



B.Tech. DEGREE EXAMINATION, JULY 2022
Fourth Semester

18CSS202J – COMPUTER COMMUNICATIONS

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- (ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

Marks	BL	CO	PO
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PART – A (25 × 1 = 25 Marks)

Answer ALL Questions

1. Source node X and destination node Y are inter-connected through three intermediate routers. Determine how many times each packet will reach the network layer, the data link layer and the physical layer during transmission at an instance from X to Y. 1 2 2 1
 (A) N/W layer-3; D/L layer-6, Phy layer-6 (B) N/W layer-5; D/L layer-8, Phy layer-8
 (C) N/W layer-4; D/L layer-7, Phy layer-7 (D) N/W layer-3; D/L layer-3, Phy layer-3
2. The PDU of transport layer, PDU of network layer and PDU of data link layer are called as _____ respectively. 1 1 1 1
 (A) Segment, datagram and frame (B) Packet, datagram and frame
 (C) Datagram, packet and frame (D) Frame, datagram and packet
3. Transport layer is responsible for _____. 1 1 1 1
 (A) Service point addressing (B) Logical addressing
 (C) Hardware addressing (D) Application specific addressing
4. A software engineer wants to develop the security algorithm using encryption. Which OSI layer protocols will help him to develop security algorithm? 1 2 1 1
 (A) Data link layer (B) Network layer
 (C) Transport layer (D) Presentation layer
5. There are five devices connected using fully-connected mesh topology. How many ports are required by each device to connect others? How many dedicated links are required to connect them? Assume it uses full duplex transmission. 1 2 2 1
 (A) 8 ports and 20 links (B) 10 ports and 20 links
 (C) 4 ports and 10 links (D) 10 ports and 10 links
6. If a network device has a mask of /28, how many IP addresses are available for hosts on this network? 1 2 3 2
 (A) 64 (B) 32
 (C) 18 (D) 14
7. Why is the first address of a block not given to either PC or router? 1 1 3 2
 (A) It is a network address (B) It is a broadcast address
 (C) It is a multicast address (D) It is a loop-back address

8. The first address assigned to any organization in classless addressing ____.
 (A) Must be a power of 4 (B) Must be evenly divisible by the number of addresses
 (C) Must belong to one of A and B (D) Must be power of 8
9. In super netting, the number of addresses that can be combined needs to be ____.
 (A) Power of 2 (B) Power of 4
 (C) Power of 8 (D) Power of 16
10. Which of the following statements are not correct?
 (i) Gateway has more overheads than a router
 (ii) Bridge does not have more overheads than a repeater
 (iii) Router has more overheads than a bridge
 (iv) Repeater has more overheads than a router
 (A) (i) and (iii) (B) (ii) and (iv)
 (C) (i), (iii) and (iv) (D) (i) and (iv)
11. To make a single bit error in the data sent at 1 Mbps, the noise must have a duration of ____.
 (A) 1 millisecond (B) 1 microsecond
 (C) 0.1 microsecond (D) 0.01 microsecond
12. The transmission media that provides the highest transmission speed in a network is ____.
 (A) Co-axial cable (B) Twisted pair cable
 (C) Optical fiber (D) Unshield twisted pair
13. Which of the following is not the responsibility of physical layer?
 (A) Synchronization of bits (B) Line configuration
 (C) Physical topology (D) Error detection
14. The NRZ-1 line encoding scheme has an average signal rate of ____.
 (A) N Bd (B) N/2 Bd
 (C) $N + \frac{1}{2}$ BD (D) N/4 Bd
15. When pulse code modulation is used to convert analog signal to digital data, the sequence of operation is ____.
 (A) Quantizing, sampling, encoding (B) Sampling, encoding, quantizing
 (C) Sampling, quantizing, encoding (D) Encoding, quantizing, sampling
16. Which is not the CSMA protocol?
 (A) 1-persistent CSMA (B) Non-persistent CSMA
 (C) P-persistent CSMA (D) n-persistent CSMA
17. Which error detection techniques detects the two bit errors
 (A) Parity check (B) Cyclic redundancy check
 (C) Linear block check (D) Selective bit check
18. To achieve the maximum efficiency in pure aloha and slotted aloha, G is ____ respectively.
 (A) $\frac{1}{2}$ and 1 (B) $\frac{1}{2}$ and $\frac{1}{2}$
 (C) 2 and 1 (D) 1 and 2

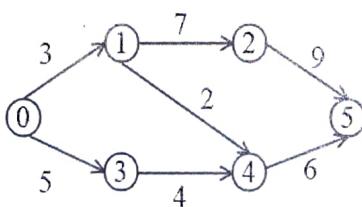
19. Let m be the data unit, r be the redundancy bit, then the relation between data and redundancy is
 (A) $2^r \geq m + r + 1$ (B) $2^r \leq m + r + 1$
 (C) $2^r \geq m$ (D) $2^r \geq m + 1$
20. Which of the following is not the feature of HDLC?
 (A) Reliable protocol (B) Flow control
 (C) Congestion control (D) Full duplex communication
21. _____ solves the problem of finding the shortest path from a point in a graph to a destination.
 (A) Kruskal's algorithm (B) Bellman ford algorithm
 (C) Prim's algorithm (D) Dijkstra algorithm
22. If the diameter of a network is more than 17 hops, which protocol should be selected?
 (A) RIPv1 (B) RIPv2
 (C) EIGRP (D) OSPF
23. _____ and _____ of IP header is changed when a packet is moving from one router to another router.
 (A) TTL, source IP address (B) Source IP address, destination IP address
 (C) TTL, checksum (D) Checksum, next hop
24. Open Shortest Path First (OSPF) is defined on the top of
 (A) UDP (B) TCP
 (C) ICMP (D) IP
25. Which is true regarding OSPF area?
 (A) If the design is hierarchical, then multiple area is not required (B) All areas need not connect to area 0
 (C) Area numbering can go upto 65536 (D) Backbone area not required

PART - B (5 × 10 = 50 Marks)

Answer ALL Questions

26. a.i. Analyze the importance of layering architecture in the data communication.
- i. Summarize and compare the various network topologies used for data communications.
- (OR)
- b.i. "TCP and UDP are the connection oriented and connectionless protocol respectively". True or false. Justify your answer.
- ii. When a sender sends a data string A : 01101101 to the receiver using serial transmission technique, what will be the data string received by the receiver?
27. a.i. A block of IP addresses is granted to CSE department of SRM university. One of the IP addresses in the block is 205.16.32.36/29. Find the first address, last address and number of addresses in the block?

- ii. A block of IP addresses starting with 192.168.0.0/16 is granted to SRM university. These IP addresses are to be assigned to the following departments. 7 3 3 2
- 1) Accounts department with 200 computers
 - 2) Director office with 16 computers
 - 3) 5 department offices, each with 500 computers
- Help them in designing the subnets using VLSM.
- (OR)**
- b.i. Mention the special addresses and summarize the block of IP addresses allocated for local area networking from each class. 4 3 3 1
- ii. Distinguish the Hub, switch, bridge and router. 6 3 2 1
28. a.i. An analog signal has a bit rate of 4000 bps and band rate of 500 baud. How many data elements are carried by each signal element? How many signal elements do we need? 4 3 4 2
- ii. Draw the graph of NRZ-L and NRZ-I scheme using the data streams 00000000, assuming that the last signal level has been positive. From the graphs, guess the bandwidth for this scheme using the average number of changes in the signal level. 6 4 4 2
- (OR)**
- b.i. You have an available bandwidth of 100 KHz which spans from 200 to 300 kHz. What are the carrier frequency and the bit rate if ASK with $d = 1$ is used for modulation. 4 3 4 2
- ii. Compare and construct the FDM, TDM and WDM. 6 4 4 1
29. a.i. Describe the selective reject ARQ and compare with Go-backN ARQ. 5 4 5 1
- ii. Given the data word 101001111 and the divisor 10111. Show the generation of the CRC code word at the sender site using binary division. 5 3 5 1
- (OR)**
- b.i. State the services provided by PPP and illustrate the PPP frame format in detail. 5 3 5 1
- ii. Draw the flow diagram of three persistence methods of CSMA and compare them. 5 4 5 1
30. a. Apply the Bellman Ford algorithm for the below network graph to construct the routing table for node 0. 10 3 6 3



- (OR)**
- b. Write the path vector algorithm and explain it for a network graph of your choice. 10 3 6 2

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Reg. No.	RA201090262000
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B.Tech. DEGREE EXAMINATION, JULY 2022
Fourth Semester

18CSC205J – OPERATING SYSTEMS

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
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Time: 2½ Hours

Max. Marks: 75

PART – A (25 × 1 = 25 Marks)

Marks BL CO PO

Answer ALL Questions

1. Multiprogramming of computer system increases _____. 1 1 1 1
 - (A) Memory
 - (B) Storage
 - (C) CPU utilization
 - (D) Cost

2. When you start up the computer the boot up storage at which the bios versions manufacturer and data are displayed on the monitor is called _____. 1 1 1 1
 - (A) Bootstrap
 - (B) Power On Self-Test (POST)
 - (C) System configuration
 - (D) Kernel loading

3. A Process Control Block (PCB) does not contain which of the following? 1 1 1 1
 - (A) Code
 - (B) Stack
 - (C) Bootstrap program
 - (D) Data

4. In Unix, the return value for the fork system call is _____ for the child process and _____ for the parent process. 1 1 1 1
 - (A) A negative integer, zero
 - (B) Zero, a negative integer
 - (C) Zero, a positive non zero integer
 - (D) A nonzero integer, zero

5. A process executes the following code, for ($i = 0; i < n; i++$) fork (); the total number of child processes created is _____. 1 1 1 1
 - (A) n
 - (B) 2^n
 - (C) 2^{n-1}
 - (D) 1

6. Which of the following process can be affected by other processes during execution in the system? 1 1 2 2
 - (A) Init process
 - (B) Child process
 - (C) Parent process
 - (D) Co-operating process

7. High priority task is indirectly preempted by medium priority the scenario is called _____. 1 2 2 1
 - (A) Priority inversion
 - (B) Priority removal
 - (C) Priority exchange
 - (D) Priority modification

- | | | |
|---|---------|--|
| 8. What will happen if a non-recursive mutex is locked more than once?
(A) Starvation
(B) Deadlock
(C) Aging
(D) Signaling | 1 2 2 2 | |
| 9. Which of the following scheduling algorithm is nonpreemptive?
(A) Shortest-job-first scheduling
(B) First-come, first-served scheduling
(C) Priority scheduling
(D) Round-robin scheduling | 1 1 2 4 | |
| 10. An edge from process P_i to P_j in a wait for graph indicates that _____.
(A) P_i is waiting for P_j to release a resource that P_i needs
(C) P_i is waiting for P_j to leave the system
(B) P_j is waiting for P_i to release a resource that P_j needs
(D) P_j is waiting for P_i to leave the system | 1 2 2 3 | |
| 11. Memory partitions are fixed size divisions then each partition contains _____.
(A) Exactly one process
(B) At least one process
(C) Multiple processes at once
(D) Atmost one process | 1 1 3 1 | |
| 12. Which factor defines logical address space?
(A) Top and bottom register
(C) General purpose register
(B) Base and limit register
(D) Special purpose register | 1 2 3 2 | |
| Segmentation falls under the category of _____ technique and the address of the segments are maintained in _____.
(A) Fixed allocation, registers
(C) Non-contiguous, segment map
(B) Contiguous, index table
(D) Continuous, mapping table | 1 1 3 1 | |
| The first fit, best fit and worst fit are used for _____.
(A) Process from a queue to put in memory
(C) Free hole from a set of available holes
(B) Processor to run the next process
(D) Schedule the process | 1 1 3 3 | |
| What is compaction?
(A) A technique of overcoming internal fragmentation
(C) A technique for overcoming external fragmentation
(B) A paging technique
(D) A technique for overcoming fatal error | 1 1 3 1 | |
| _____ is the concept in which a process is copied into the main memory in the secondary memory agreeing to the requirement.
Paging
Demand paging
(B) Segmentation
(D) Swapping | 1 1 4 1 | |
| AIM of creating page replacement algorithms is to _____.
Replace pages faster
Decrease the page fault rate
(B) Increase the page fault rate
(D) To allocate multiple pages to processes | 1 2 4 2 | |
| 18. A set of techniques that allow to execute a program which is not entirely in memory is called?
(A) Demand paging
(C) Auxiliary memory
(B) Virtual memory
(D) Secondary memory | 1 1 4 1 | |
| 19. A swapper manipulated _____ individual _____ of a process.
(A) The entire process, parts
(C) The entire process, pages
(B) All the pages of a process, segments
(D) Memory, registers | 1 2 4 2 | |
| 20. A _____ never swaps a page into memory unless that page will be needed
(A) Pager
(C) Controller
(B) Lazy swapper
(D) Arbitrator | 1 1 4 1 | |
| 21. The disk ARM move to the desired cylinder for which the time taken is called _____.
(A) Positioning time
(C) Seek time
(B) Random access time
(D) Rotational latency | 1 2 5 1 | |
| 22. The heads of the magnetic disk are attached to a _____ that moves all the head as a unit.
(A) Spindle
(C) Track
(B) Disk ARM
(D) Cylinder | 1 1 5 1 | |
| 23. In distributed file system _____ directories are visible from the local machines.
(A) Protected
(C) Private
(B) Local
(D) Remote | 1 1 5 1 | |
| 24. One disk queue with requests for I/O to blocks on cylinders. The request are in the following manner:
98, 183, 37, 122, 14, 124, 65, 67
Consider SSTF (Shortest Seek Time First) scheduling. The total number of head movements is, if the disk head of initially at 53 is _____.
(A) 236
(C) 220
(B) 246
(D) 240 | 1 3 5 | |
| 25. Which buffer holds the output for a device?
(A) Spool
(C) Status
(B) Output
(D) Magic | 1 1 | |
| PART – B (5 x 10 = 50 Marks) | Marks B | |
| Answer ALL Questions | | |
| 26. a.i. Write about process control block (PCB) and process state with respect to process. | 5 | |
| ii. With neat sketch interpret addition of medium term scheduler. | 5 | |
| (OR) | | |
| b.i. Illustrate the key aspects of symmetric multiprocessor OS considerations. | 5 | |
| ii. Justify how mutual exclusion prevent race condition. | 5 | |

PART – B ($5 \times 10 = 50$ Marks)

Answer ALL Questions

26. a.i. Write about process control block (PCB) and process state with respect to process. 5 1
 ii. With neat sketch interpret addition of medium term scheduler. 5 1

(OR)

b.i. Illustrate the key aspects of symmetric multiprocessor OS considerations. 5
 ii. Justify how mutual exclusion prevent race condition. 5

27. a.i. Write short notes on semaphore. 2

- ii. Consider the following five processes, with the length of CPU burst time given in milliseconds. Consider the FCFS, non-preemptive, SJF and Round Robin (Quantum = 1 MS) scheduling algorithms. Which algorithm give the minimum average waiting time? Discuss it.

8 4 2 4

Process	Arrival time	Burst time (ms)
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

(OR)

- b. Determine whether the given state is safe or not using deadlock avoidance algorithm.

10 3 2 3

Claim			Allocation		
A	B	C	A	B	C
3	2	2	1	0	0
6	1	3	6	1	2
3	1	4	2	1	1
4	2	2	0	0	2

Resource table		
A	B	C
9	3	6

Available vector		
A	B	C
0	1	1

28. a. Explain paging and segmentation with respect to address translation and illustrate with example.

10 2 3 2

(OR)

- b. Given memory partitions of 500 KB, 100 KB, 300 KB, 200 KB and 600 KB. In order how would each of the first-fit, best-fit and worst-fit algorithms place processes of size 418 KB, 50 KB, 25 KB, 202 KB, 506 KB, 112 KB and 95 KB (in order)? Which the algorithms make the most efficient use of memory?

10 4 3 4

29. a. List out the memory partitioning techniques and explain in detail.

10 2 4 1

(OR)

- b. Perform the following page replacement policy for given page sequence.

10 4 4 4

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

(i) Optimal (ii) LRU (iii) FIFO

Find page faults for all three page replacement policies.

30. a. Describe about the concept of disk scheduling with an example.

(OR)

- b. Define 'File and File System' and explain the various file organizations with examples.

10 2 5 1

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B.Tech. DEGREE EXAMINATION, JULY 2022

Third & Fourth Semester

18PDH103T – SOCIAL ENGINEERING

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

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Time: 2½ Hours

Max. Marks: 75

PART – A ($25 \times 1 = 25$ Marks)

Answer ALL Questions

- | | | | | | | |
|-----|--|-----|-------------------------------|---|---|-----|
| 1. | Democratic Social Engineering is otherwise called | | 1 | 1 | 1 | 6 |
| (A) | Utopian | (B) | Piecemeal | | | |
| (C) | Large scale | (D) | Social trends | | | |
| 2. | _____ advocates piecemeal Social Engineering. | | 1 | 1 | 1 | 6 |
| (A) | Adam Smith | (B) | Mc Miller | | | |
| (C) | Karl Popper | (D) | Charles Lindblom | | | |
| 3. | "Chipko Movement" is an example of _____. | | 1 | 1 | 1 | 7 |
| (A) | Alternative social change | (B) | Redemptive social change | | | |
| (C) | Reformative social change | (D) | Revolutionary social change | | | |
| 4. | A philanthropist is someone who involves in _____. | | 1 | 1 | 1 | 6,9 |
| (A) | Planting trees | (B) | Teaching | | | |
| (C) | Generous donation of money | (D) | Politics | | | |
| | for good cause | | | | | |
| 5. | SEL under personal awareness means _____. | | 1 | 1 | 1 | 6,9 |
| (A) | Society and Educational Learnings | (B) | Self and Empowerment Lessons | | | |
| (C) | Safety Engineering Lessons | (D) | Social and Emotional Learning | | | |
| 6. | "Stop Deforestation to beat the increasing air pollution" – It is a catchy slogan to campaign against | | 1 | 1 | 2 | 7 |
| (A) | Pollution | (B) | Lack of water | | | |
| (C) | Cutting of trees | (D) | Afforestation | | | |
| 7. | An association formed by citizens that functions completely autonomous from government, to perform broad spectrum of services is called _____. | | 1 | 1 | 2 | 6 |
| (A) | NGO | (B) | NPO | | | |
| (C) | Civil society organization | (D) | Foundation | | | |

8. The four facets of social responsibility are valuing diversity, building relationships, solving problems in peaceful ways and _____.
 (A) Personal identity (B) Narcissist
 (C) Contributing to the community (D) Beneficiary and caring for the environment
9. The purpose of _____ is societal benefit rather than commercial profit.
 (A) Commercial marketing (B) Social marketing
 (C) Entrepreneurship (D) Lucrative marketing
10. Which of the following can be lauded for acting with environmental responsibility?
 (A) Walmart (B) Apple
 (C) Tesla motors (D) Microsoft
11. What is the minimum percentage, the board of directors shall make sure that the company spends in every financial year as per CSR policy.
 (A) 5% (B) 4%
 (C) 2% (D) 3%
12. Corporate Social Responsibility initiatives are based on one among the four different categories.
 (A) Ethical responsibility (B) Emotional responsibility
 (C) Global responsibility (D) Government responsibility
13. "Zakaat" is the law of sharing one's earnings with the poor in
 (A) Hinduism (B) Islam
 (C) Christianity (D) Sikkism
14. _____ refers to a group or community which shares common experiences that shape the way, its members understand the world
 (A) Environment (B) Culture
 (C) Society (D) Tradition
15. _____ is all about recognizing the social problems and achieving a social change by employing entrepreneurial principles
 (A) Entrepreneurship (B) Social entrepreneurship
 (C) NGO (D) Business
16. A contemporary social entrepreneur who is the founder and manager of Grameen bank
 (A) Muhammed Yunus (B) Vashisht Gupta
 (C) Sanjay Bangar Roy (D) Mohan Verma
17. A for-profit enterprise with the dual goals of achieving profitability and attaining beneficial returns for society is called _____.
 (A) Social business (B) Green entrepreneurship
 (C) Social enterprise (D) Portfolio entrepreneurship
18. Social entrepreneurship has this advantage over others
 (A) Cost effective (B) Environmental consciousness
 (C) Negative attitude (D) Positive attitude
19. Which of the following is type of social entrepreneurs?
 (A) The community social entrepreneur
 (B) Scalable startup entrepreneur
 (C) Environmental social entrepreneur
 (D) Coordinate entrepreneur
20. How social entrepreneurs play the role of change agents.
 (A) They adopt a mission to create (B) They campaign against injustice and sustain social value
 (C) They bridge the social gap (D) They enhance networking skills
21. _____ receives huge incentives and schemes from the government.
 (A) Social entrepreneurs (B) NGO
 (C) NPO (D) Entrepreneurs
22. The _____ works towards complete transformation of a social system in order to meet major social needs.
 (A) Global social entrepreneur (B) Community social entrepreneur
 (C) Transformational social (D) Non-profit social entrepreneur entrepreneur
23. One of the most fundamental issue of the developing economy is _____.
 (A) Non availability of finance and financial services in the rural areas
 (B) Non availability of technological services
 (C) Non availability of land resources
 (D) Non availability of natural resources
24. Green wise businesses look for _____.
 (A) Ecological sensitive options (B) Globally empowering options for plants
 (C) Technically connecting options (D) Empowering agrarian economy for people
25. Energy consulting companies provide energy audit reports to their clients that make specific recommendations for
 (A) Green business (B) Social business
 (C) Energy conservation and (D) Environment and sustainability improved efficiency

PART - B (5 × 10 = 50 Marks)
Answer ALL Questions

Marks BL CO PO

26. a. Define social engineering, elucidate the importance of social engineering and differentiate the two types of social engineering with examples.
- (OR)
- b. What are different types of individual responsibility? Highlight on your real time responsibility activities.

27. a. Enumerate on any three environmental and any two social issues which is prevailing in 21st century in detail. 10 2 2 7

(OR)

b. Define social marketing, identify a social problem, explain the phases of social marketing for the social problem. 10 2 2 7

28. a. What is NGO? Explain the types and working of NGO with examples. 10 2 2 6,9

(OR)

b. Explain the phrase CSR, the government policies on CSR and CSR activities of any two corporates. 10 2 3 7,8

29. a. Who is a social entrepreneur? Explain the types of social entrepreneur with an example. 10 2 4 6,7

(OR)

b. Briefly discuss about the facets of social responsibility competencies. 10 2 3 6,7

30. a. Analyze and identify a social issue in the society, write 10 2 4 6,7

- (i) Vision and the mission statement
- (ii) Business plan
- (iii) Business strategy, and
- (iv) Innovative solution as a social entrepreneur

(OR)

b. "Social entrepreneurs are change makers". Discuss three social enterprises acting as a changing agent in India. 10 2 4 6,7

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Reg. No. RA 20410200200-05

B.Tech. DEGREE EXAMINATION, JULY 2022

Fourth Semester

18CSC206J – SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

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Time: 2½ Hours

Max. Marks: 75

PART - A ($25 \times 1 = 25$ Marks)

Answer ALL Questions

- | Answer ALL Questions | | 1 | 1 | 1 | 1 |
|----------------------|--|-----|---------------------------------|---|-----|
| 1. | Which one of the following is not an activity in software management lifecycle? | | | | |
| (A) | Proposal writing | (B) | Risk management | | |
| (C) | Customer management | (D) | People management | | |
| 2. | If you want to develop a solution to support during floods which model would you adopt preferably? | 1 | 2 | 1 | 2 |
| (A) | V-model | (B) | Waterfall | | |
| (C) | Spiral | (D) | Rapid application development | | |
| 3. | The requirement engineering builds a bridge between _____. | 1 | 1 | 1 | 1 |
| (A) | Analysis and design | (B) | Design and construction | | |
| (C) | Design and testing | (D) | Construction and testing | | |
| 4. | Identify the cost estimation technique that is independent of programming language and can be measured before software design and code done. | 1 | 2 | 1 | 1,2 |
| (A) | Lines of code | (B) | Function point | | |
| (C) | Process based | (D) | Tool based | | |
| 5. | Technical risks pose a danger to the software's _____. | 1 | 1 | 1 | 1 |
| (A) | System development | (B) | Quality and timeliness | | |
| (C) | System integration | (D) | Unit modules | | |
| 6. | Which diagram in UML shows a complete or partial view of the structure of modelled system at a specific time? | 1 | 1 | 2 | 1 |
| (A) | Sequence diagram | (B) | Collaboration diagram | | |
| (C) | Class diagram | (D) | Object diagram | | |
| 7. | Which design model elements are used to depict a model of information represented from the users view? | 1 | 1 | 2 | 1 |
| (A) | Architectural design elements | (B) | Data design elements | | |
| (C) | Interface design elements | (D) | Component level design elements | | |

8. Software _____ are a mechanism for capturing domain knowledge in a way that allows it to be reapplied when a new problem is encountered
 (A) Interface (B) Object
 (C) Patterns (D) Data
9. Which one of these are not an objective of web apps design?
 (A) Establish a consistent window (B) To keep coupling as low as into the content and possible functionality provided by the interface
 (C) Guide the user through a series of interaction with web app (D) Organize the navigation options and content available to user
10. _____ engineering deals with taking advance information from an earlier stage for a later stage in project, so that both the stages can be performed simultaneously.
 (A) Software (B) Project
 (C) Genre (D) Concurrent
11. _____ increases software code reuse and enhances productivity of developers.
 (A) Modularity (B) Simplicity
 (C) Clarity (D) Reliability
12. Standard naming conventions can be used so that the code has _____.
 (A) Modularity (B) Simplicity
 (C) Clarity (D) Reliability
13. _____ will ensure a consistent coding production with standard code that will be easy to debug and test
 (A) Coding (B) Coding methods
 (C) Coding framework (D) Constructing
14. _____ is a powerful tool to eliminate defects and improve software code.
 (A) Desk check (B) Walk through
 (C) Inspection (D) Code review
15. _____ is the quality driven development technique employed in the extreme programming.
 (A) Structured programming (B) Object oriented programming
 (C) Automatic code generation (D) Pair programming
16. _____ refers to different set of tasks which ensures that the software that has been built is traceable to customer requirements.
 (A) Verification (B) Requirement engineering
 (C) Validation (D) Design requirements
17. _____ testing is done to ensure each unit piece of source code is free from defects
 (A) Regression (B) Unit
 (C) Stress (D) Acceptance
18. Test _____ should include a work breakdown structure, requirement review, resource allocation, effort estimation, tool selection
 (A) Point analysis (B) Planning
 (C) Prioritization (D) Strategy
19. If proper risk mitigation planning is not done and a mishap occurs then the test project schedule could be jeopardized, _____ could escalate and/or quality could go down.
 (A) Risk (B) Dissatisfaction
 (C) Costs (D) Issues
20. Test bed preparation includes installing the application on a machine that is accessible to all _____.
 (A) Test teams (B) Users
 (C) Managers (D) Sponsors
21. Apart from the user manual, it is necessary to prepare a _____ to include probable scenarios that may arise during operation of the product.
 (A) System (B) Tutorial
 (C) Document (D) Process questionnaire
22. _____ is necessary to do so that the software product becomes reusable
 (A) Corrective maintenance (B) Adaptive maintenance
 (C) Preventive maintenance (D) Perfective maintenance
23. A _____ analysis can be done, to see if it is more profitable to conduct a maintenance program on the software or keep using it as it is
 (A) Profit/loss (B) Test
 (C) Maintenance (D) Corrective
24. A quality assurance plan should accompany the maintenance plan in which model?
 (A) Quick fix model (B) Boehm's model
 (C) Osborne's model (D) Iterative enhancement model
25. _____ technique is most useful when nonexistent or sketch documentation is available for the software product
 (A) Reverse engineering (B) Reengineering
 (C) Forward engineering (D) Random engineering

PART – B (5 × 10 = 50 Marks)
 Answer ALL Questions

Marks BL CO

26. a. A project size of 270 KLOC is to be developed. The software development team has average experience on similar types of projects. The project schedule is medium. Identify and state which mode will be suitable to calculate the effort, development time, effort staff size and productivity of the project and calculate them.

Software project	a _b	b _b	c _b	d _b
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

(OR)

- b. What is the necessity behind a software configuration management repository? List out the tasks it performs? Using a neat sketch, depict what the repository consists of (atleast two for each repository content). 2+3+5 4 1 2,3
27. a. Explain design types-prototyping and entity relationship models. 5+5 4 2 1,3
- b. Describe design lifecycle management with a neat diagram. 6+4 4 2 1,11
28. a. Explain the different coding standards in software construction. 5+5 3 3 1,5
- b. Provide the reasons of using coding methods and explain different coding methods (any four). 2+8 4 3 1,3
29. a. Describe in detail about verification and validation. 5+5 4 4 2,11
- b. With a neat sketch, depict life cycle and explain in detail about defect tracking. 3+7 3 4 2,3
30. a. List out the software maintenance types and describe in detail. 2+8 3 5 1,7
- b. Explain in detail about product release and different tasks involved in product release management. 3+7 4 5 1,7

* * * * *

B.Tech. DEGREE EXAMINATION, JULY 2022

Fourth Semester

18CSC207J – ADVANCED PROGRAMMING PRACTICE*(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)***Note:**

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

PART - A (25 × 1 = 25 Marks)Answer **ALL** Questions

1. What will be the output of the following codes?

 $a = 4 * 3 ** 2$

Print(a)

- | | |
|--------|---------|
| (A) 32 | (B) 36 |
| (C) 44 | (D) 144 |

Marks BL CO PO

1 4 1 1

2. What is the data type used to store values in key - value pairs?

- | | |
|----------|----------------|
| (A) List | (B) Tuple |
| (C) Set | (D) Dictionary |

1 1 1 1

3. How many times will 'Python 3' be printed?

```
for i in range(1,5):
    Print('Python 3')
```

- | | |
|-------|-------|
| (A) 3 | (B) 4 |
| (C) 5 | (D) 6 |

1 2 1 1

4. What is the output of code block?

```
st = "Programming"
st = st[::-2]
Print(st)
```

- | | |
|----------------|---------------|
| (A) nimmargorP | (B) immargorP |
| (C) gimroP | (D) Programmi |

1 4 1 1

5. What is the output of the code block?

```
y=lambda x : x * 4
Print(y(6))
```

- | | |
|----------|----------|
| (A) 24 | (B) 864 |
| (C) 1296 | (D) 4096 |

1 3 3 1

6. Suppose B is a subclass of A. Which syntax will be used to invoke the
- `__int__`
- method defined in class A from class B?

- | | |
|--------------------------------|----------------------------------|
| (A) super().___init__(self) | (B) super().___init__(self) |
| (C) super().___init__(self) -- | (D) super().___init__(self) --() |

1 2 1 1

7. Choose the syntax which doesn't insert a new record into sqlite 3 table named
- `phonebook`
- with fields,
- `phoneno`
- ,
- `fname`
- ,
- `lname`
- , and
- `email`
- using python code

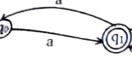
- | | |
|--|---|
| (A) insert or replace into phonebook values (123, 'A', 'B', 'xyz@gamil.com') | (B) insert into phonebook Values (&phoneno, & fname, & lname, &email) |
| (C) insert into phonebook (phoneno, email) values (?.) | (D) insert into phonebook (phoneno, fname, lname, email) values (123, 'x', 'y', 'xyz@gamil.com) |

1 2 2 1

8. The functional programming paradigm which focuses on

- | | |
|-------------------------------|-----------------------------|
| (A) Expression and stateless | (B) Stateful and expression |
| (C) Statements and expression | (D) Stateful and statements |

1 2 3 1

- | | | |
|---|---|--------------------|
| 9. The current process A need to call a routine B, the keyword that makes A to await until B complete is | (A) Await
(B) Async
(C) Call | 1 2 4 |
| 0. Which method returns the number of thread objects in the caller's thread control? | (A) Threading.activeCount()
(B) Threading.currentThread()
(C) Threading.enumerate()
(D) Threading.Thread() | 1 1 3 1 |
| Which of the following is not accepted by the given DFA? | | 1 4 5 2,3 |
|  | | |
| (A) ababaabaa
(C) abbbbaabb | (B) abbbbaa
(D) abbaabbaa | |
| Identify the right syntax to create TCP socket for message transfer in network? | | |
| A) tcp21 = socket.socket(socket.AF_INET, socket.sock_DGRAM)
B) tcp21 = socket.socket(socket.sock_DGRAM)
C) tcp21 = socket.socket(socket.AF_INET, socket.sock_STREAM)
D) tcp21 = socket.socket(socket.AF_INET, sock_STREAM) | 1 1 4 3 | |
| What is the output of the following symbolic expression | | |
| $(x12 + y12) * x12^2 . expand()$ | | 1 1 5 2,3 |
| (A) $x12 \cdot 2 + 2 \cdot x12 \cdot y12 + y12^2$
(C) $x12^2 + 2 * x12 * y12 + y12^2$ | (B) $x12^2 + 2 * x12 * y12 + 2y12^2$
(D) $x12^2 + 2 * x12 * y12 + y12^2$ | |
| What is the output of the code snippet? | | |
| <pre>x = [int(i / 2 - 5) for i in range(3,8,2)] print(x)</pre> | | 1 3 2 1 |
| (A) [0, 2, 6]
(B) [0, 1, 2] | (C) [-3, -2, -1]
(D) [-3, -1, 3] | |
| What is the output of the code snippet? | | |
| <pre>x = list(map(lambda X : X **2,range(5))) print(x)</pre> | | 1 3 3 1 |
| (A) [0, 1, 2, 3, 4, 5]
(B) [1, 4, 9, 16, 25] | (C) [0, 1, 4, 9, 16]
(D) [0, 1, 4, 9, 16,25] | |
| What is the name of python's built-in module for thread based parallelism? | | |
| thread
Thread.Threading | (B) threadall
(D) threading | 1 1 3 1 |
| Ob1 is an instance of class A. Which statement can be used to check whether object Ob1 is an instance of class A? | | 1 1 1 1 |
| Ob1.isinstance(A)
isinstance(Ob1,A) | (B) A.isinstance(Ob1)
(D) isinstance(A,Ob1) | |
| tkinter widget the purpose of mainloop method is used to | | 1 1 2.5 2 |
| Import tkinter module
To run the tkinter event loop | (B) Defining the label widget
(D) Rename the GUI window | |
| Following code is example for | | 1 5 2 1 |
| <pre>s = [] for i in range(20): if i < 5: s.append(i)</pre> | | |
| Imperative programming
Structure programming | (B) Declarative programming
(D) Functional programming | |

- | | | | | | |
|---|---|----|-----|-------|-------|
| 20. | What is the output of the following symbolic expression $(x + x * y) / x$
$\gg \text{sym.simplify}((x + x * y) / x)$ | 1 | 3 | 5 | 2 |
| | (A) $1 + y$ (B) $y + 1$
(C) 1 (D) $x = 1$ | | | | |
| 21. | Which of the following is not a valid widget in tkinter.
(A) Checkbox (B) Top level
(C) Entry (D) Radio button | 1 | 1 | 5 | 2 |
| 22. | Which of the following property of geometry manager pack allows widget to fill any space that is not used in widget's parent?
(A) fill (B) span
(C) expand (D) pad | 1 | 1 | 5 | 2.3 |
| 23. | Choose the syntax which map the button events and its event handler (fun) for a python button widget with object b1
(A) <code>b1.bind(<Button-1>,fun)</code> (B) <code>b1=tk.button(root,text='btn',event=fun)</code>
(C) <code>b1.config(command=fun)</code> (D) <code>b1.bind('Double-1',fun)</code> | 1 | 1 | 5 | 2.3 |
| 24. | The symbolic paradigm function which aids in finding the roots of equation is
(A) <code>sym.solve()</code> (B) <code>sym.solveset()</code>
(C) <code>sym.factor()</code> (D) <code>sym.diff()</code> | 1 | 1 | 5 | 2 |
| 25. | Server socket method which specify the maximum number of queued connection that must be listened before rejecting the connection.
(A) bind (B) accept
(C) listen (D) connectTo | 1 | 1 | 4 | 3 |
| PART - B (5 x 10 = 50 Marks)
Answer ALL Questions | | | | Marks | BL CO |
| 6. a.i. | A farmer wants to build a wooden fence around a rectangular field. He measures the length and width of the field and decided how high the fence be. He also decides how wide the space between each board of the fence should be. Each board is 10 cm wide. Help him with a structured program that calculates the total length of all boards required to be bought. | 6 | 3 | 1 | |
| ii. | John has discovered various rocks. Each rock is composed of various elements, and each element is represented by a lower-case letter from 'a' to 'z'. An element can present multiple times in a rock. An element is called a gem, if it occurs atleast once in each of the rocks. Given the list of rocks and in compositions, display the number of gem that exist in those rocks. | 4 | 3 | 1 | |
| (OR) | | | | | |
| b. | Create an abstract class named book, include a string field for the book's title and float for price. Within the class include constructor to initialize title, and two get methods to return title and price respectively. Include an abstract method setPrice(). Create two child class for Book: Fiction and Non-Fiction. Each must override the setPrice() method that set prices for all Fiction Book to \$24.99 and Non-Fiction to \$37.99. Write a constructor for each subclass and include a call to setPrice() create object for each subclass and print its title and price. | 10 | 3.4 | 1.0 | |
| 27. a. | Write a python code to create a Sqlite 3 table named product with fields such as P_id, P_name, price, manufacturer, quantity. Insert the rows into the table and perform the following operations.
(i) Find and print the 3 most expensive products
(ii) What are the product manufactures available?
(iii) Find the total count of products under each manufacturer
(iv) Update the quantity of product by 100 for those product which has quantity less than 10
(v) Find the products with manufacturer names starts with letter 'A' or 'D'. | 10 | 3.5 | | |

PART – B ($5 \times 10 = 50$ Marks)
Answer **ALL** Questions

Answer **ALL** Questions

26. a.i. A farmer wants to build a wooden fence around a rectangular field. He measures the length and width of the field and decided how high the fence be. He also decides how wide the space between each board of the fence should be. Each board is 10 cm wide. Help him with a structured program that calculates the total length of all boards required to be bought. 6 3 1

ii. John has discovered various rocks. Each rock is composed of various elements, and each element is represented by a lower-case letter from 'a' to 'z'. An element can present multiple times in a rock. An element is called a gem, if it occurs atleast once in each of the rocks. Given the list of rocks and in compositions, display the number of gem that exist in those rocks. 4 3 1

(OR)

b. Create an abstract class named book, include a string field for the book's title and float for price. Within the class include constructor to initialize title, and two get methods to return title and price respectively. Include an abstract method setPrice(). Create two child class for Book: Fiction and Non-Fiction. Each must override the setPrice() method that set prices for all Fiction Book to \$24.99 and Non-Fiction to \$37.99. Write a constructor for each subclass and include a call to setPrice() create object for each subclass and print its title and price. 10 3.4 1.1

27. a. Write a python code to create a Sqlite 3 table named product with fields such as P_id, P_name, price, manufacturer, quantity. Insert the rows into the table and perform the following operations. 10 3.5

(i) Find and print the 3 most expensive products
(ii) What are the product manufactures available?
(iii) Find the total count of products under each manufacturer
(iv) Update the quantity of product by 100 for those product which has quantity less than 10
(v) Find the products with manufacturer names starts with letter 'A' or 'D'.

(OR)

b.i. Illustrate with suitable code block how imperative paradigm differ from declarative paradigm. 4

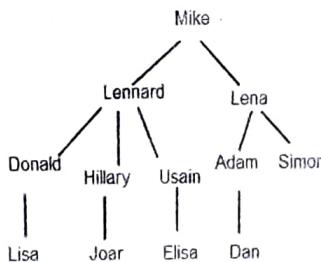
- ii. Write a python code for list comprehension function that takes a string argument and extract all the vowel's from it. 3 3 2 1
- iii. Write a python code using lambda and map to update the contents of list sequence to its squares. 3 3 2 1
28. a. In computing, the producer-consumer problem is a classical example of multi process synchronization problem. The problem describes two processes, producer and consumer. Producer generates the data and add to buffer and the consumer consume data by removing from buffer. Make sure producer wont add data into buffer if its full and consumer won't consume from empty buffer. In both cases the process is made to sleep. Solve the problem by implementing multithreading approach. 10 3,4 3,6 1

(OR)

- b. Write a python code to implement the following using function programming.
- Create a encrypted text for a given string using ceaser cipher by using map function 3 3 3 1
 - Given runs scored by 2 players in a series of matches, use reduce function to find who is better player of two 3 4 3,6 1
 - Given two trending topics and bunch of tweets. Count the number tweets for each topics by using map, reduce, and filter function 4 3 3,6 1
29. a. In client-server communication after the handshake, either client or the server can choose to send a ping to other party. When the ping is received, the recipient must send back a pong as soon as possible. Write a python socket programming code to implement the above. 10 4 4 3

(OR)

- b. Consider the following family tree 10 5 4 3



- Male (Mike, Lennard, Donald, Hillary, Usain, Adam, Simon, Joar)
- Female (Lena, Lisa, Elisa)

Define the predicate for parent, brother, sister, cousin uncle, aunt, son, daughter, and grandparent. Answer the following

- Who were the cousins of Adam? 5 4,5 5 2,3
- Who is the aunt of Hillary? 5 4,5 5 2,3

30. a.i. Write a python code to construct a Deterministic Finite Automata (DFA) for the language accepting strings ending with '011' over input alphabets $\Sigma = \{0,1\}$. 5 4,5 5 2,3
- ii. Write a python code to construct a Non-Deterministic Finite Automata (NFA) for the language $L = (a \mid b)^* aab$. 5 4,5 5 2,3

(OR)

- b. Write a python code using tkinter for the below GUI. 10 6 2,5 2,3

Mark sheet					
Name	<input type="text"/>	Dept	<input type="text"/>		
Roll no	<input type="text"/>				
S No	Subject	Grade	Credit	Credit obt	
1.	CS201	<input checked="" type="checkbox"/> A	4	40	
2.	CS202	<input checked="" type="checkbox"/> C	4	32	
3.	CS203	<input checked="" type="checkbox"/> B	3	27	
4.	MA201	<input checked="" type="checkbox"/> A	4	40	
<input type="button" value="Result"/> Total credit 139 SGPA 9.27					

Reg. No. R A 2 0

B.Tech. DEGREE EXAMINATION, JULY 2022
Fourth Semester

18CSC204J – DESIGN AND ANALYSIS OF ALGORITHMS

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

PART – A ($25 \times 1 = 25$ Marks)

Answer ALL Questions

- | Answer ALL Questions | | | | | | | | |
|----------------------|--|---|---------------------------------------|------------|---|---|-------|-------|
| 1. | What is the worst and best case complexity of ordered linear search? | (A) $\Omega(n \log n)$, $O(n)$ | (B) $O(n)$, $\Omega(1)$ | 1 | 1 | 1 | 1,2,3 | |
| 2. | What is the average case running time of an insertion sort algorithm? | (A) $\Theta(n)$ | (B) $\Theta(n \log n)$ | 1 | 1 | 1 | 1,2,3 | |
| 3. | The time complexity of the following pseudo code is, _____ | int X(n)
{
if ($n == 0$) return 1;
else return $n * X(n-1)$;
} | (A) $O(1)$ | (B) $O(n)$ | 1 | 2 | 1 | 1,2,3 |
| 4. | What are the three algorithm construction? | (A) Input, process, output | (B) Sequence, selection, repeat | 1 | 1 | 1 | 1,2,3 | |
| | | (C) Input/ output, decision, repeat | (D) Loop, input/ output, process | | | | | |
| 5. | Consider the recurrence relation, | $T(n) = \begin{cases} 2T(\sqrt{n}) + 1 & n > 2 \\ 2 & 0 < n \leq 2 \end{cases}$ | T(n) in terms of Θ notation is | 1 | 3 | 1 | 1,2,3 | |
| | | (A) $\Theta(\log \log n)$ | (B) $\Theta(\log n)$ | | | | | |
| | | (C) $\Theta(\sqrt{n})$ | (D) $\Theta(n)$ | | | | | |
| 6. | What is the run time efficiency of using brute force technique for the closest pair problem? | (A) $O(n)$ | (B) $O(n \log n)$ | 1 | 1 | 2 | 1,2,3 | |
| | | (C) $O(n^2)$ | (D) $O(n^3 \log n)$ | | | | | |

7. What is the average case time complexity of merge sort?
 (A) $O(n \log n)$
 (B) $O(n^2)$
 (C) $O(n^2 \log n)$
 (D) $O(n \log n^2)$

1 1 2 1,2,3

8. How many recursive calls are there in recursive matrix multiplication by Strassen's method?
 (A) 5
 (B) 7
 (C) 8
 (D) 4

1 2 2 1,2,3

9. _____ is a method of constructing a smallest polygon out of N given points.
 (A) Closest pair problem
 (B) Quick hull problem
 (C) Path compression
 (D) Union by rank

1 1 2 1,2,3

10. Solve using master's theorem. $T(n) = 16T(n/4) + n!$
 (A) $\Theta(n)$
 (B) $\Theta(\log n)$
 (C) $\Theta(n \log n)$
 (D) $\Theta(n!)$

1 2 2 1,2,3

11. Given items as {value, weight} pairs $\{(40, 20), (30, 10), (20, 5)\}$. The capacity of knapsack = 20. Find the maximum value output assuming items to be divisible.
 (A) 60
 (B) 80
 (C) 100
 (D) 40

1 2 3 1,2,3

12. If an optimal solution can be created for a problem by constructing optimal solutions for its sub problems, the problem possesses _____ property.
 (A) Overlapping subproblems
 (B) Optimal substructure
 (C) Memorization
 (D) Greedy

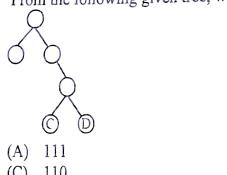
1 2 3 1,2,3

13. When a top-down approach of dynamic programming is applied to a problem, it usually _____.
 (A) Decreases both, the time complexity and the space complexity
 (B) Decreases the time complexity and increases the space complexity
 (C) Increases the time complexity and decreases the space complexity
 (D) Increases both, the time complexity and the space complexity

1 2 3 1,2,3

14. From the following given tree, what is the computed code word for 'C'?

1 2 3 1,2,3



- (A) 111
 (B) 101
 (C) 110
 (D) 011

15. What is the running time of the Huffman encoding algorithm?
 (A) $O(C)$
 (B) $O(\log C)$
 (C) $O(C \log C)$
 (D) $O(N \log C)$

1 1 3 1,2,3

16. The problem of finding a subset of positive integers whose sum is equal to a given positive integer is called as _____.
 (A) N-queen problem
 (B) Subset sum problem
 (C) Knapsack problem
 (D) Hamiltonian circuit problem

1 2 4 1,2,3

17. How many possible solutions exist for an 8-queen problem?

- (A) 100
 (B) 98
 (C) 92
 (D) 88

1 2 4 1,2,3

18. Which of the following branch and bound strategy leads to breadth first search?

- (A) LIFO branch and bound
 (B) FIFO branch and bound
 (C) Lowest cost branch and bound
 (D) Highest cost branch and bound

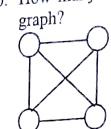
1 1 4 1,2,3

19. How many colors (unique) will be required for proper vertex coloring of an empty graph having N vertices?

- (A) 0
 (B) 1
 (C) 2
 (D) n

1 2 4 1,2,3

20. How many unique colors will be required for vertex coloring of the following graph?



- (A) 2
 (B) 3
 (C) 4
 (D) 5

1 1 5 1,2,3

21. The worst-case efficiency of solving a problem in polynomial time is _____.
 (A) $O(P(n))$
 (B) $O(P(n \log n))$
 (C) $O(P(n^2))$
 (D) $O(P(m \log n))$

1 1 5 1,2,3

22. Problems that can be solved in polynomial time are known as _____.
 (A) Intractable
 (B) Tractable
 (C) Decision
 (D) Complete

1 2 5 1,2,3

23. The Euler's circuit problem can be solved in _____.
 (A) $O(n)$
 (B) $O(n \log n)$
 (C) $O(\log n)$
 (D) $O(n^2)$

1 1 5 1,2,3

24. Which of the following problems is not NP complete?
 (A) Hamiltonian circuit
 (B) Bin packing
 (C) Partition problem
 (D) Halting problem

1 1 5 1,2,3

25. Hamiltonian path problem is _____.
 (A) NP problem
 (B) P class problem
 (C) NP-complete problem
 (D) N class problem

1 1 5 1,2,3

PART – B (5 × 10 = 50 Marks)

Answer ALL Questions

Marks BL CO PO

26. a.i. Develop an algorithm to sort 'n' numbers in an array. Analyse its best, worst case complexity.

5 3 1,6 1,2,3

- ii. Show that $T(n) = n^3 + 20n + 1$ is in $O(n^4)$.

5 3 1 1,2,3

(OR)

- b.i. Write short notes on characteristics of a good algorithm.

5 1 1 1,2,3

14JA4/18CSC204J

5 3 1 1,2,3

- ii. Solve using recursion tree method. $T(n) = T\left(\frac{n}{3}\right) + T\left(\frac{2n}{3}\right) + cn$; where $T(1) = 1$.

5 3 2,6 1,3

27. a.i. Use divide and conquer strategy to develop an algorithm to find closest pair of points. Analyze the constructed algorithm and determine worst case time complexity.

5 3 2 1,2

- ii. Solve using Master's theorem $T(n) = 4T\left(\frac{n}{3}\right) + 1$.

(OR)

5 3 2,6 1,2,3

- b.i. Construct an algorithm to perform matrix multiplication using divide and conquer strategy. Determine it's worst case time complexity.

5 3 2 1,2,3

- ii. Find the maximum subarray in the given array of 8 numbers using divide and conquer strategy. $A[] = \{-2, -5, 6, -2, -3, 1, 5, -6\}$.

28. a.i. Identify the optimal solution to perform matrix chain multiplication. The matrices are

A1	A2	A3	A4	A5	A6
30×35	35×15	15×5	5×10	10×20	20×25

Use dynamic programming strategy to solve the given problem.

2 1 3 1,2,3

- ii. Define optimal substructure.

(OR)

10 3 3,6 1,2,3

- b. Construct an algorithm using greedy technique to encode the given string.

String = "BCAADDCCACACAC"

29. a.i. Solve the travelling salesman problem using branch and bound technique. The adjacency matrix of the city graph is given below,

$$M = \begin{bmatrix} \infty & 2 & 3 & 4 \\ 1 & \infty & 4 & 3 \\ 2 & 3 & \infty & 4 \\ 4 & 3 & 2 & \infty \end{bmatrix}$$

(OR)

10 3 4 1,2,3

- b. Solve the knapsack problem and find optimal solution using branch and bound technique. The weights and profits of each items are given below

Weights (W) = {2, 4, 6, 9}

Profits (P) = {10, 10, 12, 18}

Where the sack capacity (M) = 15.

30. a.i. Construct an algorithm to perform randomized quick sort.

6 3 5 1,2,3

- ii. Perform the complexity analysis of randomized quick sort algorithm.

4 4 5 1,2,3

(OR)

5 4 5 1,2,3

- b.i. Criticize Hamiltonian cycle is a NP problem.

5 2 5 1,2,3

- ii. Write short notes on satisfiability problem with example.

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Reg. No. R 123456789

B.Tech. DEGREE EXAMINATION, JULY 2022
Fourth Semester

18MAB204T – PROBABILITY AND QUEUEING THEORY

(For the candidates admitted from the academic year 2020 – 2021 and 2021 – 2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

PART – A ($25 \times 1 = 25$ Marks)

Answer ALL Questions

7. If the random variable X follows the uniform distribution in $(-3,3)$, then $P(X < 0)$
- $\frac{1}{4}$
 - $\frac{1}{2}$
 - $\frac{1}{3}$
 - $\frac{1}{5}$
8. A candidate applying for UPSC exam has the probability of 0.2 of passing the test in a given trial. The probability that he will pass the test on the fourth trial is
- 0.1024
 - 0.0064
 - 0.2014
 - 0.0406
9. The mean and variance of the Poisson distribution are
- λ and λ^2
 - λ^2 and λ
 - λ and λ
 - λ and $1/\lambda$
10. The mean of the exponential distribution with pdf $\lambda e^{-\lambda x}, x > 0$ is
- λ
 - $1/\lambda$
 - $1/\lambda^2$
 - $-\lambda$
11. _____ results if you fail to reject the null hypothesis when the null hypothesis is actually false
- Type I error
 - Type II error
 - Type III error
 - Type IV error
12. The t-statistic is given by
- $t = \bar{x} + \mu / \sqrt{n-1}$
 - $t = \bar{x} - \mu / \sqrt{n-1}$
 - $t = \bar{x} - \mu / \sqrt{n}$
 - $t = \bar{x} + \mu / \sqrt{n}$
13. If $n_1=n_2=n$ then the degrees of freedom to test the differences of mean of two samples is
- $n_1 - n_2 - 2$
 - $n_1 + n_2 + 2$
 - $2n - 2$
 - $2n + 2$
14. The mean of the t-distribution is
- 0
 - $\nu/\nu-2$
 - $\nu/\nu+2$
 - $\nu-2$
15. Which of the following value is not typically used for α ?
- 0.01
 - 0.25
 - 0.05
 - 0.02
16. The symbolic notation of queuing model is represented by
- Neumann's
 - Fisher's
 - Kendall's
 - Euler's
17. The average number of customers in the queue system $(M/M/1:\infty/FIFO)$ is
- $\lambda/\mu-\lambda$
 - $\lambda/\mu+\lambda$
 - $\mu/\lambda-\mu$
 - $\mu/\lambda+\mu$
18. The traffic intensity of a queuing system is
- λ
 - μ
 - λ/μ
 - μ/λ
19. The probability that the waiting time of a customer in the system exceeds 't' in the queue model $(M/M/1:(\infty/FIFO))$ is
- $e^{-(\mu-\lambda)t}$
 - $e^{(\mu+\lambda)t}$
 - $e^{\mu t}$
 - $e^{\lambda t}$
20. The probability that the system becomes idle is denoted by
- P_1
 - P_0
 - P_2
 - P_n
21. In a transition probability matrix, the sum of all elements of any row is
- 0
 - 1
 - 2
 - 1
22. A non-null persistent and aperiodic state is called
- Periodic
 - Reducible
 - Ergodic
 - recurrent
23. Chapman-Kolmogorov theorem states that
- $[p_{ij}^{(n)}] = [p_{ij}]^n$
 - $p_{ij} = p_{ji}$
 - $p_{ij} = p_{ij}^{(n)}$
 - $[n p_{ij}] = [p_{ij}]^n$
24. Markov process is one in which the future value is independent of the _____ values.
- Present
 - Past
 - Future
 - Middle
25. If P is the tpm of the regular chain, then
- $\pi P = \pi$
 - $\pi = P$
 - $\pi + P = \pi$
 - $\pi - P = \pi$

PART – B (5 × 10 = 50 Marks)

Answer ALL Questions

26. a. A random variable X has the following probability distribution.

$X=x$	0	1	2	3	4	5	6	7
$P(X=x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

Find, (i) The value of k (ii) $P(1.5 < X < 4.5/X > 2)$ (iii) The smallest value of λ for which $P(X \leq \lambda) > 1/2$.

(OR)

- b. A random variable X has a density function given by $f(x) = \begin{cases} 2e^{-2x}; x \geq 0 \\ 0; x < 0 \end{cases}$

Find, (i) The MGF of X (ii) The first two moments about the origin (iii) Mean and variance of X.

27. a. Out of 800 families with 4 children each, how many families would be expected to have
- 2 boys and 2 girls
 - At least 1 boy
 - At most 2 girls and
 - Children of both sexes

Assume equal probabilities for boys and girls.

(OR)

- b. State and prove the memory less property of exponential distribution. Hence find the conditional probability that a repair takes at least 10 hrs given that its duration exceeds 9 hrs. Assume the time (in hours) required to repair a machine is exponentially distributed with parameter $\lambda=1/2$. 10 4 2 1

28. a. In a large city A, 20 percent of a random sample of 900 school boys had a slight physical defect. In another large city B, 18.5 percent of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant? 10 4 3 2

(OR)

- b. Samples of two types of electric bulbs were tested for length of life and the following data were obtained 10 4 3 2

	Size	Mean	S.D
Sample I	8	1234 hrs	36 hrs
Sample II	7	1036 hrs	40 hrs

Is the difference in the means sufficient to warrant that type I bulbs are superior to type II bulbs?

29. a. Two independent samples of eight and seven items respectively had the following values of the variable, 10 3 4 1

Sample I	9	11	13	11	15	9	12	14
Sample II	10	12	10	14	9	8	10	

Do the two estimates of population variance differ significantly at 5% level of significance?

(OR)

- b. Customers arrive at a one-man barber shop according to a Poisson process with a mean inter arrival time of 12 min. Customers spend an average of 10 min in the barber's chair. 10 3 4 1

- (i) What is the expected number of customers in the barber shop?
- (ii) Calculate the percentage of time an arrival can walk straight into the barber's chair without having to wait.
- (iii) How much time can a customer expect to spend in the barber's shop?
- (iv) What is the average time customers spend in the queue?

30. a. The transition probability matrix of a Markov chain $\{X_n\}, n=1,2,3, \dots$ having 3 states 1, 2 and 3 is $P = \begin{pmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{pmatrix}$ 10 3 5 1

$$\text{and the initial distribution is } p^{(0)} = (0.7, 0.2, 0.1).$$

Find, (i) $P(X_2 = 3)$ (ii) $P(X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 2)$

(OR)

- b. Three boys A, B and C are throwing a ball to each other. A always throws the ball to B and B always throws the ball to C, but C is just as likely to throw the ball to B as to A. Show that the process is Markovian. Find the transition matrix and classify the states. 10 3 5 2

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