and Course Name: Advanced Operating Systems

Time: 2 hours Max. Marks: 80

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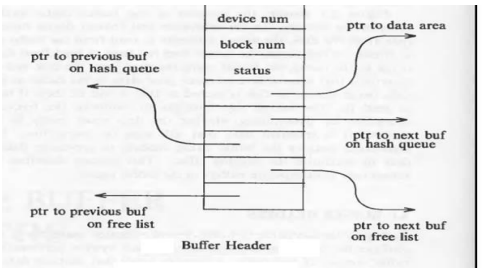
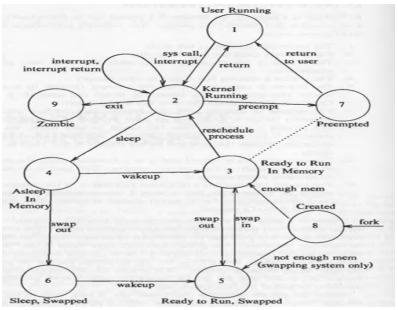
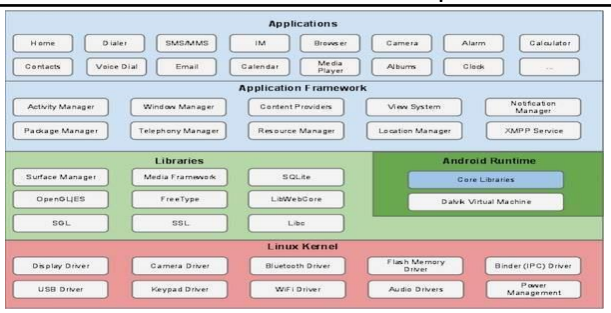
Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	C
Q3.	B
Q4	A
Q5	A
Q6	B
Q7	C
Q8.	D
Q9.	C
Q10.	B
Q11.	A
Q12.	C
Q13.	A
Q14.	D
Q15.	D
Q16.	B
Q17.	A
Q18.	B
Q19.	C
Q20.	D

Q.2 (A)	Needs to explain any two of the following in detail with diagram. (5 Marks) 1. Layered approach 2. The Kernel based approach 3. The virtual machine approach
Q.2 (B)	**Structure of buffer header (2 Marks)** **Explain any one scenario (3 Marks)**  The five typical scenarios that kernel may follow in getblk to allocate a buffer in the disk block are • Block in the hash queue, and its buffer is free. • Cannot find block on the hash queue => allocate a buffer from free list. • Cannot find block on the hash queue => allocate a buffer from free list but buffer on the free list marked “delayed write” => flush “delayed write” buffer and allocate another buffer. • Cannot find block on the hash queue and free list of buffer also empty. • Block in the hash queue, but buffer is busy.
Q.2 (C)	Fields in process table and U area need to be explained. **(5 Marks)**
Q.2 (D)	1. Minicomputer model 2. Workstation model 3. Workstation server model 4. Processor pooled model 5. Hybrid model **Explain all models with diagram in detail.(5 Marks)**
Q.2 (E)	Tightly coupled and loosely coupled system with diagram. **(5 Marks)**
Q.2 (F)	Time Constraints, Correctness, Embedded, Safety, Concurrency, Distributed, Stability. **If explained any five (5 Marks)**

Q.3 (A) i.	Superblock fields **(5 Marks)**
Q.3 (A) ii.	access, location, concurrency and fault transparency **(5 Marks)**
Q.3 (A) iii.	1. Pre-emption inside Spin –Lock controlled critical sections.

	2. Cache corruption 3. Context Switching overheads **If all three explained 5 Marks**
Q.3 (B) i.	 **3 Marks for diagram** **7 Marks for explaining all states** The complete set of process states: 1. Executing in user mode. 2. Executing in kernel mode. 3. Ready to run. 4. Sleeping in memory. 5. Ready to run, but in swap space (covered later). 6. Sleeping in swap space. 7. Preempted. (the process is returning from kernel to user mode, but the kernel preempts it and does a context switch to schedule another process. Very similar to state 3) 8. Newly created. Not ready run, nor sleeping. This is the start state for all processes expect process 0. 9. The process executed *exit* system call and is in the *zombie* state. The process no longer exists, but it leaves a record containing an exit code and some timing statistics for its parent process to collect. The zombie state is the final state of a process.
Q.3 (B) ii.	 **3 marks for diagram** **7 marks for explaining main components** • Applications • Application Framework

	• Android Runtime • Platform Libraries • Linux Kernel

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: CSDLO5013 and Course Name: Advanced Algorithm

Time: 2 hours Max. Marks: 80

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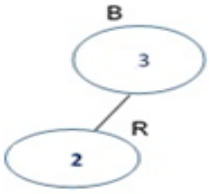
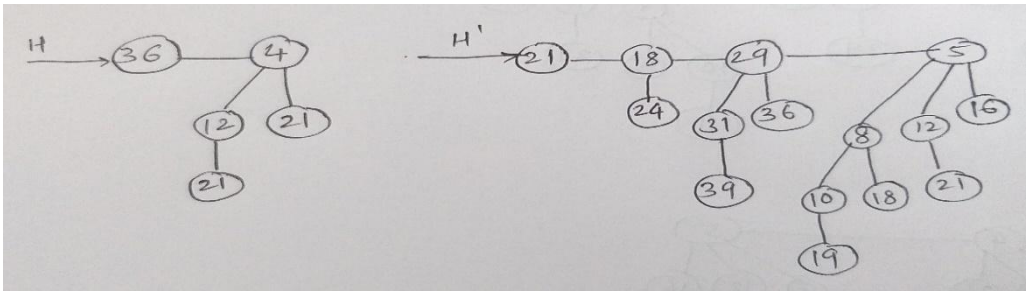
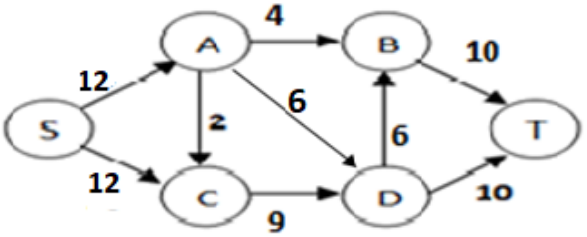
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which one of the following is method of solving recurrences of recursive algorithms?
Option A:	Subtraction method
Option B:	Multiplication method
Option C:	Substitution Method
Option D:	Addition method
2.	What does maximum flow problem of network flow involve?
Option A:	Finding a flow between source and sink that is minimum.
Option B:	Finding a flow between source and sink that is maximum.
Option C:	Finding the minimum cost spanning tree.
Option D:	Finding the shortest path between source and sink.
3.	In the binomial heap there are degree 3 and degree 4 binomial trees are present and if we insert new node with key value 17 then the new structure will be.
Option A:	Collection of binomial tress but not binomial heap
Option B:	Hash table
Option C:	AVL tree
Option D:	Binomial Heap
4.	What will be the function f(n) if level sum cost in every level of the recursion tree is remains same?
Option A:	Level sum of first level
Option B:	Level sum of last level
Option C:	Level sum of middle level multiplied by number of levels
Option D:	Level sum of each level multiplied by number of levels
5.	Which of the following method computes total cost of an algorithm in amortized analysis?
Option A:	Aggregate method
Option B:	Accounting method
Option C:	Potential method

Option D:	Average method
6.	Complexity of an algorithm to determine whether any pair of segment intersects using sweeping is (n=no of segments).
Option A:	O(n)
Option B:	O(n.logn)
Option C:	O(logn)
Option D:	O(1)
7.	How many nodes will be there in binomial tree of order 2 that is B(2) will have ?
Option A:	6
Option B:	9
Option C:	4
Option D:	8
8.	In Red Black tree, if newly inserted node is Z, P(Z)=RED , sibling of P(Z) is RED, then _____action will be required for the fixup Red Black tree properties.
Option A:	Change color of sibling of P(Z), P(Z),GP(Z)
Option B:	Left rotate [T,P(Z)]
Option C:	Right rotate [T,P(Z)]
Option D:	Right rotate [T,GP(Z)]
9.	In the network flow the flow from one vertex to another must not exceed the given capacity is called as
Option A:	Capacity constraint
Option B:	Skew Symmetry
Option C:	Flow conservation property
Option D:	Residual Capacity
10.	Which of the following class consists of problems that are solvable in polynomial time?
Option A:	P
Option B:	NP
Option C:	NP Complete
Option D:	NP Hard
11.	Select correct type of Graham's Scan and Jarvis's March algorithms.
Option A:	Incremental method
Option B:	Divide and conquer method
Option C:	The prune-and-search method
Option D:	Rotational sweep method
12.	To prove NP-Completeness of a problem
Option A:	Select a known P problem
Option B:	Select a known NP problem
Option C:	Select a known NP-Complete problem
Option D:	Select a known NP-Hard problem

13.	In delete operation of Red Black tree, if root node will become double black (DB) then which operation to perform to fixup?
Option A:	Change color of left child
Option B:	Change color of right child
Option C:	Do nothing
Option D:	Remove DB
14.	Travelling sales man problem belongs to which of the class?
Option A:	P
Option B:	NP
Option C:	Linear
Option D:	Dynamic
15.	In randomized hiring problem, what can be the different strategies used?
Option A:	Maximizing & Scoring
Option B:	Minimizing
Option C:	Choosing Sequentially
Option D:	Personal Behavior
16.	If the cross product of the vectors p1 and p2 is negative then
Option A:	p1 is clockwise from p2 with respect to the origin (0,0).
Option B:	p1 is counterclockwise from p2 with respect to the origin (0,0).
Option C:	p1 and p2 are collinear, pointing in same direction.
Option D:	p1 and p2 are collinear, pointing in opposite direction.
17.	Which of the following variable provides a convenient method for converting between probabilities and expectations?
Option A:	Indicator variable
Option B:	Random variable
Option C:	Indicator random variable
Option D:	Temporary variable
18.	In flow network the flow from vertex u to vertex v is the negative of the flow in reverse direction is called as_____.
Option A:	Capacity constraint
Option B:	Skew Symmetry
Option C:	Flow conservation property
Option D:	Residual Capacity
19.	In RB trees if parent node is with black color then children's must be_____.
Option A:	Black color
Option B:	Red color
Option C:	Any color
Option D:	One red & other black color
20	The INITIALIZE_PREFLOW (G, s) algorithm defines the height of source with
Option A:	0
Option B:	Infinity
Option C:	1 + min { h[v] : (s, v) ϵ Ef }

Option D:	Number of vertices in the given network.

Q2 **(20 Marks)**	**Solve any Four out of Six 5 marks each**
A	Solve the recurrence by master method to find asymptotic bound T(n)=9T(n/3)+n
B	Write relabel-to-front algorithm of maximum flow network.
C	Justify your answer after inserting key value 1 and deleting the same key value, resulting Red-Black tree is same or not as initial. 
D	Explain Jarvis March algorithm for finding convex hull.
E	Explain hiring problem.
F	Write vertex cover problem solving algorithm by approximation algorithm.

Q3. **(20 Marks)**	**Solve any TWO out of THREE 10 marks each**
A	Perform union of two Binomial Heaps given here. 
B	What is maximum flow in the given flow network from source S to sink T ? Show all the flow networks, residual networks and augmented paths. 
C	Solve the given recurrence by recursion tree method to find asymptotic bound. $T(n)=4T(n/2)+n^2$

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

Q 2 A.

Solution: We have a=9, b=3, f(n) = n (2m)

Case 1 => $T(n)=\Theta(n^2)$ (3m)

Q.2 B.

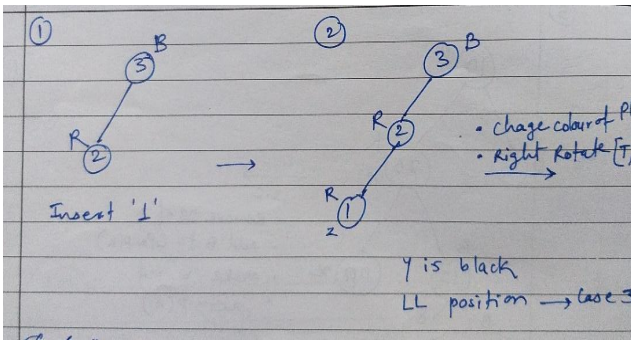
Solution: *(all steps required)*

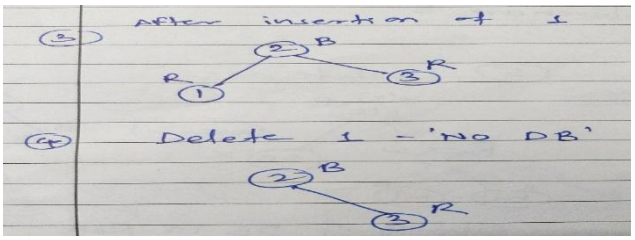
The relabel-to-front algorithm

1. Initialize-Preflow(G,s,t)
2. L□V[G]-{s,t}
3. u□head[L]
4. for each vertex u in V[G]-{s,t}
5. do current[u]□head[N[u]]
6. While u!=NIL
7. do old-height□h[u]
8. Discharge(u)
9. if h[u]>old-height
10. then move u to the front of list L
11. u□next[u]

Q.2 C.

Solution: *(Insert 2.5m & deletion 2.5m)*





Q.2 D. Answer:

Algorithm Jarvis March

1. Consider point P0 in set Q with minimum y-coordinate or the leftmost such point in case of a tie.
2. Consider the next convex hull vertex P1 which has the smallest polar angle with respect to x-axis from P0. Choose the farthest point, in case of a tie.
3. Choose vertices P2,P3,....,Pk similarly until yk=ymax.
4. The sequence P0, P1,...,Pk is right chain of CH(Q).
5. To choose the left chain of CH(Q), start with pk.
6. Choose vertex Pk+1 which has the smallest polar angle w.r.t negative x-axis from Pk. Choose the farthest point, in case of a tie.
7. Choose vertices Pk+1, Pk+2,...,P1 similarly until P1=P0. (3m)

For example (2m)

Q.2E. Solution:

(Explanation 2m)

Algorithm HIRE_ASSISTANT(n)

1. Randomly permute the candidate list
2. best ← 0 //Candidate 0 is the least-qualified dummy candidate

2. for i ← 1 to n

3. do interview candidate i

4. if candidate i is better than candidate best

5. then best ← i

6. hire candidate i (3m)

Q.2F. Solution: (all steps required)

APPROX-VERTEX-COVER

1: C ← Ø ; //initialize cover of empty set

2: E' ← E // copy all the edges

3: while E' ≠ Ø; do //until all edges considered

4: let (u, v) be an arbitrary edge of E'

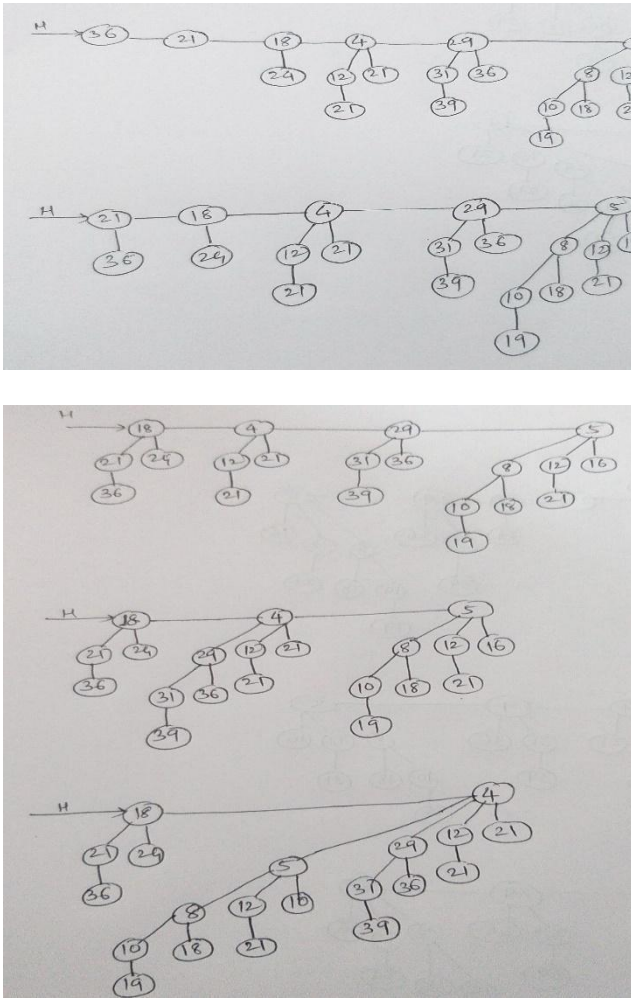
5: C ← C {(u, v)}

6: remove from E' all edges incident on either u or v

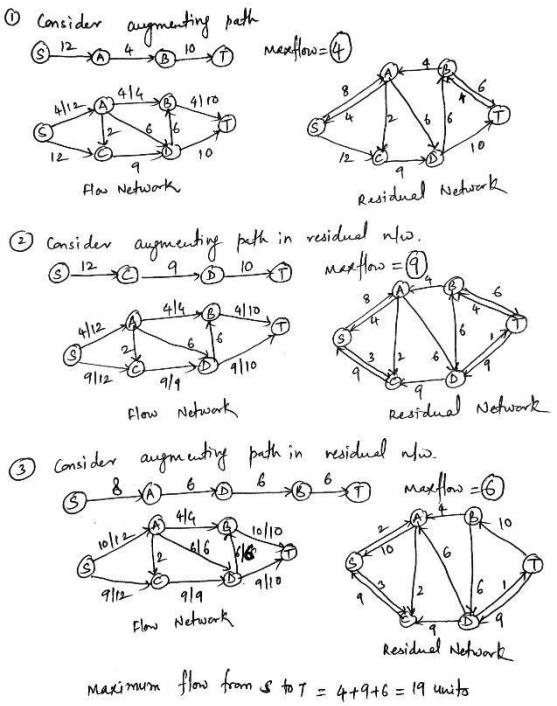
7: return C

Q 3 A. Solution:

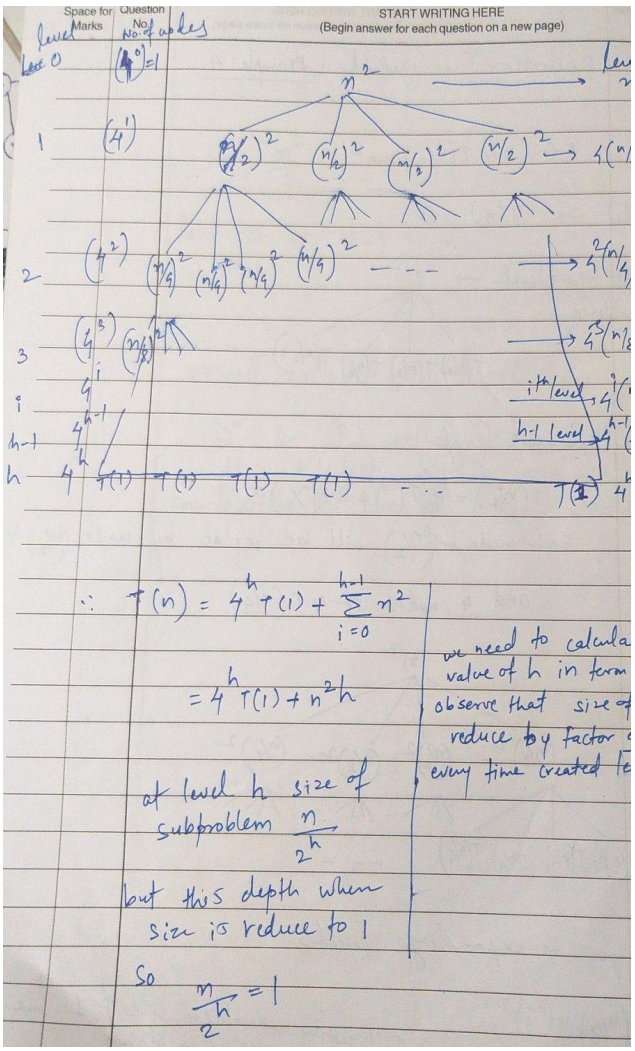
(Merge 3m & Appling cases for BH construction 7m)

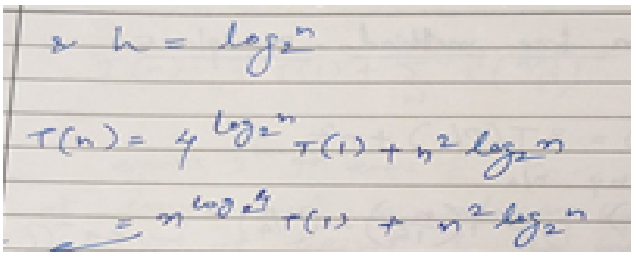


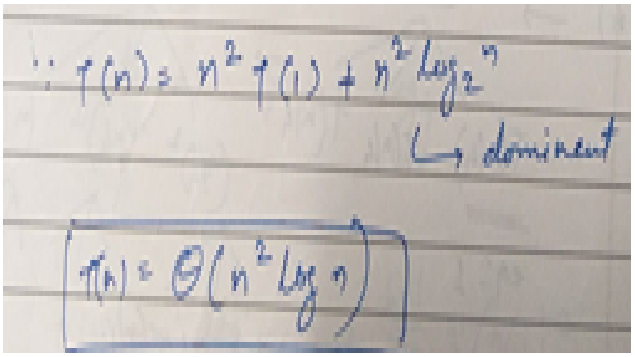
Q. 3 B) Solution: (all steps required- Note: As per selection of augmentations path)



Q.3C. Solution: (tree constructions with details of level cost 5m & final asymptotic bound writing 5m)


Space for Marks
Question No.
START WRITING HERE
(Begin answer for each question on a new page)
level
No. of nodes
level 0
1
2
3
i
h-1
h
n^2
$(n/2)^2$
$(n/4)^2$
$(n/8)^2$
$4^0=1$
4^1
4^2
4^3
4^i
4^{h-1}
4^h
T(1)
ith level
h-1 level
$\therefore T(n) = 4^h T(1) + \sum_{i=0}^{h-1} n^2$
$= 4^h T(1) + n^2 h$
at level h size of subproblem $\frac{n}{2^h}$
but this depth when size is reduce to 1
So $\frac{n}{2^h} = 1$
we need to calcula
value of h in term
observe that size o
reduce by factor
every time created te


$\therefore h = \log_2 n$
$T(n) = 4^{\log_2 n} T(1) + n^2 \log_2 n$
$= n^{\log_2 4} T(1) + n^2 \log_2 n$


$\therefore T(n) = n^2 T(1) + n^2 \log_2 n$
↳ dominent
$T(n) = \Theta(n^2 \log n)$