

Reg. No.	R	A	1	5	1	1	0	0	0	3	0	<i>.....</i>

B.Tech. DEGREE EXAMINATION, JUNE 2019
 1st to 7th Semester

(For the candidates admitted during the academic year 2015 – 2016 to 2017-2018)

Note:

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

15CS434E – NETWORK SECURITY

- Max. Marks: 100 Marks: 100
- PART – A (20 × 1 = 20 Marks)**
 Answer ALL Questions
- 1. A small change in either the plaintext or the key should produce a significant change in cipher text. This is called as
 - (A) Avalanche effect
 - (B) Confusion
 - (C) Diffusion
 - (D) Transposition
 - 2. Greater the number of rounds in a block cipher lead to
 - (A) Greater complexity
 - (B) Lesser complexity
 - (C) Simple computation
 - (D) Easy encryption
 - 3. Symmetric encryption systems use _____ keys.
 - (A) 4
 - (B) 3
 - (C) 2
 - (D) 1
 - 4. The order of plaintext letters are rearranged. This is termed as
 - (A) Confusion
 - (B) Substitution
 - (C) Diffusion
 - (D) Transposition
 - 5. The output feedback mode decryption can be expressed as
 - (A) $P_j = C_j \oplus E(K, [C_{j-1} \oplus P_{j-1}])$
 - (B) $P_j = E(K, [C_{j-1} \oplus P_{j-1}])$
 - (C) $P_j = E(K, C_{j-1})$
 - (D) $P_j = C_j \oplus E(K, [C_j \oplus P_{j-1}])$
 - 6. The Euler's totient function $\phi(37)$ is
 - (A) 38
 - (B) 39
 - (C) 36
 - (D) 35
 - 7. Consider a RSA system defined with parameters p, q, e and message M which of the following are kept secret?
 - (A) p, q, e
 - (B) e and $p * q$
 - (C) p, e
 - (D) p, q
 - 8. The condition for selecting the parameter e in RSA algorithm is
 - (A) $\gcd(\phi(n), e) = 0$
 - (B) $\gcd(\phi(n), e) = 1$
 - (C) $\gcd(\phi(e), n) = 0$
 - (D) $\gcd(\phi(e), n) = 1$

be handed

nature by bob

*“” if the key
 SFUUUFYA
 FFUVFYA*

- Page 1 of 3
- 06JF1-7/15CS434E
- SNF3-7/15CS434E

9. The process of taking hash of the message and encrypting the message with the Creator's private key is
 (A) Non-repudiation
 (B) Encryption
 (C) Digital signature
10. In data authentication algorithm block is
 (A) Output from previous block XORed with next block of input message
 (B) Input message from previous block XORed with next block of input message
 (C) Key from previous block is XORed with next block of output messages
 (D) Key from previous block is XORed with next block of input message
11. In a SHA system with block size 1024 bits and message length 128 bits, the size of the message after padding should be
 (A) 869 mod 1024
 (B) 896 mod 1024
 (C) 986 mod 1024
 (D) 968 mod 1024
12. MAC stands for _____ in cryptography
 (A) Message authentication code
 (B) Medium access control
 (C) Medium authentication control
 (D) Message access control
13. DAA uses _____ encryption algorithm to generate message authentication code.
 (A) AES-128
 (B) DES
 (C) Triple DES
 (D) AE-256
14. CMAC supports _____ mode for generating message authentication code.
 (A) Counter
 (B) Cipher block chain
 (C) Cipher feedback
 (D) Output feedback
15. A framework for the permission of authentication services where a directory may serve as repository of public-key certificate is
 (A) X.509
 (B) TTP
 (C) Certificate authority
 (D) IPsec
16. PGP is a open source software package used to provide
 (A) IP security
 (B) Transport layer security
 (C) E-mail security
 (D) WLAN security
17. An individual who is not authorized to use the computer and who penetrates a system access, control to exploit legitimate users is known as
 (A) Misfeasor
 (B) Masquerader
 (C) Spoofler
 (D) Virus
18. _____ virus infects a master boot record and spreads when a systems is booted.
 (A) Boot sector virus
 (B) Memory resident virus
 (C) Parasitic virus
 (D) Polymorphic virus
19. Which of the following service is not provided by firewall?
 (A) Service control
 (B) Direction control
 (C) Behaviour control
 (D) Internal threat control
20. _____ type of firewall remembers the profile of the earlier transaction.
 (A) Source inspection firewall
 (B) IP address firewall
 (C) Stateful inspection firewall
 (D) Packet filtering firewall

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

21. Using Vigenere cipher, encrypt and decrypt the word 'EXPLANATION' using the key 'LEG'.
 22. In a single round of Feistel cipher structure, the complex function $F = T(R) \text{ XOR } K$ where T is a transposition cipher with key (3 4 2 1), R is the right half of the plaintext and K is the round given as 0011. What would be the O/P of this round for the plaintext 11000110?
 23. When are two numbers relatively prime to each other? Give examples.
 24. Find the largest primitive root of 11.
 25. Summarize the attacks addressed by message authentication code (MAC).
 26. List the requirements for a hash function in message authentication.
 27. State the techniques for learning passwords.

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

28. a. Using hill cipher, encrypt the message 'DR GREER ROCKS' with key $\begin{pmatrix} 1 & 3 \\ 2 & 1 \end{pmatrix}$ (OR)

- b. Describe output feed back mode and counter mode of operations. List the advantages of counter mode.

29. a. Given $E_{11}(1, 6)$ and $G = (2, 7)$ and $n_B = 7$, $P = (10, 9)$, $k = 3$ perform encryption and decryption of elliptic curve cryptography.

- b. Demonstrate RSA algorithm. Perform encryption and decryption using RSA algorithm for the following $p = 7, q = 11$ and $m = 8, e = 7$.

30. a. With necessary diagrams explain the working mechanism of SHA-512 algorithm.

(OR)

- b. Explain the various key distribution strategies.

31. a. What are the services offered by PGP? Describe a PGP message reception sequence.

(OR)

- b. Elaborate on key management phase in IEEE 802.11i.

32. a. What are the two approaches to intrusion detection? Explain.

(OR)

- b. Describe the process by which filtering firewall can successfully secure the system.

Reg. No.

B.Tech. DEGREE EXAMINATION, NOVEMBER 2019
Third to Seventh Semester

15CS434E – NETWORK SECURITY
(For the candidates admitted during the academic year 2015 – 2016 to 2017 – 2018)

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

ded

00

PART – A ($20 \times 1 = 20$ Marks)
Answer ALL Questions

- An interruption attack is also called as _____ attacks.
 (A) Masquerade
 (B) Alteration
 (C) Fabrication
 (D) Replay attack
 - The attacks based on linear cryptanalysis use
 (A) Chosen cipher text only
 (B) Chose plaintext
 (C) Known cipher text only
 (D) Known plaintext-cipher text pairs
 - The number of rounds in 64 bits DES and 128 bits AES are respectively.
 (A) 12 and 12
 (B) 12 and 16
 (C) 16 and 12
 (D) 16 and 32
 - Using monoalphabetic cipher, encrypt the plaintext "if we wish to replace letters" if the key is "DKVQFIBJWPESCXHTMYAUOLRGZN"
 (A) WIRFRWAJUHVYFTSDVFSUUUFYA (B) WIRFRAWJHUYFTSDVFSUUUFYA
 (C) WIRFRAWJHSYFTSVDSFFUVFYA (D) WIRFRAWJSHFYSTVDSFFUVFYA
 - $11 \bmod 7$ and $-11 \bmod 7$ are _____ respectively.
 (A) 4 and 3
 (B) 4 and 4
 (C) 4 and -3
 (D) 4 and -4
 - Which one of the following is not Fermat theorem?
 (A) $a^{p-1} \equiv 1 \pmod{p}$
 (B) $a^p \equiv a \pmod{p}$
 (C) $a^{p-1} \pmod{p} = 1 \pmod{p}$
 (D) $a^{p-1} \pmod{p} = a \pmod{p}$
 - Alice digitally signs a message and sends it to bob. Verification of the signature by bob requires
 (A) Alice's public key
 (B) Bob's public key
 (C) Bob's private key
 (D) Alice's private key
 - Euler's totient function $\phi(41)$ and $\phi(40)$ are _____ respectively.
 (A) 40 and 24
 (B) 40 and 16
 (C) 40 and 39
 (D) 40 and 12

9. Entity authentication is used to protect against
 (A) Session hijacking (B) Impersonation
 (C) Replay attack (D) Identity theft
10. Encrypted key exchange (EKE) protocol is resistant to
 (A) Replay attacks (B) Man-in-the-middle attacks
 (C) Dictionary attacks (D) Reflection attacks
11. Given a hash value y , it is computationally infeasible to find an input x such that $H(x) = y$. It is referred to as
 (A) One-way property (B) Weak-collision resistance
 (C) Strong collision resistance (D) One-to-one relation
12. In external error control, error correcting code is appended to
 (A) Cipher text (B) Private key
 (C) Plain text (D) Public key
13. An extra network-layer header is inserted by
 (A) AH in transport mode (B) AH in tunnel mode
 (C) ESP in transport mode (D) TLS security
14. The SSL record protocol provides two services namely
 (A) Non-repudiation and access control (B) Authentication and access control
 (C) Authentication and authorization (D) Confidentiality and message integrity
15. The message integrity check in CCMP is computed using
 (A) Two-phase key mixing (B) AES in CBC mode
 (C) A keyed hash (D) A CRC
16. The SIM authenticates itself to the MCSHLR using
 (A) A user password (B) A digital certificate
 (C) A response to a challenge (D) A encrypted signaling message
17. A technique that focuses on characterizing the past behaviour of individual users or related groups of users and then detecting significant deviation is called
 (A) Statistical anomaly (B) Profile based anomaly
 (C) Threshold (D) Markov chain
18. Which of the following is necessary feature of a DDOS attack?
 (A) Use of TCP SYN packets (B) Use of spoofed port address
 (C) Use of multiple attackers geographically (D) Use of malformed IP packets
19. The most effective remedy for SQL injection attacks is
 (A) To filter HTML form input at the client (B) To employ stored procedures on the side
 (C) To employ prepared SQL statements on the web server (D) To perform input validation on the database server via regular expression
20. Probabilistic packet marking is a technique used in support of
 (A) DDOS prevention (B) IP trace back
 (C) DDOS detection (D) worm detection
21. Distinguish the mono alphabetic cipher and polyalphabetic cipher.
22. Construct a play fair key matrix using key "encyption". Encrypt the plaintext "Caeser cipher" using it.
23. Determine gcd(6622, 645) using Euclid algorithm.
24. Find the primitive root of $p = 23$.
25. Describe the identity-based encryption (IBE).
26. Describe X.509 digital certificate format.
27. What is botnet? How does a computer become a bot?
- PART - C (5 x 12 = 60 Marks)**
- Answer ALL Questions
28. a. Describe the various stages of advanced encryption standard (AES) algorithm with a neat sketch.
- b. Draw the block diagram of SDES algorithm and encrypt the plaintext (P) = 11010101 using key K = 0111010011. The permutation and substitution box are given below
- $$P_{10} = \begin{bmatrix} 3 & 5 & 2 & 7 & 4 & 10 & 1 & 9 & 8 & 6 \end{bmatrix}$$
- $$P_8 = \begin{bmatrix} 6 & 3 & 7 & 4 & 8 & 5 & 10 & 9 \end{bmatrix}$$
- $$P_4 = \begin{bmatrix} 2 & 6 & 3 & 1 & 4 & 8 & 5 & 7 \end{bmatrix}$$
- $$IP = \begin{bmatrix} 4 & 1 & 2 & 3 & 2 & 3 & 4 & 1 \end{bmatrix}$$
- $$IP^T = \begin{bmatrix} 4 & 1 & 3 & 5 & 7 & 2 & 8 & 6 \end{bmatrix}$$
- $$P_4 = \begin{bmatrix} 2 & 4 & 3 & 1 \end{bmatrix}$$
- $$S_0 = \begin{bmatrix} 1 & 0 & 3 & 2 \\ 3 & 2 & 1 & 0 \\ 0 & 2 & 1 & 3 \\ 3 & 1 & 3 & 2 \end{bmatrix} \quad S_1 = \begin{bmatrix} 0 & 1 & 2 & 3 \\ 2 & 0 & 1 & 3 \\ 3 & 0 & 1 & 0 \\ 2 & 1 & 0 & 3 \end{bmatrix}$$
- (OR)
29. a.i. Find the multiplicative inverse of $(79, 3220)$ using extended Euclidean algorithm and find Q such that $Q \times 79 \equiv 1 \pmod{3220}$.
- i. State and prove the Fermat's theorem.
- b. Consider the elliptic curve $E_5(1,6)$ that is $y^2 = x^3 + x + 6$ with modulus of $P = 11$. Consider the point $G = (2, 7)$ and compute the multiples of G from $2G$ through $8G$.
30. a. Consider a Diffie-Hellman scheme with a common prime $q = 11$ and a primitive root $\alpha = 2$
 (i) Show that 2 is a primitive root of 11
 (ii) If user A has a public key $Y_A = 9$ what is A's private key X_A ?
 (iii) If user B has public key $Y_B = 3$ what is the shared secret key K ?
 (OR)

PART - B (5 x 4 = 20 Marks)
 Answer ANY FIVE Questions

21. Distinguish the mono alphabetic cipher and polyalphabetic cipher.
22. Construct a play fair key matrix using key "encyption". Encrypt the plaintext "Caeser cipher" using it.
23. Determine gcd(6622, 645) using Euclid algorithm.
24. Find the primitive root of $p = 23$.
25. Describe the identity-based encryption (IBE).
26. Describe X.509 digital certificate format.

1st

00

- b. What is mutual authentication? Explain the various types of mutual authentication with neat diagram.
31. a. Discuss on services provided by the SSL record protocol and steps involved in SSL record protocol transmission.
- b. Describe the key hierarchy of IEEE 802.11 and how each key is derived. **(OR)**
32. a. What is SQL injection attack? Explain how the attack and its remedies are implemented.
- b. Classify the worms based on their vector of propagation and explain them. **(OR)**

* * * *

B.Tech. DEGREE EXAMINATION, MAY 2022
Sixth Semester

18CSE354T – NETWORK SECURITY

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

- (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)

Marks BL CO PO

Answer ALL Questions

- | Answer ALL Questions | | | | | |
|----------------------|---|---|--|---|-------|
| 1. | In a network, if p is the only packet being transmitted and there was no earlier transmission, which of the following delays could be zero? | (A) Propagation delay
(C) Queuing delay | (B) Transmission delay
(D) Processing delay | 1 | 1 1 1 |
| 2. | Among the following statements, which are true with respect to signature based IDS? | (A) It cannot work with an IPS
(C) It detects never – before seen anomalies | (B) It only identifies on known signature
(D) It works best in large enterprise | 1 | 1 1 1 |
| 3. | Bypassing a device, or performing another action, to attack or place malware on a target network without being detected is called | (A) Packet filter
(C) Evasion | (B) State table
(D) Honeypot | 1 | 1 1 1 |
| 4. | The advantage of setting up a DMZ with two firewalls is | (A) You can control where traffic goes in the three networks
(C) You can do load balancing | (B) You can do stateful packet filtering
(D) Improved network performance | 1 | 1 1 1 |
| 5. | Which malicious program cannot do anything until actions are taken to activate the file attached by the malware? | (A) Trojan horse
(C) Virus | (B) Worm
(D) Bots | 1 | 1 1 1 |
| 6. | The encryption protocols used to secure the authentication of computers using IPsec is | (A) Kerberos V5
(C) SHA | (B) Certificates
(D) HASH | 1 | 1 2 1 |
| 7. | The mode which can be used to secure communications between two LANs is | (A) AH tunnel mode
(C) AH transport mode | (B) IKE tunnel mode
(D) ESP transport mode | 1 | 1 2 1 |

8. Which of the following organizations is primarily concerned with military encryption
 (A) NSA
 (B) NIST
 (C) IEEE
 (D) ITU
9. In tunnel mode, IPsec protects the _____
 (A) Entire IP packet
 (B) IP header
 (C) IP payload
 (D) IP trailer
10. What is the size of the RSA signature hash after the MD5 and SHA-1 processing?
 (A) 42 bytes
 (B) 32 bytes
 (C) 38 bytes
 (D) 48 bytes
11. _____ is a process which verifies the identity of a user who wants to access the system.
 (A) Authentication
 (B) Non-reputation
 (C) Integrity
 (D) Availability
12. Which algorithm provides the private key and its corresponding public key?
 (A) Key generation algorithm
 (B) Signature verifying algorithm
 (C) Signing algorithm
 (D) DES algorithm
13. Which hashing algorithm is used to derive the PTK for PMK?
 (A) SHA - 1
 (B) SHA - 2
 (C) SHA - 3
 (D) MD - 5
14. In which port forwarding technique does the client act on the server's behalf?
 (A) Remote forwarding
 (B) Local forwarding
 (C) Stable forwarding
 (D) Packet forwarding
15. How many algorithms digital signature consists of
 (A) 2
 (B) 3
 (C) 4
 (D) 5
16. Which one of the following is not a higher-layer SSL protocol?
 (A) Alert protocol
 (B) Handshake protocol
 (C) Alarm protocol
 (D) Change cipher spec protocol
17. Which protocol is used to convey SSL related alerts to the peer entity?
 (A) Alert protocol
 (B) Handshake protocol
 (C) Upper layer protocol
 (D) Change cipher spec protocol
18. In the alert protocol the first byte takes the value 1 or 2 which corresponds to _____ and _____ respectively.
 (A) Select, alarm
 (B) Alert, alarm
 (C) Warning, alarm
 (D) Warning, fatal

PART – B (5 × 10 = 50 Marks)

Answer ALL Questions

- | | Marks | BL | CO | PO |
|---|-------|----|----|----|
| 19. Which is the key exchange algorithm used in cipher suite parameters? | 1 | 1 | 4 | 1 |
| (A) RSA
(B) Fixed Diffie-Hellman
(C) Ephemeral | | | | |
| 20. The certificate message is required for any agreed-on key exchange method except _____
(A) Ephemeral Diffie – Hellman
(B) Anonymous Diffie – Hellman
(C) Fixed Diffie – Hellman
(D) RSA | 1 | 1 | 4 | 1 |
| 21. With respect to IEEE 802.11 wireless LAN, MSDU stands for _____.
(A) MAC service data unit
(B) Main server data user
(C) Multiframe service datagram
(D) MAC service device usage | 1 | 1 | 5 | 1 |
| 22. Frequency band definition and wireless signal encoding are functions of which layer?
(A) Physical layer
(B) Logical link control layer
(C) Medium access layer
(D) Application layer | 1 | 1 | 5 | 1 |
| 23. Another name for the AAA key (Authentication, Authorization and Accounting key) is _____.
(A) Pre-shared key
(B) Pairwise transient key
(C) Master session key
(D) Key conformation key | 1 | 1 | 5 | 1 |
| 24. In which phase of operation does the STA prove their identities to each other?
(A) Discovery
(B) Authentication
(C) Key generation and (D) Protected data transfer | 1 | 1 | 5 | 1 |
| 25. What was the security algorithm defined for the IEEE 802.11?
(A) WEP
(B) RSN
(C) WPA
(D) SSL | 1 | 1 | 5 | 1 |
| 26. a. Describe about IDS with its advantages and disadvantages.
(OR)
b. Describe different types of network layer attacks. Give an example for each. | 10 | 1 | 1 | 1 |
| 27. a. Explain in detail about architecture of IP security.
(OR)
b. Enumerate the basic combinations of security associations in detail. | 10 | 1 | 2 | 1 |
| 28. a. Write in detail about the security services (PGP, S/MIME for E-mail.
(OR) | 10 | 1 | 3 | 1 |

MINNATION, NOVEMBER 2

o 7th Semester
 © MANAGEMENT SYSTEM
 within first 45 minutes and OMR
 answer booklet.

- b. Illustrate with an example, the Diffie Hellman key exchange algorithm in detail. 10 1 3 1
29. a. Explain in detail about SET for E-commerce transaction. 10 1 4 1
- (OR)
- b. Discuss in detail about change cipher spec and alert protocol. 10 1 4 1
30. a. Write in detail about IEEE 802.11 wireless LAN. Analyze its performance. 10 1 5 1
- (OR)
- b. Describe about buffer overflow and format string attacks. 10 1 5 1

* * * * *

Reg. No.											
----------	--	--	--	--	--	--	--	--	--	--	--

B.Tech. DEGREE EXAMINATION, NOVEMBER 2018
3rd to 7th Semester

15IT302J – DATABASE MANAGEMENT SYSTEMS

(For the candidates admitted during the academic year 2015-2016 to 2017-2018)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. A relational database consists of a collection of

(A) Tables	(B) Fields
(C) Records	(D) Keys
2. A domain is atomic if elements of the domain are considered to be _____ units.

(A) Different	(B) Indivisible
(C) Constant	(D) Divisible
3. Database _____ which is the logical design of the database, and the database _____ which is a snapshot of the data in the database at given instant in time?

(A) Instance, schema	(B) Relation, schema
(C) Relation, domain	(D) Schema, instance
4.  Represents which one of the following?

(A) Entity	(B) Derived attribute
(C) Multivalued attribute	(D) Weak entity
5. _____ is a special type of integrity constraints that relates two relations and maintains consistency across the relations.

(A) Entity integrity constraints	(B) Referential integrity constraints
(C) Domain integrity constraints	(D) Domain constraints
6. Which of the following is a single value attribute?

(A) Customer_id	(B) Address
(C) Contact_number	(D) Customers_emailid
7. A table can be logically connected to another table by defining a

(A) Super key	(B) Candidate key
(C) Primary key	(D) Foreign key
8. The assignment operator in relational algebra is denoted by

(A) →	(B) ←
(C) =	(D) ==

exchange algorithm.

9. Select cust_name FROM account WHERE balance < = 100000 AND balance > = 90000;
this query can be replaced by which of the following?
(A) SELECT cust_name FROM account WHERE balance between 90000 AND 100000;
(B) SELECT cust_name FROM account WHERE sal < = 90000 AND sal > = 100000;
(C) Select cust_name FROM emp WHERE balance BETWEEN 90000 AND 100000;
(D) SELECT cust_name FROM account WHERE balance BETWEEN 100000 and 90000;
10. All aggregate functions except _____ ignore null value in their input collection.
(A) Count (attribute)
(B) Count (*)
(C) Avg ()
(D) Sum ()
11. The union operation automatically _____, unlike the select clause.
(A) Adds tuples
(B) Eliminates unique tuples
(C) Add common tuples
(D) Eliminates duplicate
12. A DELETE command operates on _____ relations.
(A) Null
(B) More than two
(C) Two
(D) One
13. Which forms are based on the concept of functional dependency?
(A) 1 NF
(B) 2 NF
(C) 3 NF
(D) 4 NF
14. Which of the following is not a Armstrong's axiom?
(A) Reflexivity rule
(B) Transitivity rule
(C) Linear regression rule
(D) Augmentation rule
15. CUSTOMER (cust_id, name, street, city, state, pincode) for any pincode, there is only one city and state. Also, for given street, city and state, there is just one pincode. In normalization term, CUSTOMER is a relation in
(A) 1 NF only
(B) 2 NF and also in 1 NF
(C) 3 NF and also in 2 NF and 1NF
(D) BCNF and also in 3 NF, 2 NF and 1 NF
16. There are two functional dependency with same set of attributes on the left side of the arrow:
 $A \rightarrow BC$, $A \rightarrow B$. This can be combined as
(A) $A \rightarrow BC$
(B) $A \rightarrow B$
(C) $B \rightarrow C$
(D) $A \rightarrow ABC$
17. Tape storage device is referred to as _____ storage.
(A) Direct access
(B) Random access
(C) Sequential access
(D) Indirect access
18. _____ increases the number of I/O operations needed to write a single logic block, pays a significant time penalty in terms of write performance.
(A) RAID level 1
(B) RAID level 2
(C) RAID level 3
(D) RAID level 5
19. What are the two phases in locking protocols?
(A) Growing, shrinking
(B) Add, sub
(C) Open, close
(D) First, second
20. Transaction processing is associated with everything below except.
(A) Producing detail summary or (B) Recording a business activity
(C) Exception reports
(D) Confirming a action or triggering a response

9. Select cust_name FROM account WHERE balance < = 100000 AND balance > = 90000;

this query can be replaced by which of the following?

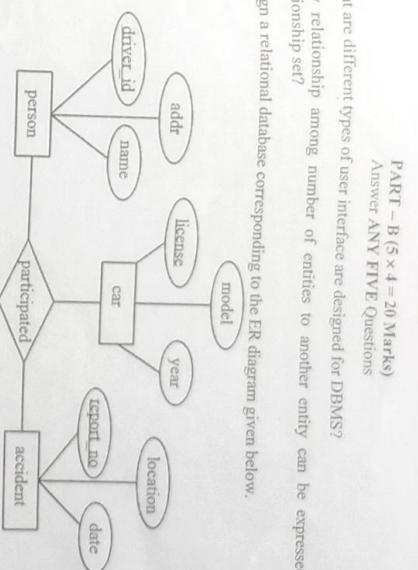
21. What are different types of user interface are designed for DBMS?

22. How relationship among number of entities to another entity can be expressed using relationship set?

23. Design a relational database corresponding to the ER diagram given below.

PART - B ($5 \times 4 = 20$ Marks)

Answer ANY FIVE Questions



24. Let the following relation schema be given: R = (A, B, C) and S = (D, E, F) let r(R) and s(S) be given. Give expression in SQL that is equivalent to each of the following queries

(i)

$\pi_A(r)$

(ii)

$\sigma_{B=17}(r)$

(iii)

$r \times s$

(iv)

$\pi_{A,F}(\sigma_{C=D}(r \times s))$

25. Explain what is meant by 'repetition of information' and 'inability to represent information'.
26. Compare BCNF and 3NF with example.
27. List the ACID properties. Explain the usefulness of each.

PART - C ($5 \times 12 = 60$ Marks)

Answer ALL Questions

28. a.i. What are main function of a database administrator?

ii. Explain the database system structure with block diagram.

b.i. List four major difference between a file processing system and a DBMS.

b.ii. Explain database language of DBMS in detail.

29. a. Construct an ER diagram for a hospital with set of patients and set of medical doctors. Associate with each patient a log of various tests and examination conducts.
b. i. List four major difference between a file processing system and a DBMS.
b. ii. Explain database language of DBMS in detail.
30. a. Construct an ER diagram for a hospital with set of patients and set of medical doctors. Associate with each patient a log of various tests and examination conducts.
b. i. List four major difference between a file processing system and a DBMS.
b. ii. Explain database language of DBMS in detail.

b. Consider the following schema

Suppliers (sid, sname, address)

Parts (pid, pname, color)

Catalog (sid, pid, cost)

Write the following queries in relational algebra

- (i) Find the names of supplier who supply some red parts
- (ii) Find the sids of suppliers who supply some red parts or are at '18, MAIN ROAD'
- (iii) Find the sids of suppliers who supply some red parts and some green parts
- (iv) Find the sids of supplier who sell most expensive parts
- (v) List the cost of all part supplied by sid = 104 supplier
- (vi) Find the part which has same cost

30. a. Consider the employee database

employee (employeename, street, city)

works (employname, companyname, salary)

company (companyname, city)

manager (employeename, managername)

Give an expression in SQL for following queries

- (i) Find names of all employees who work for 'ABC company'
- (ii) Find the names and cities of all employee who work for 'ABC company'
- (iii) Find the employee who do not work for 'ABC company'
- (iv) Modify the database so that 'MARK' now lives in 'Los Angeles'
- (v) Delete all tuples in works relation for employees of 'XY Pvt.Ltd'
- (vi) Find the names of employee who works for 'XY Pvt.Ltd' and annual income >100000.

(OR)

b.i. Explain embedded SQL in detail.

(8 Marks)

ii. What do you mean by integrity constraint?

(4 Marks)

31. a. Let R = (A, B, C, G, H, I) as schema and set of F of functional dependencies {A→B, A→C, CG→H, CG→I, B→H}.

- (i) Compute F^+ closure of set of functional dependencies
- (ii) Compute closure of attribute set $(AG)^+$
- (iii) Compute the canonical cover F_C of F.

(OR)

b. Explain the third normal form with examples. Give the decomposition algorithm and with pseudo code.

32. a.i. Give a brief overview of physical storage media.

ii. Explain the different levels in RAID.

(OR)

b.i. What are different states of transaction?

(4 Marks)

ii. Explain lock-based protocol used for concurrency control.

(8 Marks)

* * * * *

Reg. No.										
----------	--	--	--	--	--	--	--	--	--	--

B.Tech. DEGREE EXAMINATION, NOVEMBER 2019

Third to Seventh Semester

15IT302J – DATABASE MANAGEMENT SYSTEMS

(For the candidates admitted during the academic year 2015 – 2016 to 2017 – 2018)

Note:

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer ALL Questions

1. DBMS is a set of _____ to access the data.

(A) Codes	(B) Programs
(C) Information	(D) Metadata
2. A logical structure of the database

(A) Schema	(B) Attribute
(C) Parameter	(D) Distance
3. The _____ level helps application programs hide the details of data types.

(A) Physical	(B) Logical
(C) User	(D) View
4. Entity is a _____.

(A) Object of relation	(B) Present working model
(C) Thing in real world	(D) Model of relation
5. The attribute ‘AGE’ is calculated from ‘Date-of-birth’. The attribute ‘AGE’ is

(A) Single valued	(B) Multivalued
(C) Composite	(D) Derived
6. Which of the following can be addressed by enforcing a referential integrity constraint?

(A) All phone number must include the area code	(B) Certain fields are required (such as email, or phone number) before the record is accepted
(C) Information on the customer must be known before anything can be sold to that customer	(D) Then entering an order quantity, the user must input a number and not some text (ie 12 rather ‘dozen’)
7. The assignment operator is denoted by _____ in relational algebra.

(A) →	(B) ←
(C) =	(D) ==
8. For select operation the _____ appear in the subscript and the _____ argument appears in the parenthesis after the sigma (σ).

(A) Relation, predicates	(B) Operation, predicates
(C) Relation, operation	(D) Predicates, relation

9. Which is a join condition contains an equality operator?
(A) Equijoins
(B) Cartesian
(D) Left
(C) Natural

10. Which of the following statement is a prepared statement?
(A) Insert into departments values (?,?,?);
(B) Insert into department values (x,x,x);
(C) SQL set connect option (conn, SQL);
(D) SQL transact (conn, SQL roll back);
auto commit on;

11. SELECT * FROM teaches WHERE sec-id = 'CS-101';
Which of the following id is selected for the following query?
(A) 1003
(B) 1001
(C) None
(D) Error message appears

12. Which of the following is used to access the database servers at the time of executing the program and get the data from the server accordingly?
(A) Embedded SQL
(B) Dynamic SQL
(C) SQL declarations
(D) SQL data analysis

13. A table on the many side of a one to many or many to many relationship must
(A) Be in 2 NF
(B) Be in 3 NF
(C) Having a single attribute key
(D) Having a composite key

14. Functional dependencies are the type of constraints that are based on _____.
(A) Key
(B) Key revisited
(C) Superset key
(D) None of the mentioned

15. We can use the following three rules to find logically implied functional dependencies. This collection of rule is called _____.
(A) Axioms
(B) Armstrong's axioms
(C) Armstrong's
(D) Closure

16. Suppose relation R(A,B,C,D,E) has following functional dependencies F = {A→B, B→C,
BC→A, A→D, E→A, D→E}. Which of the following is not key?
(A) A
(B) E
(C) B,
(D) D

17. Which of the following stores several GB of data but usually lost when power failures?
(A) Flash memory
(B) Disk
(C) Main memory

18. _____ is a round one half of the maximum seek time.
(A) Access time
(B) Average seek time
(C) Seek time
(D) Rotational latency time

19. Which level of RAID refers to disk mirroring with block striping?
(A) RAID level 3
(B) RAID level 0
(C) RAID level 1
(D) RAID level 2

20. The property of a transaction that persists all the crashes is
(A) Atomicity
(B) Durability
(C) Isolation
(D) All of the mentioned

PART - B (5 × 4 = 20 Marks)
Answer ANY FIVE Questions

21. What is the purpose of database systems?

22. Describe the two type of participation constraints in ER mode.

23. Explain about DML commands,

24. Consider the employee database
employee (employeename, street, city)
works (employeename, company_name, salary)
company (companyname, city)
manages (employeename, manager-name)

Give an expression in SQL for each of the following queries.
(i) Find the company that has smallest payroll
(ii) Delete all tuples in the 'works' relation for employees of 'Tata Pvt Ltd'.

1 be handed

25. Compute the closure of the following set F of functional dependencies for relation schema R = {A,B,C,D,E}
A → BC
CD → E
B → D
E → A
List the candidate keys for R.

database

26. What are the main performance measures of the qualities of disk?

27. What is conflict serializability and view serializability?

PART - C (5 × 12 = 60 Marks)

Answer ALL Questions

28. a. Explain the database system structure with neat diagram in detail.

(OR)

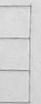
b. Explain the people who work with a database and how can be categorized.

29. a. Design an ER diagram for keeping track of the exploits of your favorite sports team. You should store the matches played, the scores in each match, the players in each match, and individual player statistics for each match. Summary statistics should be nodded as derived attributes.

b. Consider the following relational schema
(OR)

employee (empno, name, office, age)
books (isbn, title, authors, publisher)
loan (empno, isbn, data)

Write the following queries in relational algebra.
(i) Find the names of employees who have borrowed a book published by 'McGraw-Hill'.



- (ii) Find the names of employees who have borrowed all books published by 'McGraw-Hill'
- (iii) Find the names of employees who have borrowed more than five different books published by 'McGraw-Hill'
- (iv) For each publisher, find the name of employees who have borrowed more than five books of that publisher

30. a. Consider the relation schema.

Customer (customername, c_street, c-city)
 branch (branchname, b_city, assets)
 account (accountno, branch_name, balance)
 loan (loanno, branch_name, amount)
 depositor (customer_name, account_no)
 borrower (customer_name, loan-no)

- (i) Find the load number of those loans with loan amount not between 6000 and 8000 (2 Marks)
- (ii) Find the customername whose street address, include the substring 'main' (2 Marks)
- (iii) Find average account balance at each branch (2 Marks)
- (iv) Find all customer who have either an account or a loan (but not both) at the bank with natural join (3 Marks)
- (v) Find the names of all branches that have an assets value greater than that of each in Chennai (3 Marks)

(OR)

b. Let R = (A,B,C) and let r_1 and r_2 both be relations on schema R. Give an expression in SQL that is equivalent to each of the following queries.

- (i) $r_1 \cup r_2$
- (ii) $r_1 \cap r_2$
- (iii) $r_1 - r_2$
- (iv) $\pi_{AB}(r_1) \bowtie \pi_{BC}(r_2)$

31. a. Explain the following in detail

- (i) Closure of a set of functional dependencies
- (ii) Closure of attribute sets
- (iii) Canonical cover

(OR)

- b.i. What is partial functional dependency and non-trivial functional dependency? (4 Marks)
- ii. Explain 2 NF, BCNF and 3 NF in detail. Explain how to ensure dependency preserving decomposition in above normal form. (8 Marks)

32. a. Explain the RAID architecture in detail.

(OR)

- b.i. Explain various modes of lock in transaction. (3 Marks)
- ii. Explain how locks are granted. (3 Marks)
- iii. Explain two phase locking protocol with example. (6 Marks)

* * * * *

Reg. No. _____

B.Tech. DEGREE EXAMINATION, DECEMBER 2018
1st to 6th Semester

15IT302J – DATABASE MANAGEMENT SYSTEMS
(For the candidates admitted during the academic year 2015-2016 to 2017-2018)

Note:

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A ($20 \times 1 = 20$ Marks)
Answer ALL Questions

1. In the architecture of a database system, external level is the _____.
(A) Physical level (B) Logical level
(C) Conceptual level (D) View level

2. DML is provided for _____.
(A) Description of logical structure of database (B) Addition of new structures in the database system
(C) Manipulation and processing of database (D) Definition of physical structure of database system

3. ODBC stands for _____.
(A) Object Database Connectivity (B) Oracle Database Connectivity
(C) Oral Database Connectivity (D) Open Database Connectivity

4. A relational database developer refers to a record as _____.
(A) Entity (B) Relation
(C) Tuple (D) Attribute

5. Which of the following gives a logical structure of the database graphically?
(A) Entity-relationship diagram (B) Entity diagram
(C) Relationship diagram (D) Database diagram

6. Given the relational and ER modules, which of the following is incorrect?
(A) An attribute of an entity can have more than one value (B) An attribute of an entity can be composite
(C) In a row of a relational table, an attribute can have more than one value (D) In a row of a relational table, an attribute can have exactly one value or a null value

7. Which of the following operations results in all pairs of tuples from the two relations, regardless of whether their attribute values match?
(A) Join (B) Cartesian product
(C) Intersection (D) Set difference

PART - B ($5 \times 4 = 20$ Marks)

Answer ANY FIVE Questions

8. A primary key when combined with a foreign key creates _____.
 (A) Many-to-many relationship between the tables that connect them
 (B) Parent-child relationship between the tables that connect them
 (C) Network model between the tables (D) One-to-many relationships between the tables that connect them
9. What type of statement is the following? "Insert into faculty values (1006, 'Balaji', 'DBMS');"
 (A) DML
 (B) DML
 (C) DCL
 (D) DFL
10. Which of the following group function should be used to find the mean of salary?
 (A) Mean (salary)
 (B) Avg (salary)
 (C) Sum (salary)
 (D) Count (salary)
11. If we want to retain all duplicates, we must use _____ in place of union.
 (A) Union all
 (B) Union some
 (C) Intersect all
 (D) Intersect some
12. Aggregative functions can be used in the select list or the _____ clause of a statement or subquery. They cannot be used in a _____ clause.
 (A) Having, where
 (B) Where, having
 (C) Groupby, where
 (D) Groupby, having
13. _____ is the process of organizing data into related tables or relations.
 (A) Normalization
 (B) Generalization
 (C) Specialization
 (D) Decentralization
14. A relation is in _____, if an attribute of a composite key is dependent on an attribute of other composite key
 (A) 1 NF
 (B) 2 NF
 (C) 3 NF
 (D) BCNF
15. In 2NF _____ dependencies exist.
 (A) No functional dependencies exist
 (B) No multivalued dependencies exist
 (C) No partial functional dependencies exist
 (D) No partial multivalued dependencies exist
16. Which normal form is considered adequate for normal relational database design?
 (A) 1 NF
 (B) 2 NF
 (C) 3 NF
 (D) 4 NF
17. Which one of these is the characteristics of RAID 5?
 (A) Distributed parity
 (B) No parity
 (C) All parity in a single disk
 (D) Double parity
18. _____ helps solve concurrency problem
 (A) Transaction monitor
 (B) Transaction serializability
 (C) Locking
 (D) Two phase commit
19. Which of the following handles variety of data like text, numbers, image audio and video?
 (A) Multimedia databases
 (B) Mobile databases
 (C) Image databases
 (D) Parallel databases
20. Two phase locking stands for _____.
 (A) Growing and shrinking phase
 (B) Primary and secondary phase
 (C) Normal and abnormal phase
 (D) Open and close phase

ax. Marks: 75

ld be handed over

21. Differentiate file processing system and database management system.
22. Compare 'Total participation' and 'Partial participation' with a suitable example.
23. Under what category of commands (DDL/DML/DCL), the following queries fall
 (i) desc student;
 (ii) select empid, ename, age from employee;
 (iii) alter table student add (branch varchar2(5))
 (iv) drop employee
24. Briefly describe insertion and deletion anomalies in relational database design, with examples.
25. Brief how deadlock is identified using "wait-for" graph. Give an example.
26. Define the four properties, a DBMS is required to maintain for its proper functionality.
27. Justify with a suitable example, how 'self-join' is useful.

PART - C ($5 \times 12 = 60$ Marks)

Answer ALL Questions

28. a. With a help of a diagram, explain the database system architecture, detailing about all the functional components.
- b.i. Differentiate two-tier and three-tier architecture of a database system with block diagrams.
- ii. Describe about 'derived attribute' and 'composite attribute' with suitable examples.
29. a. Construct an E-R model for a library management system, whose requirements are briefed below.
 "The library contains various categories of books. The publisher details of all the books are to be maintained. As the system is part of an educational institution, faculty members, non-teaching members and students will be borrowing books. The 'data of return' if not properly followed leads to a five, for which a bill is provided to the member". Mention clearly the entities and their attributes, relationship with mapping cardinalities.
- ax. Marks: 75
- (OR)
- b. With reference to the following educational institution related schema, give one example each for 'Selection', 'Projection', 'Cartesian product', 'Union', 'Intersection' and 'Rename' Relational algebraic operations. Give a brief description about each operation and its example.
- Schema:
 $\text{student}(\text{s_regno}, \text{s_name}, \text{dept}, \text{email}, \text{id})$
- $\text{dept}(\text{d_id}, \text{d_name}, \text{D_loc})$
- $\text{course}(\text{c_id}, \text{c_name}, \text{c_credit})$
30. a. Construct SQL queries for the questions given below with reference to the following schema. Assume appropriate records for the relations.
- Schema:
 $\text{emp}(\text{e_id}, \text{e_name}, \text{addr1}, \text{addr2}, \text{city})$
 $\text{works}(\text{e_id}, \text{comapny_name}, \text{salary})$
 $\text{company}(\text{company_name}, \text{city})$
 $\text{manages}(\text{e_id}, \text{manager_id}, \text{manager_name})$

ld be handed over

ax. Marks: 75

Questions:

- (i) Find the street and city of all employees who work for "TCS", live in "Chennai" and earn > 40,000 rupees
- (ii) Find the names of all employees who do not work for "Infosys"
- (iii) Assume that companies may be located in several cities. Find all companies located in every city in which "HCL" is located
- (iv) Find the names of all employees who live in the same city as that of "Shubham"
- (v) Find the names of managers, who manage more than five employees, living in a particular city
- (vi) Find the names and companies they (employees) work, for all who have a higher salary than their manager.

(OR)

- b. Construct SQL queries for the questions given below, with reference to the following schema. Assume appropriate records for the relations

Schema:

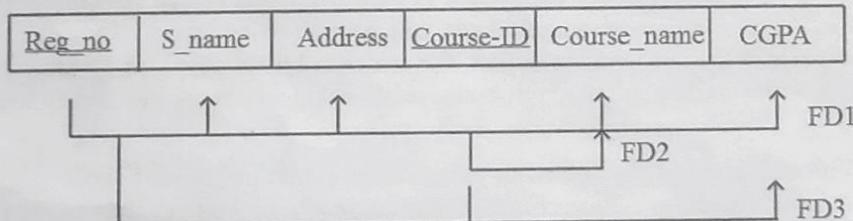
emp (e_no, e_name, job, mgr, h_date, d_no)
 dept (d_no, d_name, location)

Note: mgr is the 'emp no' of the employee to whom the employee reports to; h_data is joining date; d_no is department number.

Questions:

- (i) List all the employees who joined after "Sowmya";
- (ii) List all the employees who have atleast one person reporting to them
- (iii) List the name of employees with their immediate higher authority
- (iv) List the details of employees earning more than the highest paid manager
- (v) Display the senior-most employee details
- (vi) List the employees details whose salary is greater than the lowest salary of an employee belonging to 'dept number = 15'.

31. a. For the below given student-related schema, find the third normal form (3NF)



Give a brief description on 3NF.

(OR)

- b.i. Detail the problems in bad database design and justify how normalizations helps overcome them.

- ii. Differentiate 1NF, 2NF and 3NF in a brief manner.

32. a. What is RAID? How RAID helps to improve performance and reliability of a system? Discuss about the various levels of RAID.

(OR)

- b. "Two phase locking protocol ensures serializability"- using a suitable scenario, justify this statement. Also discuss about 'strict' and 'rigorous' two-phase locking protocols.

* * * * *

Reg. No. _____

B.Tech. DEGREE EXAMINATION, JUNE 2022

Sixth Semester

18CSC303J – DATABASE MANAGEMENT SYSTEMS

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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

PART – A (25 x 1 = 25 Marks)		Marks	BL	CO	PO
Answer ALL Questions					
1.	Database is a _____.	1	1	1	1.1.1
	(A) Collection of inter related data (B) Collection of raw data (C) Collection of binary data (D) Collection of unstructured data				
2.	Arrange in the correct order	1	1	1	1.1.1
	(A) View level, physical level, logical level (B) Logical level, view level, physical level (C) Physical level, view level, (D) View level, logical level, physical level				
3.	Create and insert are	1	2	1	1.1.1
	(A) DDL and DML respectively (B) DML and DCL respectively (C) DML and DDL respectively (D) DDL and TCL respectively				
4.	Drop table, table name is a	1	2	1	1.1.1
	(A) DDL command (B) DCL command (C) TCL command (D) DML command				
5.	DDL Datas are _____ automatically without _____. (A) Committed, manual commit (B) Deleted, delete (C) Recovered, manual recovery (D) Executed, manual execution	1	2	1	1.1.1
6.	ER is defined as	1	1	2	2.1.2
	(A) Entity relationship (B) Enterprise relationship (C) Enterprise relation (D) Enterprise recovery				
7.	Write the correct function for select round (sysdate, 'year') from dual;	1	1	2	2.2.2
	(A) Round (d, format) (B) Round (d, 'format') (C) Round (SD, YEAR) (D) Round ('DD-MM-YY', 'YEAR')				
8.	Converts the string in a given format in to oracle data format	1	2	2	2.2.3
	(A) TO_DATE (Str, 'DATE') (B) TO_DATE (Str, 'format') (C) TO Month (Str, 'Str') (D) TO_DATE (DATE, Str)				

ees who work for "TCS", live in "Chennai", do not work for "Infosys", located in several cities. Find all cities where "is located" is located in the same city as that of "Shri Ram".

18. Functional dependency is a relationship between - using a suitable two-phase locking.

19. A table is in BCNF if it is in 3NF and if every determinant is a _____ key.

20. Choose the correct symbol for the relational algebra operator 'SELECT'.

21. Collections of operations that form a single logical unit of work are called _____.

22. The 'all or none' is referred as _____.

23. Which of the following system is responsible for ensuring durability?

24. A transaction that has not been completed successfully is called as _____.

25. The execution sequence in concurrency control are termed as _____.

26. a.i. Differentiate between DBMS and file processing system. List any two advantages with DBMS.

b. What is the significance of mapping cardinalities? Explain all the types with pictorial representations.

27. a. Draw an extended ER diagram for Microsoft campus club (MCC) connected by an ABC college

- An ABC college has decided to setup a MC club

- MCC can be categorized based on the type. Quiz club, creater club

- A student can join in any one of the MC clubs

- Each MC club has a faculty advisor who trains the students

- Each student can be identified by using id. no

Include all the above requirement and model the MC club appropriately.

(OR)

1. Power (m, n) (B) m power n (D) m power m

(C) m-n power (C) Candidate

2. Choose the correct symbol for the relational algebra operator 'SELECT'.

(A) π (B) \cup (D) σ

(C) \times (E) δ

3. How many primary keys are possible in a table?

(A) Any number (B) 2 (D) 1

(C) 5 (E) 0

4. Which is the wrong one?

(A) Select * from employee where salary > 10000; (B) Select max (salary) from employees;

(C) Select * from employees (D) Select min (salary) from employees;

(E) Select salary > avg (salary);

5. To apply set operations in 'Table A' and 'Table B'

(A) Different column names can be (B) Common column names alone be used in table A and B

(C) Common column names with (D) Different column names with matching data types alone be used in table A and B

6. A DDL command after any number of DML command

(A) Stores the data permanently (B) No affect with DML commands

(C) No effect with DDL command (D) Stores the DDL statement data alone

7. Identify how normalization is equal to

(A) 2NF (B) INF (C) Zero (D) None of the above

8. Functional dependency is a relationship between - using a suitable two-phase locking.

9. Power (m, n) (B) m power n (D) m power m

(C) m-n power (C) Candidate

10. Column data type references table (column) is an example syntax of

(A) Primary key (B) Foreign key (D) Superkey

(C) Unique key (E) None

11. How many primary keys are possible in a table?

(A) Any number (B) 2 (D) 1

(C) 5 (E) 0

12. Which is the wrong one?

(A) Select * from employee where salary > 10000; (B) Select max (salary) from employees;

(C) Select * from employees (D) Select min (salary) from employees;

(E) Select salary > avg (salary);

13. Choose the correct one

(A) Select salary from employees (B) Select salary from employees where salary > avg salary;

(C) Select salary from employees (D) Select salary = avg (salary) from where salary > (select avg employees);

(E) Select salary > avg (salary);

14. To apply set operations in 'Table A' and 'Table B'

(A) Different column names can be (B) Common column names alone be used in table A and B

(C) Common column names with (D) Different column names with matching data types alone be used in table A and B

15. A DDL command after any number of DML command

(A) Stores the data permanently (B) No affect with DML commands

(C) No effect with DDL command (D) Stores the DDL statement data alone

16. Eliminating partial dependency is equal to

(A) 2NF (B) INF (C) Zero (D) None of the above

17. Normalization is the process of

(A) Eliminating (or) avoiding data redundancy (B) Re-structuring the tables

(C) Works with DBMS program (D) Works with transaction level

18. Functional dependency is a relationship between

(A) Entities (B) Rows

(C) Attributes (D) Tables

1. 1 3 3 34.1

2. 1 3 4 41.1

3. 1 3 4 41.1

4. 1 1 4 41.2

5. 1 1 4 41.2

6. 1 1 4 41.2

7. a. 10 3 2 33.1

b. 10 3 1 31.2

c. 10 3 1 31.2

d. 10 3 1 31.2

e. 10 3 1 31.2

f. 10 3 1 31.2

g. 10 3 1 31.2

h. 10 3 1 31.2

i. 10 3 1 31.2

j. 10 3 1 31.2

k. 10 3 1 31.2

l. 10 3 1 31.2

m. 10 3 1 31.2

n. 10 3 1 31.2

o. 10 3 1 31.2

p. 10 3 1 31.2

q. 10 3 1 31.2

r. 10 3 1 31.2

s. 10 3 1 31.2

t. 10 3 1 31.2

u. 10 3 1 31.2

v. 10 3 1 31.2

w. 10 3 1 31.2

x. 10 3 1 31.2

y. 10 3 1 31.2

z. 10 3 1 31.2

aa. 10 3 1 31.2

bb. 10 3 1 31.2

cc. 10 3 1 31.2

dd. 10 3 1 31.2

ee. 10 3 1 31.2

ff. 10 3 1 31.2

gg. 10 3 1 31.2

hh. 10 3 1 31.2

ii. 10 3 1 31.2

jj. 10 3 1 31.2

kk. 10 3 1 31.2

ll. 10 3 1 31.2

mm. 10 3 1 31.2

nn. 10 3 1 31.2

oo. 10 3 1 31.2

pp. 10 3 1 31.2

qq. 10 3 1 31.2

rr. 10 3 1 31.2

ss. 10 3 1 31.2

tt. 10 3 1 31.2

uu. 10 3 1 31.2

vv. 10 3 1 31.2

ww. 10 3 1 31.2

xx. 10 3 1 31.2

yy. 10 3 1 31.2

zz. 10 3 1 31.2

aa. 10 3 1 31.2

bb. 10 3 1 31.2

cc. 10 3 1 31.2

dd. 10 3 1 31.2

ee. 10 3 1 31.2

ff. 10 3 1 31.2

gg. 10 3 1 31.2

hh. 10 3 1 31.2

ii. 10 3 1 31.2

jj. 10 3 1 31.2

kk. 10 3 1 31.2

ll. 10 3 1 31.2

mm. 10 3 1 31.2

nn. 10 3 1 31.2

oo. 10 3 1 31.2

pp. 10 3 1 31.2

qq. 10 3 1 31.2

rr. 10 3 1 31.2

ss. 10 3 1 31.2

tt. 10 3 1 31.2

uu. 10 3 1 31.2

vv. 10 3 1 31.2

ww. 10 3 1 31.2

xx. 10 3 1 31.2

yy. 10 3 1 31.2

zz. 10 3 1 31.2

aa. 10 3 1 31.2

bb. 10 3 1 31.2

cc. 10 3 1 31.2

dd. 10 3 1 31.2

ee. 10 3 1 31.2

ff. 10 3 1 31.2

gg. 10 3 1 31.2

hh. 10 3 1 31.2

ii. 10 3 1 31.2

jj. 10 3 1 31.2

kk. 10 3 1 31.2

ll. 10 3 1 31.2

mm. 10 3 1 31.2

nn. 10 3 1 31.2

oo. 10 3 1 31.2

pp. 10 3 1 31.2

qq. 10 3 1 31.2

rr. 10 3 1 31.2

ss. 10 3 1 31.2

tt. 10 3 1 31.2

uu. 10 3 1 31.2

vv. 10 3 1 31.2

ww. 10 3 1 31.2

xx. 10 3 1 31.2

yy. 10 3 1 31.2

zz. 10 3 1 31.2

aa. 10 3 1 31.2

bb. 10 3 1 31.2

cc. 10 3 1 31.2

dd. 10 3 1 31.2

ee. 10 3 1 31.2

ff. 10 3 1 31.2

gg. 10 3 1 31.2

hh. 10 3 1 31.2

ii. 10 3 1 31.2

jj. 10 3 1 31.2

kk. 10 3 1 31.2

ll. 10 3 1 31.2

mm. 10 3 1 31.2

nn. 10 3 1 31.2

oo. 10 3 1 31.2

pp. 10 3 1 31.2

qq. 10 3 1 31.2

rr. 10 3 1 31.2

ss. 10 3 1 31.2

tt. 10 3 1 31.2

uu. 10 3 1 31.2

vv. 10 3 1 31.2

ww. 10 3 1 31.2

xx. 10 3 1 31.2

yy. 10 3 1 31.2

zz. 10 3 1 31.2

aa. 10 3 1 31.2

bb. 10 3 1 31.2

cc. 10 3 1 31.2

dd. 10 3 1 31.2

ee. 10 3 1 31.2

ff. 10 3 1 31.2

gg. 10 3 1 31.2

hh. 10 3 1 31.2

ii. 10 3 1 31.2

jj. 10 3 1 31.2

kk. 10 3 1 31.2

ll. 10 3 1 31.2

mm. 10 3 1 31.2

nn. 10 3 1 31.2

oo. 10 3 1 31.2

pp. 10 3 1 31.2

qq. 10 3 1 31.2

rr. 10 3 1 31.2

ss. 10 3 1 31.2

tt. 10 3 1 31.2

uu. 10 3 1 31.2

vv. 10 3 1 31.2

ww. 10 3 1 31.2

xx. 10 3 1 31.2

yy. 10 3 1 31.2

zz. 10 3 1 31.2

aa. 10 3 1 31.2

bb. 10 3 1 31.2

cc. 10 3 1 31.2

dd. 10 3 1 31.2

ee. 10 3 1 31.2

ff. 10 3 1 31.2

gg. 10 3 1 31.2

hh. 10 3 1 31.2

ii. 10 3 1 31.2

jj. 10 3 1 31.2

kk. 10 3 1 31.2

ll. 10 3 1 31.2

mm. 10 3 1 31.2

nn. 10 3 1 31.2

oo. 10 3 1 31.2

pp. 10 3 1 31.2

qq. 10 3 1 3

- b. Draw a ER diagram for entire university governance, including all the major streams of the university, from academics to management. Kindly concentrate on creating relations between one another, without affecting the data integrity. 10 3 2 3.4.1
28. a. How user query is executed in the query processing engine? Give a detail on the operations involved with neat sketch. 10 4 3 3.4.2
- (OR)**
- b.i. Write an example for using AFTER UPDATE TRIGGER using any employee relation. 5 4 3 4.1.1
- ii. Explain with example 5 4 3 4.1.3
- Commit
 - Roll back
 - Save point
29. a. Define functional dependency with respect to normal forms. How 2NF and 3NF can be resolved? Give an example scenario for the above situation, using 'STUDENT' relation. 10 5 4 4.3.1
- Note: column names can be generated with respect to student relation.
- (OR)**
- b.i. Give an example table structure for multi-valued dependency and define with required explanations. 5 5 4 4.3.4
- ii. Analyze the syntax for writing 'cursors' and list any two real time examples of cursors. 5 5 4 4.3.4
30. a.i. Correlate system recovery and serializability, analyze the effect of cascading rollbacks. 5 5 5 5.1.2
- ii. How two phase commit protocol works in transaction management systems? 5 5 6 5.3.1
- (OR)**
- b. Draw an example scenario for dead lock. (Using transaction states (or units). How dead lock prevention, detection and recovery works on different situations? 10 5 6 6.2.1

* * * * *

Reg. No. **R A 1 5 1 1 0 0 3 0 3 0** **REPO**

B.Tech. DEGREE EXAMINATION, NOVEMBER 2019

First to Eighth Semester

15CS434E – NETWORK SECURITY

(For the candidates admitted during the academic year 2015-2016 to 2017-2018)

Note:

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer ALL Questions

1. The general equation of the encryption process for poly alphabetic ciphers is
 (A) $C_i = (P_i + R_i \text{ mod } m) \text{ mod } 26$ (B) $C_i = (P_i - R_i \text{ mod } m) \text{ mod } 26$
 (C) $C_i = (P_i - R_i \text{ mod } 26) \text{ mod } m$ (D) $C_i = (P_i + R_i \text{ mod } 26) \text{ mod } m$
2. The keyword matrix size of play fair cipher is
 (A) 3×3 (B) 5×5
 (C) 2×2 (D) $n \times n$
3. Plain text is handled one blocks at a time and each block of plain text is encrypted using the same key. This is known as
 (A) DES (B) ECB
 (C) CBC (D) CFB
4. AES cipher takes a plain text block size of
 (A) 64 bits (B) 128 bits
 (C) 256 bits (D) 512 bits
5. The sender encrypts his message with his public key. The resultant service offered is
 (A) Authentication (B) Authorization
 (C) Message integrity (D) Confidentiality
6. What is factoring problem in RSA?
 (A) Computing multiplicative inverse of a number (B) Identifying prime numbers
 (C) Computation of prime factors of n (D) Identifying relative primes
- 7.Nonce is used in key distribution to identify.
 (A) The current time (B) the transaction uniquely
 (C) The sender (D) The receiver
8. A key distribution mechanism where user A broad casts its public key is
 (A) Public key certificate (B) Public available directories
 (C) Public announcement of public key (D) Public key authority

9. Diffie-Hellmann key exchange algorithm is to prove
 (A) Timing attacks
 (B) Masquerade
 (C) Man in the middle attack
 (D) Sequence modification attack
10. The elliptic curve can be expressed in equation of the form
 (A) $y = x^3 + ax^2 + b$
 (B) $y^2 = x^3 + ax + b$
 (C) $y^2 = x^3 + ax^2 + b$
 (D) $y = x^3 + a + b$
11. In cryptography, hash function is used to
 (A) Encrypt the message
 (B) Check the availability of the message
 (C) Verify the integrity of the message
 (D) Check the confidentiality of the message
12. In SHA 512, system with block size 1024 bits and message length 128 bits, the size of the message after padding should be
 (A) $986 \text{ mod } 1024$
 (B) $689 \text{ mod } 1024$
 (C) $896 \text{ mod } 1024$
 (D) $869 \text{ mod } 1024$
13. In Kerberos, if an user logs on to the work station, the user approaches
 (A) Server directly
 (B) Authentication server
 (C) Ticket granting server
 (D) Remote gateway
14. The ticket lifetime in Kerberos authentication environment refers to
 (A) Validity of the ticket
 (B) Validity of the session
 (C) Validity of the service
 (D) Validity of the server
15. The order in which the services are applied in PGP is
 (A) Signature, compression and encryption
 (B) Encryption, compression and signature
 (C) Compression, signature and encryption
 (D) Signature, encryption and compression
16. WLTs uses _____ message authentication code for checking the integrity of the message or data.
 (A) CMAC
 (B) HMAC
 (C) DAA
 (D) DSS
17. A software that collects information from a computer and transmits into another system is known as
 (A) Adware
 (B) Virus
 (C) Spyware
 (D) Worm
18. An approach which immediately blocks the outgoing transfer when a threshold is exceeded in outgoing connect rate is called as
 (A) Rate limiting
 (B) Rate halting
 (C) Threshold halting
 (D) Threshold limiting
19. An intruder transmit packets from the outside. With a source IP address field containing an address of an internal host
 (A) IP address spoofing
 (B) MAC spoofing
 (C) SYN spoofing
 (D) Fragment attacks

20. A software module used to device an individual host is called as
 (A) Personal firewall
 (B) Host-based firewall
 (C) Distributed firewall
 (D) Inspection firewall

PART – B (5 × 4 = 20 Marks)
 Answer ANY FIVE Questions

21. Using play fair cipher, encrypt, the plain text "HIDE THE GOLD" using the key "PLAY FAIR EXAMPLE".

22. What is an Euler's totient function? Find $\phi(341)$?

23. User A and B use the Diffie-Helman key exchange technique with a common prime $q=71$ and a primitive $\alpha=7$.
 (a) If user A has private key $X_A=12$, what is β^1 's public key Y_B ?
 (b) What is the shared secret key K if A's private key $X_A=57$?

24. State Fermat's and Euler's theorem. Verify format's theorem $a=8$ and $p=9$.

25. Summarize the attacks addressed by message authentication code (MAC).

26. What is public and private key ring in PGP?

27. Does firewall present internal threats? Justify your answer with a scenario.

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

28. a. Encrypt and decrypt the plain text "SEND AID NOW" using the hill cipher with the key "HELP" special instruction. Use 2×2 matrix.

P10				-	P8			
3	5	2	7	4	10	1	9	8

- b. Using S-DES encrypt the plain text 1001101 using the key 1110001100. The P and S-boxes are given below.
 (OR)

IP				IP ⁻¹			
P4		IP ⁻¹		IP		P8	
2	4	3	1	4	1	2	3
0	1	2	3	0	1	2	3

$$\begin{array}{l} S_0 = \begin{bmatrix} 0 & 1 & 2 & 3 \\ 1 & 0 & 3 & 2 \\ 2 & 1 & 0 & 1 \\ 3 & 2 & 3 & 0 \end{bmatrix} \quad S_1 = \begin{bmatrix} 0 & 1 & 2 & 3 \\ 1 & 2 & 0 & 1 \\ 2 & 3 & 1 & 0 \\ 3 & 0 & 1 & 2 \end{bmatrix} \\ S_2 = \begin{bmatrix} 2 & 0 & 2 & 1 & 3 \\ 3 & 1 & 3 & 2 \end{bmatrix} \quad S_3 = \begin{bmatrix} 2 & 3 & 0 & 1 & 0 \\ 3 & 2 & 1 & 0 & 3 \end{bmatrix} \end{array}$$

29. a. Encrypt and decrypt using RSA algorithm for $p=7$ $q=13$ $l=11$ and $M=7$. Analyze the security aspects of RSA.
- b. Using ECC, explain how key exchange and encryption are performed. (OR)
30. a. With a block diagram, explain how secure hash algorithm is used to preserve integrity of messages.
- b. Elaborate on authentication dialogue in Kerberos Ver 4. (OR)
31. a. With neat sketch, discuss the IP sec architecture.
- b. What are the services offered by PGP? Describe a PGP message generation sequence. (OR)
32. a.i. Explain different types of firewall configuration.
- ii. Describe the indicative placement of firewalls in an enterprise network.
- b.i. State the six classes of worm defense. (4 Marks)
- ii. Explain the operation of PWC architecture. (8 Marks)

* * * * *

IITEE EXAMINATION, DECEMBER 2019
First to Eighth Semester

SCS314J – COMPILER DESIGN
Admitted during the academic year 2015-2016 to 2017-2018
red in OMR sheet within first 45 minutes and OMR sheet
the end of 45th minute.
ould be answered in answer booklet.

PART – A ($20 \times 1 = 20$ Marks)
Answer ALL Questions
ns in the following C statement is: `printf("i=%d,&i=%d", i, i+1);`
(B) 26
(D) 21

words of a language are recognized during
he program
eneration
(B) The lexical analysis
(D) Data flow analysis

ysis for a modern computer language such as Java
owing machine models in a necessary and sufficient
ite automata
erministic pushdown
ta
(B) Deterministic
(D) Turing machine

maximum number of moves that can be taken by a
ilon and unit production to parse a string with ' n '
(B) $n-1$
(D) 2^n

the following describes a handle as applicable
is the position in a sentential form where the next
is a non terminal whose production will be used
is the terminal to be replaced
is the production P that will be used for reduction
in the sentential form of the production
relation between NFA accepted language and DFA
>
= regular expression the operator '*' stands for
) Iteration
) Concatenation
(B)
(D)

Reg. No. _____

B.Tech. DEGREE EXAMINATION, DECEMBER 2019

First to Eighth Semester

N

15CS314J – COMPILER DESIGN

(For the candidates admitted during the academic year 2015-2016 to 2017-2018)

Note:

- Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
Part - B and **Part - C** should be answered in answer booklet.

T

Time: Three Hours

Max. Marks: 100

PART - A ($20 \times 1 = 20$ Marks)

Answer ALL Questions

- The number of tokens in the following C statement is: `printf("i=%d,&i=%x",i,&i);`
(A) 3 (B) 26
(C) 10 (D) 21
 - In compiler, keywords of a language are recognized during
(A) Parsing of the program (B) The lexical analysis of the program
(C) The code generation (D) Data flow analysis
 - The lexical analysis for a modern computer language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense?
(A) Finite state automata (B) Deterministic pushdown automata
(C) Non deterministic pushdown (D) Turing machine automata
 - What is the maximum number of moves that can be taken by a bottom up parser for a grammar with no epsilon and unit production to parse a string with 'n' tokens?
(A) $n/2$ (B) $n-1$
(C) $2n-1$ (D) 2^n
 - Which of the following describes a handle as applicable to LR parsing.
(A) It is the position in a sentential form where the next shift or reduce operation will occur
(B) It is non terminal whose production will be used for reduction in next step
(C) It is the terminal to be replaced
(D) It is the production P that will be used for reduction in the next step along with a position in the sentential form of the production
 - The relation between NFA accepted language and DFA accepted language is
(A) > (B) <
(C) = (D) \leq
 - In regular expression the operator '*' stands for
(A) Iteration (B) Selection
(C) Concatenation (D) Addition

- q=7 q=13 |= 11, and M=7. Analyze
8. Which one of the following is a top down parser?
 (A) Recursive descent parser (B) Operator precedence parser
 (C) An LR(K) parser (D) An LALR(K) parser
9. Some code optimizations are carried out on the intermediate code because.
 (A) Program analysis is more accurate on intermediate code than on machine code
 (B) The information from data flow analysis cannot otherwise be used for optimization
 (C) The information from the front end cannot otherwise be used for optimization
 (D) They enhance the portability of the compiler to other target processors
10. Which one of the following is false?
 (A) A basic block is a sequence of instructions where control enters the sequence at beginning and ends in exit
 (B) Available expression analysis can be used for common sub expression elimination
 (C) Live variable analysis can be used for dead code elimination
 (D) $x = 4 * 5 \Rightarrow x = 20$ is an example of common sub expression elimination
11. One of the purpose of using intermediate code in compiler is to
 (A) Make parsing and semantic analysis simpler
 (C) Increase the changes of reusing the machine independent code optimizer in other compilers
12. The process manager has to keep track of
 (A) Status of each program (B) Information to a programmer using the system
 (C) Both of the mentioned (D) Variable details of the program
13. Which loader function is accomplished by loader?
 (A) Relocation (B) Allocation
 (C) Linking (D) Loading
14. Which one of the following features cannot be captured as CFG?
 (A) Syntax of if then else statement (B) Syntax of recursive procedures
 (C) A variable declared before its use (D) Matching nested parentheses
15. The identification of common sub expression and replacement of run-time computations by compile time computations is
 (A) Loop optimizations (B) Local optimization
 (C) Constant folding (D) Data flow analysis
16. The graph that shows basic blocks and their successor relationship is called
 (A) DAG (B) Flow graph
 (C) Control graph (D) Hamilton graph
17. When a compiler is rebooted, a special type of loader is executed called
 (A) Compile and go loader (B) Boot loader
 (C) Bootstrap loader (D) Relative loader
18. Relocation bits used by relocations loader are specified by
 (A) Relocating loader itself (B) Linear
 (C) Assembler (D) Macro processor
19. Peep hole optimization is
 (A) Loop optimization (B) Local optimization
 (C) Constant folding (D) Data flow analysis
20. A bottom up parser generates
 (A) Right most derivation (B) Right most derivation in reverse
 (C) Left most derivation (D) Left most derivation in reverse
- PART - B (5 x 4 = 20 Marks)**
 Answer ANY FIVE Questions
21. Define lexiceme, token and pattern.
22. Write the algorithm for first and follow in parser.
23. Differentiate L-attribute and S-attribute.
24. Write three address code sequence for the assignment statement $d = (a - b) + (a - c) * (a - e)$.
25. List the types of system software.
26. Write a short note on copy propagation with example.
27. Define cross compiler with T-diagram.
- PART - C (5 x 12 = 60 Marks)**
 Answer ALL Questions
28. a. Convert the regular expression " $a(ba^*)^*$ " to DFA and minimize it.
 (OR)
- b. Explain the phases of compiler with a neat sketch. Write down the output of each phase for the expression $a = b + c * d0$
29. a. Construct a predictive parser table or the grammar.
 $S \rightarrow (L)^*$
 $L \rightarrow L, S$
 And show whether the following string will be accepted or not $(a, (a, (a, a)))$.
- b. Consider the following grammar.
 $E \rightarrow E + T \mid T$
 $T \rightarrow T * F \mid F$
 $F \rightarrow id$
 Construct the SLR parsing table for the above grammar.

30. a. Explain about back patching for procedure call.

(OR)

b. Describe the process of syntax directed translations of Boolean expression.

31. a. Discuss the various issues in design of code generation.

(OR)

b. Explain about PEEPHOLE optimization technique.

32. a.i. List out the various loop optimization techniques.

(3 Marks)

ii. Write a short note on any four loop optimization technique with example.

(9 Marks)

(OR)

b. Discuss in detail about different storage allocation strategies.

* * * *

15 x 1 = 25 Marks

ALL Questions

search method are in

(B) 2

(D) 4

nt may consists of

(B) Voice

(D) Animation

nd actions available t

(B) Sensor

(D) Short term

interleaving computati

(B) Online search

(D) Depth-first s

pecific knowledge be

(B) Depth-first se

(D) Uniformed sea

G with n vertices, k

ected components in G

(B) $k+1$

(D) $n-k$

vertices and e edges,

(B) $2n$

(D) e^n

te?

(B) Global min/max i

(D) Backtracking

B.Tech. DEGREE EXAMINATION, JUNE 2022
Sixth Semester

18CSC365J – ARTIFICIAL INTELLIGENCE
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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)

Marks BL CO PO

Answer ALL Questions

- Answer ALL Questions

 - How many types of informed search method are in artificial intelligence? 1 4 1 5
 (A) 1 (B) 2
 (C) 3 (D) 4
 - The task environment of an agent may consists of _____. 1 2 1 5
 (A) Sensors (B) Voice
 (C) Picture (D) Animation
 - Which depends on the precepts and actions available to the agent? 1 4 1 5
 (A) Agent (B) Sensor
 (C) Design problem (D) Short term
 - Which search agent operates by interleaving computation and action? 1 1 1 4
 (A) Offline search (B) Online search
 (C) Breadth-first search (D) Depth-first search
 - Which search uses the problem specific knowledge beyond the definition of the problem? 1 4 1 4
 (A) Informed search (B) Depth-first search
 (C) Breadth-first search (D) Uniformed search
 - In a depth-first traversal of a graph G with n vertices, k edges are marked as tree edges. The number of connected components in G is 1 1 2 4
 (A) k (B) k+1
 (C) $n-k-1$ (D) $n-k$
 - For an undirected graph G with n vertices and e edges, the sum of the degrees of each vertex is 1 4 2 4
 (A) ne (B) $2n$
 (C) $2e$ (D) e^n
 - When hill-climbing algorithm terminate? 1 1 2 4
 (A) Stopping criterion met (B) Global min/max is achieved
 (C) No neighbor has higher value (D) Bo backtracking

the security
integrity of
9. Hill climbing sometimes called _____ because it grabs a good neighbor
state without thinking ahead about where to go next.
(A) Needy local search
(B) Heuristic local search
(C) Greedy local search
(D) Optimal local search

10. In KANSAS+OHIO = OREGON then find the value of G+R+O+S+S
(A) 7
(B) 8
(C) 9
(D) 10

11. General games involves _____.
(A) Single-agent
(B) Multi-agent
(C) Only-single agent and multi-agent
(D) Neither single-agent nor multi-agent

12. Which search is equal to minimax search but eliminates the branches that can't influence the final decision?
(A) Depth-first search
(B) Breadth-first search
(C) Alpha-beta pruning
(D) Genetic search

13. What is the total number of logical connectives in artificial intelligence?
(A) 7
(B) 3
(C) 6
(D) 5

14. Which is a refutation complete inference procedure for a propositional logic?
(A) Clauses
(B) Variables
(C) Propositional resolution
(D) Proposition

15. _____ is a theorem proving technique that proceeds by building refutation proofs.
(A) Variable
(B) Logic
(C) Resolution
(D) Theory

16. How can be the goal is thought of in backward chaining algorithm?
(A) Queue
(B) List
(C) Vector
(D) Stack

17. Which algorithm are in more similar to backward chaining algorithm?
(A) Depth-first search algorithm
(B) Breadth-first search algorithm
(C) Hill-climbing search algorithm
(D) A 0 star algorithm

18. The process by which the brain incrementally orders actions needed to complete a specific tasks is referred as
(A) Planning problem
(B) Partial order planning
(C) Total order planning
(D) Both planning problem and partial order

19. _____ analysis is problem solving techniques used in artificial intelligence for limiting search in AI programs.
(A) Mean-end
(B) Mean-start
(C) Mean-average
(D) Mean-middle

20. Which is a mixture of backward and forward search technique?

(A) Mean-end
(B) A0 star
(C) A *
(D) Sub goal

21. What are not present in finish actions?
(A) Preconditions
(B) Effect
(C) Finish
(D) Cause

22. How many possible plans are available in partial-order solution?
(A) 5
(B) 6
(C) 7
(D) 9

23. Which university introduced expert systems?
(A) Massachusetts Institute of (B) University of Oxford
(C) Stanford University
(D) University of Cambridge

24. Which of the following is not a capabilities of expert systems?
(A) Advising
(B) Demonstrating
(C) Explaining
(D) Expanding

25. Which of the following is incorrect application of expert systems?
(A) Design domain
(B) Monitoring systems
(C) Knowledge domain
(D) Systems domain

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

Marks BL CO PO

26. a.i. Write about problem space and search.
ii. Give details about production system.

b.i. Give short notes on intelligent agents.
ii. Goals based agents explain with example.

(OR)
27. a.i. Explain search techniques.
ii. Compare A* algorithm and A0* algorithm.

b.i. Define hill climbing search.
(OR)
ii. If point + zero = energy , then E + N + E + R + G + Y = ?

i. If point + zero = energy , then E + N + E + R + G + Y = ?
ii. Give notes on alpha-beta pruning.

(OR)

b.i. Describe about knowledge and reasoning. 5 3 3 8

ii. Define about unification. 5 3 3 8

29. a.i. Explain about formed reasoning with example. 5 4 4 11

ii. Give notes on block world problem. 5 4 4 11

(OR)

b.i. Write note on simple planning agent. 5 3 4 11

ii. Define mean-end analysis. 5 3 4 8

30. a.i. Explain about partial order planning. 5 3 5 8

ii. Write short notes on knowledge based planning. 5 3 5 7

(OR)

b.i. Explain about expert system architecture. 5 3 5 4

ii. Define about expert system shells. 5 3 5 5

* * * * *

NOVEMBER 2018

LLIGENCE
ear 2015-2016 to 2017-2018)

45 minutes and OMR sheet should

klet.

Max. M

Marks)
tions

Programming with your own i

Playing a game

-) Your definition to a problem
-) Representing your problem and parameter

and returns _____ as an output.
B) Problem, solution
D) Parameters, sequence of a

of these state.
(B) Last state
(D) Final state

(B) Breadth-first search
(D) Linear search

or
(B) 8-queen problem
(D) Robot navigation

pansion node at first for eval
(B) Best-first search
(D) Linear search

(B) A sequence of step
(D) Arbitrary represen

Reg. No.											
----------	--	--	--	--	--	--	--	--	--	--	--

B.Tech. DEGREE EXAMINATION, NOVEMBER 2018
3rd to 7th Semester

15CS401 – ARTIFICIAL INTELLIGENCE

(For the candidates admitted during the academic year 2015-2016 to 2017-2018)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer ALL Questions

1. What is Artificial Intelligence?
 (A) Putting your intelligence into computer (B) Programming with your own intelligence
 (C) Making a machine intelligence (D) Playing a game
2. What is state space?
 (A) The whole problem (B) Your definition to a problem
 (C) Problem you design (D) Representing your problem with variable and parameter
3. A search algorithm takes _____ as an input and returns _____ as an output.
 (A) Input, output (B) Problem, solution
 (C) Solution, problem (D) Parameters, sequence of actions
4. A problem is a search space defined by one of these state.
 (A) Initial state (B) Last state
 (C) Intermediate state (D) Final state
5. Which search method takes less memory?
 (A) Depth-first search (B) Breadth-first search
 (C) Optimal search (D) Linear search
6. A problem solving approach works well for
 (A) 8-puzzle problem (B) 8-queen problem
 (C) Finding a optimal path from a given source to a destination (D) Robot navigation
7. Which function will select the lowest expansion node at first for evaluation?
 (A) Greedy best-first search (B) Best-first search
 (C) Depth-first search (D) Linear search
8. A production rule consists of _____.
 (A) A set of rules (B) A sequence of steps
 (C) Set of rules and sequence of steps (D) Arbitrary representation to problem

- 5 3 8
5. Which is not a property of representation of knowledge?
 (A) Representation verification (B) Representational adequacy
 (C) Inferential adequacy (D) Inferential efficiency
10. Which is used to construct the complex sentences?
 (A) Symbols (B) Connectives
 (C) Logical connectives (D) Symbols and connectives
11. How many proposition symbols are there in AI?
 (A) 1 (B) 2
 (C) 3 (D) 4
12. What will happen if two literals are identical?
 (A) Remains the same (B) Added as three
 (C) Reduced to one (D) One variable less
13. Which of the following search belongs to totally ordered plan search?
 (A) Forward state-space search (B) Hill-climbing search
 (C) Depth-first search (D) Breadth-first search
14. One of the main challenges of NLP is _____.
 (A) Handling ambiguity of sentences (B) Handling tokenization
 (C) Handling POS-Tagging (D) Linguistics
15. Machine translation
 (A) Converts one human language to another language
 (C) Converts any human language to English
16. Converts human language to machine language
 (B) Converts machine language to human language
16. How many types of quantifiers are available in AI?
 (A) 6 (B) 2
 (C) 3 (D) 4
17. General games involves _____.
 (A) Single agent (B) Multi agent
 (C) Neither single-agent nor multi-agent (D) Only single-agent and multi-agent
18. The initial state and legal moves for each side define the _____ for the game.
 (A) Search tree (B) Game tree
 (C) State space search (D) Forest
19. _____ is/ are the well known expert systems for medical diagnosis systems.
 (A) MYCIN (B) CADUCEUS
 (C) DENDRAL (D) SMH-PAL
20. The main components of the expert systems are _____.
 (A) Inference engine (B) Knowledge base
 (C) Inference engine and knowledge base (D) Meta data

PART - B (5 × 4 = 20 Marks)
 Answer ANY FIVE Questions

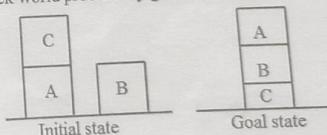
21. What is AI? Write the properties of AI.
22. State the requirements for good control strategy and explain it.
23. What is iterative deepening? Give example.
24. State the differences between BFS and DFS.
25. How is predicate logic helpful in knowledge representation and state the syntax of first order predicate logic?

26. Name the expert system tools used for research.
27. State the applications of expert systems.

PART - C (5 × 12 = 60 Marks)
 Answer ALL Questions

28. a. What is problem characteristics? Explain briefly the various problem characteristics.
 (OR)
 b. Explain about defining the problem as a state space search by using water jug problem with (4,3) quantity jugs. Assume the initial state of the problem as (0,0) and goal state as (2,0).
29. a. What do you mean by searching? Explain A^* algorithm in detail with an example.
 (OR)
 b. What are the problems encountered during hill climbing and what are the ways available to deal with these problems and write the hill climbing algorithm.
30. a. Explain various approaches to knowledge representation.
 (OR)
 b. Explain the knowledge representation using predicate and propositional logic with an unification algorithm.

31. a. Describe the components of planning in detail.
 (OR)
 b. Solve the following block world problem by goal-stack planning method.



32. a. Explain alpha-beta pruning procedure with an example.

(OR)

b. Discuss in detail about expert system with its architecture diagram.

* * * * *

Reg. No.											
----------	--	--	--	--	--	--	--	--	--	--	--

B.Tech. DEGREE EXAMINATION, MAY 2022

Sixth Semester

18CSC305J – ARTIFICIAL INTELLIGENCE

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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

Marks BL CO PO

1. The performance measure, the agents prior knowledge, the agents actions and the agents percept sequence are all referred to as

1 1 1 1

- (A) Semi-dynamic (B) Rationality
(C) Agent (D) Autonomy

2. Which could be best way to deal with game playing problem?

1 1 1 1

- (A) Linear approach (B) Heuristic approach
(C) Random approach (D) An optimal approach

3. Solve the given crypt arithmetic puzzle and find the value of A, B and C respectively.

1 2 1 1

A A

+B B

CBC

- (A) 9, 1, 0 (B) 8, 1, 0
(C) 9, 2, 1 (D) 8, 9, 1

4. In 8-queen problem, all 8 queens should be placed in a 8×8 grid where no two queens should be in the same row, the same column, or in diagonal to one another. Find out what type of constraint it is

1 2 1 1

- (A) Higher – order (B) Unary
(C) No order (D) Binary

5. A searching algorithm that searches for the shortest path between the initial and the final state

1 1 2 2

- (A) Breadth first search (B) Depth first search
(C) A* algorithm (D) Linear search

6. Your friend is in a building that has 9 floors and you want to locate him. Which search technique would you use?

1 2 2 2

- (A) Depth first search (B) Depth limited search
(C) Iterative deepening (D) Breadth first search

5 4 1 2
10 3 2 2

- ii. Solve room colouring problem with an example using CSP.
 27. a. Explain alpha beta pruning with example specifying the need for the same.
 Give the condition in which pruning can be done.

10 4 2 2

(OR)

- b. Illustrate A^* algorithm with initial state and final state as given below.

2	8	3
1	6	4
7		5

1	2	3
8		4
7	6	5

Initial state Final state

Explain the steps involved.

3 2 3 2
7 3 3 2

28. a.i. Define resolution and its steps.

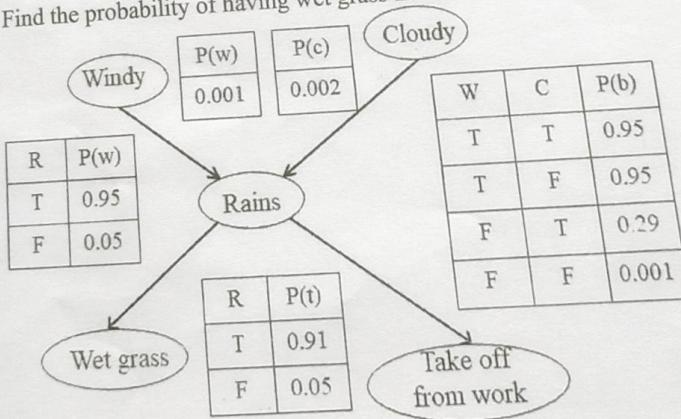
- ii. Prove by resolution that John likes peanuts from the given statements.
 (1) John likes all kind of food
 (2) Apple and vegetable are food
 (3) Anything anyone eats and not killed is food
 (4) Anil eats peanuts and still alive
 (5) Harry eats everything that Anil eats

(OR)

- b.i. What is Baye's theorem and give its applications.

- ii. Find the probability of having wet grass in the below diagram.

3 2 3 2
7 3 3 2



29. a. Demonstrate Artificial Neural Network Algorithm with example.

10 3 4 2

(OR)

- b. Demonstrate Support Vector Machine Algorithm with example.

10 3 4 2

30. a. Illustrate frame-based expert system with its components guidelines and its working principles.

10 3 5 2

(OR)

- b. What is Natural Language Processing? Illustrate its functionalities in detail.

10 3 5

* * * * *

Reg. No. _____

B.Tech. DEGREE EXAMINATION, MAY 2022

Fifth to Seventh Semester

18CSE453T – NETWORK ROUTING ALGORITHMS

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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)

Marks BL CO PO

Answer ALL Questions

1. Time to live value is 14 then maximum number of hops to travel packet is 1 2 1 2
(A) 13 (B) 14
(C) 15 (D) 16

2. _____ is used for loop back purpose. 1 1 1 1
(A) 127.0.0.0 (B) 127.0.0.1
(C) 127.0.0.2 (D) 127.0.0.3

3. Consider the scenario where host A can talk to host C, while host B talks to Host D, which type of device support parallel communications? 1 1 1 1
(A) Repeaters (B) Switches
(C) Hubs (D) Bridges

4. What type of class addressing does 239.255.255.255 falls on? 1 1 1 1
(A) Class A (B) Class B
(C) Class C (D) Class D

5. Encryption done at _____ layer and process to process communication done at _____ layer in OSI model. 1 1 1 1
(A) Session and presentation layer (B) Presentation and transport
(C) Presentation and data link (D) Data link and transport

6. The recently accessed data are stored in the _____ buffer. 1 1 2 1
(A) Router (B) Router processor control
(C) Traffic manager (D) Cache

7. _____ shapes the outgoing traffic to the subscriber according to the service level agreement. 1 1 2 1
(A) Queue manager (B) Traffic manager
(C) Forwarding engine (D) Route control processor

8. The alternate name of longest matching prefix is 1 1 2 1
(A) Best matching prefix (B) Disjoint prefix
(C) Binary trie (D) Multibit trie

- | | | | | | |
|-----|---|---|---|---|---|
| 9. | _____ is used by service providers for interconnecting a few thousand small networks. | 1 | 1 | 2 | 4 |
| (A) | Core router | 1 | 2 | 2 | 3 |
| (B) | Edge router | 1 | 2 | 2 | 3 |
| (C) | Enterprise router | 1 | 2 | 2 | 3 |
| (D) | Access router | 1 | 2 | 2 | 3 |
| 10. | The information stored in the forwarding table is _____. | 1 | 1 | 2 | 4 |
| (A) | Address look up | 1 | 1 | 2 | 4 |
| (B) | Next hop information | 1 | 1 | 2 | 4 |
| (C) | Router information | 1 | 1 | 2 | 4 |
| (D) | Route information | 1 | 1 | 2 | 4 |
| 11. | Widest path algorithms can be identified as _____. | 1 | 1 | 2 | 4 |
| (A) | Non-additive shortest path algorithm | 1 | 1 | 2 | 4 |
| (B) | Additive shortest path algorithm | 1 | 1 | 2 | 4 |
| (C) | Multiplicative path algorithm | 1 | 1 | 2 | 4 |
| (D) | Best path algorithm | 1 | 1 | 2 | 4 |
| 12. | The complexity of Dijkstra's algorithm to find the shortest path to all destinations is _____. | 1 | 1 | 2 | 4 |
| (A) | $O(N^2)$ | 1 | 1 | 2 | 4 |
| (B) | $O(N)$ | 1 | 1 | 2 | 4 |
| (C) | $O(N^3)$ | 1 | 1 | 2 | 4 |
| (D) | $O(LN)$ | 1 | 1 | 2 | 4 |
| 13. | Select the component which contain the traffic costs on Dijkstra's shortest path algorithm | 1 | 1 | 2 | 4 |
| (A) | Nodes | 1 | 1 | 2 | 4 |
| (B) | Edges | 1 | 1 | 2 | 4 |
| (C) | Weights | 1 | 1 | 2 | 4 |
| 14. | The overall distance of a path is computed by adding a cost of a link to the cost of the next link along a path until all links for the path are considered as _____. | 1 | 1 | 2 | 4 |
| (A) | Non-additive property | 1 | 1 | 2 | 4 |
| (B) | Additive property | 1 | 1 | 2 | 4 |
| (C) | Commutative property | 1 | 1 | 2 | 4 |
| 15. | The information initialization is achieved by the path vector routing protocol by using _____. | 1 | 1 | 2 | 4 |
| (A) | 2 way handshake | 1 | 1 | 2 | 4 |
| (B) | Hello protocol | 1 | 1 | 2 | 4 |
| (C) | 3 way handshake | 1 | 1 | 2 | 4 |
| 16. | If a link or an interface card is likely to fail, RIP V1 faces serious transient issues including possibility of creating _____. | 1 | 1 | 2 | 4 |
| (A) | Brown hole routes | 1 | 1 | 2 | 4 |
| (B) | Red hole routes | 1 | 1 | 2 | 4 |
| (C) | White hole routes | 1 | 1 | 2 | 4 |
| 17. | RIP V2 has been extended four use with IPv6 addressing known as _____. | 1 | 1 | 2 | 4 |
| (A) | RIPng1 | 1 | 1 | 2 | 4 |
| (B) | RIPng12 | 1 | 1 | 2 | 4 |
| (C) | RIPng | 1 | 1 | 2 | 4 |
| 18. | IGRP runs directly over IP with protocol type field set to _____. | 1 | 1 | 2 | 4 |
| (A) | 9 | 1 | 1 | 2 | 4 |
| (B) | 10 | 1 | 1 | 2 | 4 |
| (C) | 8 | 1 | 1 | 2 | 4 |
| (D) | 12 | 1 | 1 | 2 | 4 |
| 19. | _____ is used to flood the network with routing information. | 1 | 1 | 2 | 4 |
| (A) | Link state data | 1 | 1 | 2 | 4 |
| (B) | Link state booting | 1 | 1 | 2 | 4 |
| (C) | Link state routing | 1 | 1 | 2 | 4 |
| (D) | Link state advertisements | 1 | 1 | 2 | 4 |
| 20. | ECMP stands for _____. | 1 | 1 | 2 | 4 |
| (A) | Equal-cost multipath | 1 | 1 | 2 | 4 |
| (B) | Equivalent-cost multipath | 1 | 1 | 2 | 4 |
| (C) | Equivalent-cost multipath | 1 | 1 | 2 | 4 |
| (D) | Equal-cost multicast | 1 | 1 | 2 | 4 |
| 21. | When node S wants to send a packet to node D. But does not know a route to D, node S initiates a _____. | 1 | 1 | 2 | 4 |
| (A) | Route discovery | 1 | 1 | 2 | 4 |
| (B) | Router detection | 1 | 1 | 2 | 4 |
| (C) | Way discovery | 1 | 1 | 2 | 4 |
| 22. | Which routing protocol has the smallest default administrative distance? | 1 | 1 | 2 | 4 |
| (A) | IBGP | 1 | 1 | 2 | 4 |
| (B) | OSPF | 1 | 1 | 2 | 4 |
| (C) | EIGRP | 1 | 1 | 2 | 4 |
| (D) | Automatic state protocols | 1 | 1 | 2 | 4 |
| 23. | Which of the following is not the category of dynamic routing algorithm? | 1 | 1 | 2 | 4 |
| (A) | Distance vector protocols | 1 | 1 | 2 | 4 |
| (B) | Link state protocols | 1 | 1 | 2 | 4 |
| (C) | Hybrid protocols | 1 | 1 | 2 | 4 |
| 24. | CGSR routing involves cluster routing, where by a node is required to find the best route over cluster heads from the _____. | 1 | 1 | 2 | 4 |
| (A) | Cluster-member table | 1 | 1 | 2 | 4 |
| (B) | Group-member table | 1 | 1 | 2 | 4 |
| (C) | Team-member table | 1 | 1 | 2 | 4 |
| (D) | Individual-member table | 1 | 1 | 2 | 4 |
| 25. | An efficient link state packet forwarding mechanism is called _____. | 1 | 1 | 2 | 4 |
| (A) | Multi point relaying | 1 | 1 | 2 | 4 |
| (B) | Single point relaying | 1 | 1 | 2 | 4 |
| (C) | Point-to-point relaying | 1 | 1 | 2 | 4 |
| (D) | Multi focus relaying | 1 | 1 | 2 | 4 |

Marks BL co K

- | | | | | | | | | |
|-------------------------------------|---|-------|---------------------------|----|----|--|--|--|
| 0. | ECMP stands for | | | | | | | |
| (A) | Equal-cost multipath | (B) | Equivalent-cost multipath | | | | | |
| (C) | Equivalent-cost multipath | (D) | Equal-cost multicast | | | | | |
| 1. | When node S wants to send a packet to node D. But does not know a route to D, node S initiates a _____. | 1 | 2 | 5 | 2 | | | |
| (A) | Route discovery | (B) | Router detection | | | | | |
| (C) | Way discovery | (D) | Course finding | | | | | |
| 22. | Which routing protocol has the smallest default administrative distance? | 1 | 1 | 5 | 1 | | | |
| (A) | IBGP | (B) | OSPF | | | | | |
| (C) | RIP | (D) | EIGRP | | | | | |
| 23. | Which of the following is not the category of dynamic routing algorithm? | 1 | 1 | 5 | 1 | | | |
| (A) | Distance vector protocols | (B) | Link state protocols | | | | | |
| (C) | Hybrid protocols | (D) | Automatic state protocols | | | | | |
| 24. | CGSR routing involves cluster routing, where by a node is required to find the best route over cluster heads from the | 1 | 1 | 5 | 1 | | | |
| (A) | Cluster-member table | (B) | Group-member table | | | | | |
| (C) | Team-member table | (D) | Individual-member table | | | | | |
| 25. | An efficient link state packet forwarding mechanism is called | 1 | 1 | 5 | 1 | | | |
| (A) | Multi point relaying | (B) | Single point relaying | | | | | |
| (C) | Point-to-point relaying | (D) | Multi focus relaying | | | | | |
| | | Marks | BL | CO | PO | | | |
| | | 10 | 2 | 1 | 2 | | | |
| PART – B (5 x 10 = 50 Marks) | | | | | | | | |
| Answer ALL Questions | | | | | | | | |
| 6. | a. With neat diagram explain network management architecture. | 10 | 2 | 1 | 2 | | | |
| | | (OR) | | | | | | |
| b. | With the help of suitable architecture explain the router operations/functions. | 10 | 1 | 1 | 1 | | | |
| 27. | a. Illustrate the shared CPU architecture of a router with neat diagram. | 10 | 1 | 2 | 3 | | | |
| | | (OR) | | | | | | |
| b. | Explain the shared forwarding engine architecture with a switched backplane of a router. | 10 | 2 | 2 | 24 | | | |
| 28. | a. Write down the algorithm of widest path calculation for Dijkstra based approach and find the shortest path with your own sample network. | 10 | 2 | 3 | 3 | | | |
| | | (OR) | | | | | | |
| b.i. | Differentiate Bellman-Ford algorithm and the distance vector algorithm. | 5 | 2 | 3 | 2 | | | |

5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
29. a. Explain about BGP operations, BGP configuration and BGP decision process. 10 2 4 2

(OR)

b. Elaborate the operation of IGRP and EIGRP. 10 2 4 2

30. a. Discuss on Cluster-Head Gateway Switch Routing (CGSR) protocol with proper diagram. 10 1 5 1

(OR)

b. Discuss routing responsibilities to nodes in hierarchical state routing protocol. 10 1 5 1

P(0)
0.95
0.95
0.7
0.

Reg. No.	R	P	1	6	1	1	0	0	3	0	3	0	5	0	4
----------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

B.Tech. DEGREE EXAMINATION, NOVEMBER 2019

Third to Seventh Semester

15CS401 – ARTIFICIAL INTELLIGENCE

(For the candidates admitted during the academic year 2015 – 2016 to 2017 – 2018)

ote:

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer ALL Questions

1. Artificial intelligence is defined as

(A) Transferring your intelligence into computers	(B) Programming with your intelligence
(C) Making machine intelligent	(D) Putting more memory to computer
2. What is the term used for describing the judgment or common sense part of problem solving?

(A) Heuristic	(B) Critical
(C) Value based	(D) Analytical
3. AND-OR graph is related with

(A) Hill climbing	(B) Simulated annealing
(C) DFS	(D) Problem reduction
4. The data structure for DFS is

(A) Stack	(B) Queue
(C) Priority queue	(D) Linked list
5. Heuristic is used in

(A) Informed search	(B) Un-informed search
(C) Brute force	(D) Blind search
6. The time complexity for breadth-first search is

(A) $O(b^d)$	(B) $O(bd)$
(C) $O(d)$	(D) $O(n)$
7. In A^* algorithm if $g(n) = 0$ then it becomes

(A) Hill climbing	(B) AND-OR graph
(C) Linear search	(D) Heuristic search
8. Consider a complete search tree of depth 15, every node at node 0 to 14 has 10 children and every node at depth 15 is a leaf node. In the complete tree

(A) There will be $O(15^{10})$ children	(B) There will be $O(10^{15})$
(C) There will be 15 children	(D) There will be 15×10 children

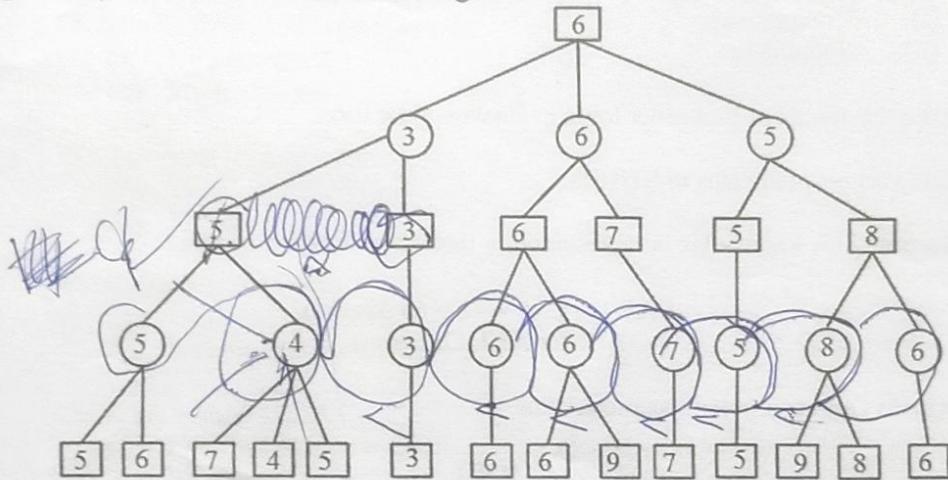
9. If P is a proposition the P takes the value
 (A) [0, 1] (B) {0, 1}
 (C) 0 (D) 1
10. If $P \rightarrow Q \vdash Q$ then the differencing procedure is known as
 (A) Modus tollens (B) Syllogism
 (C) Modus ponens (D) Tautology
11. IFNQ, $P \rightarrow Q \vdash ?$
 (A) P (B) Q
 (C) NP (D) NQ
12. $A \vee \neg A$ is known as
 (A) Unit resolution (B) Modus ponens
 (C) Modus tollens (D) FOL
13. Temporal logic is related with
 (A) Time (B) Space
 (C) Models (D) Planning
14. Strips is related with
 (A) Goal stack planning (B) Learning
 (C) Knowledge representation (D) Propositional logic
15. ATN is used to check
 (A) Parse a sentence in NLP (B) Check the syntax
 (C) Intermediate representation (D) Correctness of sentences
16. In NLP F measure is given as
 (A) $(3 * \text{precision} * \text{recall}) / (\text{precision} + \text{recall})$ (B) $(2 * \text{precision} * \text{recall}) / (\text{precision} + \text{recall})$
 (C) $(\text{precision} + \text{recall}) / (\text{precision} - \text{recall})$ (D) $(\text{Precision} - \text{recall}) / (\text{precision} + \text{recall})$
17. Utility function denotes
 (A) Numeric value for a terminal state (B) Numeric value for a start state
 (C) It is a heuristic value (D) It denotes the value for intermediate state
18. In zero-sum game
 (A) No player wins (B) It is a draw
 (C) Game doesn't take place (D) If one player wins then other loses
19. α - β pruning is used for
 (A) Traverse the tree from left to right (B) Top down search
 (C) Reduce the search space (D) Bottom up search
20. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$ where x belongs to A. Then
 the fuzzy set A is called normal when
 (A) $h(A) = 0$ (B) $h(A) < 0$
 (C) $h(A) = 1$ (D) $h(A) < 1$
- (OR)
- b. Explain the following (4 Marks)
 (i) Depth limited search
 (ii) Best first search
30. a.i. Explain unification algorithm. (4 Marks)
- ii. The law says that "it is a crime for an American to sell weapons to hostile nations. The country "Nano", an enemy of America has some missiles, and all of its missiles were sold by colonel west, who is an American".
 - Use resolution principle to prove that west is a criminal. (4 Marks)
21. What is Turing test?
22. Define a state space search problem in AI with example.
23. Define Heuristic value for
 (i) Travelling salesman problem
 (ii) 8 puzzle problem
24. In propositional logic define the following
 (i) Completeness
 (ii) Soundness
25. Write the syntax of first order logic in Backus-Naur form.
26. State various predicates in STRIPS.
27. Illustrate how knowledge is represented in fuzzy based expert system?
- PART - C (5 x 12 = 60 Marks)
- Answer ALL Questions

31. a. Explain goal stack planning and solve the following.



b. Explain various levels of NLP.

32. a. Explain α - β cut off and solve the following.



(OR)

b. Draw the architecture of expert system. Explain all individual components.



* * * * *

B.Tech. DEGREE EXAMINATION, NOVEMBER 2018
3rd to 7th Semester

15CS314J – COMPILER DESIGN

(For the candidates admitted during the academic year 2015 - 2016 to 2017 - 2018)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A ($20 \times 1 = 20$ Marks)

Answer ALL Questions

Do or No.																			
-----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

8. A shift reduce parser carries out the actions specified within braces immediately after reducing with the corresponding rule of the grammar. $S \rightarrow xW \{Print\}^*, S \rightarrow y \{Print\}^*$, $W \rightarrow Sz \{Print\}^*$ what is the translation of "xxyyzz"?

- (A) 11231 (B) 11233 (C) 23131 (D) 233321

9. Synthesized attributes of a node in the parse tree computed

- (A) From the attributes of the left sibling (B) From the attributes of the right sibling
(C) From the attributes of the root node (D) From the attributes of the children

10. The polish notation of the expression $a + (b * c) / d$ is

- (A) $a b c * / +$ (B) $a b c * d / +$
(C) $a b c * d / +$ (D) $a b c * + d /$

11. Type checking is normally done during

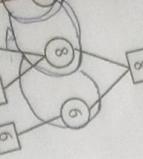
- (A) Lexical analysis (B) Syntax analysis
(C) Syntax directed translation (D) Code generation

12. Back patching is useful for handling

- (A) Condition jumps (B) Unconditional jumps
(C) Backward reference (D) Forward references

13. Which of the following code is faster?

- (A) Mov R₀, a (B) Mov R₀, R_i
(C) Mov a, R₀ (D) Mov R_i, a



14. Reduction in strength

- (A) Weakens the processor's processing (B) Saves memory space

- (C) Runs faster (D) Runs slower

15. Consider the following code segment

$$x = u - t;$$

$$y' = x * v'_i$$

$$x = y' + w'_i$$

$$y' = t - z'_i$$

The minimum number of total variable required to convert the above code segment to static single assignment form is

- (A) 6 (B) 8
(C) 7 (D) 10

16. The languages that need heap allocation in the runtime environment are

- (A) Those that use global variables (B) Those that use dynamic sloping
(C) Those that support recursion (D) Those that allow dynamic data structure

17. Code motion moves

- (A) All instructions in the loop outside (B) Loop invariant instruction outside the loop
(C) All instructions in the loop into the (D) Loop-invariant instructions in the loop into pre-header of the loop

18. A flow graph connecting various blocks is meant to

- (A) Graphically flow information in the (B) Maintain data information and distribute to compiler various blocks on need basis
(C) Block the flow of information (D) Flow away all the information

19. Peephole optimization is a form of

- (A) Loop optimization (B) Local optimization
(C) Constant folding (D) Data flow analysis

20. Local and loop optimization in turn provide motivation for

- (A) Data flow analysis (B) Constant folding
(C) Peephole optimization (D) DFA and constant folding

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

21. Identify the lexeme that make up the tokens in the following program segment. Indicate the corresponding token and pattern

```
void swap (int i, int j)
{
    int t;
    t = i;
    i = j;
    j = t;
}
```

22. Consider the grammar $S \rightarrow A1B, A \rightarrow a1/\epsilon, B \rightarrow 0B1/B/\epsilon$
Find the leftmost derivation, right most derivation and parse tree for the string 00101.

23. Check whether the given grammar $S \rightarrow aSbS/bSbS/$ is ambiguous.

24. Define DAG. Construct DAG for the expression $a + a * (b - c) + (b - c) * d$.

25. Define three address code. What are the types of three-address statements?

26. What are the structure preserving transformations on basic block?

27. What are the actions performed by the code generation algorithm?

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

- b. Explain in detail the process of compilation. Illustrate the output of each phase of compilation for the input $a - (b + c) * (b + c) * 2$.

- b. Construct minimum state DFA for the regular expression $(a | b)^* a(a | b)$.

29. a. Construct predictive parser for the following grammar G

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid id$$

And parse the input string $id * id * id$.

(OR)

b. Construct the LALR parsing table for the grammar,

$$S \rightarrow L = R \mid R$$

$$L \rightarrow *R \mid id$$

$$R \rightarrow L$$

(8 Marks)

30. a.i. Give the syntax directed definition for flow of control statements.

(4 Marks)

ii. Write the three address code for the expression $a < b$ or $c < d$ and $e < f$.

b.i. What are the various methods of implementing three address statements? Explain with example.

(8 Marks)

ii. Translate the arithmetic expression $a * -(b + c)$ into syntax tree and postfix notation. (4 Marks)

(8 Marks)

31. a.i. Discuss briefly about simple code generation algorithm.

(4 Marks)

ii. How to generate a code for a basic block from its DAG representation?

(OR)

b. Write in detail about the issues in the design of a code generator.

32. a. Explain the various storage allocation strategies with suitable example.

(OR)

b. Explain the principal sources of optimization with necessary example.

* * * * *

Reg. No.											
----------	--	--	--	--	--	--	--	--	--	--	--

B.Tech. DEGREE EXAMINATION, MAY 2018

1st to 6th Semester

15CS314J – COMPILER DESIGN

(For the candidates admitted during the academic year 2015 – 2016 onwards)

Note:

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer ALL Questions

1. The number of tokens in the following ‘C-Language’ statement is
 $\text{printf } ("i = \%d, \& i = \% ", i, \& i)$
 - (A) 3
 - (B) 26
 - (C) 10
 - (D) 21
2. Compiler should report the presence of _____ in the source program in translation process.
 - (A) Classes
 - (B) Objects
 - (C) Errors
 - (D) Text
3. Consider the production of the grammar $S \rightarrow AA$, $A \rightarrow aa$, $A \rightarrow bb$. Describe the language specified by the production grammar
 - (A) $L = \{aaaa, aabb, bbaa, bbbb\}$
 - (B) $L = \{abab, abaa, aaab, baaa\}$
 - (C) $L = \{aaab, aaba, bbaa, bbbb\}$
 - (D) $L = \{aaaa, abab, bbaa, aaab\}$
4. Which of the following is used for grouping of characters into token?
 - (A) Parser
 - (B) Code optimizer
 - (C) Code generator
 - (D) Lexical analyzer
5. The grammar $A \rightarrow AA|(A)e$ is not suitable for predictive parsing because the grammar is
 - (A) Ambiguous
 - (B) Left recursive
 - (C) Right recursive
 - (D) Operator grammar
6. Which of the following grammar rules violate the requirement of an operator grammar
 - (i) $P \rightarrow QR$
 - (ii) $P \rightarrow QSR$
 - (iii) $P \rightarrow t$
 - (iv) $P \rightarrow QtRr$
 - (A) (i) only
 - (B) (ii) and (iii) only
 - (C) (i) and (iii) only
 - (D) (iii) and (iv) only
7. Consider the following grammar,
 $S \rightarrow FR$
 $R \rightarrow s/t$
 $F \rightarrow id$
 In predictive parsing table, ‘M’ of the grammar, the entries M[s, id] and M[R, \$] respectively are
 - (A) {S→FR} and {R→t}
 - (B) {S→FR} and { }
 - (C) {S→FR} and {R→*s}
 - (D) {F→id} and {R→t}

- ii. Mention any four compiler construction tools. (2 Marks)

(OR)

- b. Compare NFA and DFA. Convert the given regular expression to NFA using Thompson's construction and compute DFA $((t/a)b^*)^*$.

29. a. Obtain LR(0) items for the following grammar

$$S \rightarrow L = R \mid R$$

$$L \rightarrow *R \mid id$$

$$R \rightarrow L$$

Compute FIRST and FOLLOW sets for the given grammar and obtain SLR parsing table. Check whether the given grammar is SLR.

(OR)

- b. Consider the grammar $E \rightarrow E + T \mid T, T \rightarrow T * F \mid F, F \rightarrow (E) \mid id$ using predictive parsing. Parse the string $id + id * id$.

30. a.i. Generate intermediate code for the following code segment along with the required syntax-directed translation scheme.

```

while (i < 10)
if (i % 2 == 0)
    evensum = evensum + i;
else
    oddsum = oddsum + i;
```

(6 Marks)

- ii. Why are quadruples preferred over triples in an optimizing compiler? (2 Marks)

- iii. Write the various three address code forms of intermediate code. (4 Marks)

(OR)

- b. List the types of three address statements. What are the various methods of implementing three address statements? Explain with an example.

31. a.i. Construct DAG and optimal target code for the expression

$$x = ((a+b) | (b-c)) - (a+b) * (b-c) + f$$

(9 Marks)

- ii. List out the advantages of DAG. (3 Marks)

(OR)

- b.i. Discuss the issues in the design of code generator with example. (8 Marks)

- ii. What are the actions performed by the code generation algorithms? (4 Marks)

(8 Marks)

(4 Marks)

32. a.i. Describe the principal sources of optimization. (8 Marks)

- ii. Write short notes on loop-optimization. (4 Marks)

(OR)

- b.i. What are the different storage allocation strategies? Explain. (8 Marks)

- ii. Write short notes on parameter passing. (4 Marks)

* * * * *

Reg. No.											
----------	--	--	--	--	--	--	--	--	--	--	--

B.Tech. DEGREE EXAMINATION, JUNE 2019
 1st to 7th Semester

15CS314J – COMPILER DESIGN

(For the candidates admitted during the academic year 2015 - 2016 to 2017 - 2018)

Note:

- (i) Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) Part - B and Part - C should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
 Answer ALL Questions

1. What is the output of lexical analyzer?

(A) Parse tree	(B) List of tokens
(C) Intermediate code	(D) Machine code
2. A grammar that produces more than one parse tree for same sentence is called

(A) Ambiguous	(B) Unambiguous
(C) Regular	(D) Irregular
3. Following context free grammar $S \rightarrow aB|bA$, $A \rightarrow b|aS|bAA$, $B \rightarrow b|bS|aBB$ generates strings of terminals that have

(A) Equal number of a's and b's	(B) Odd number of a's and odd number of b's
(C) Even number of a's and b's	(D) Odd number of a's and even number of a's
4. Positive closure of a language L is defined as

(A) L^*	(B) L^+
(C) L	(D) L^-
5. Which one of the following is a top down parser?

(A) Recursive descent parsing	(B) Operator precedence parsing
(C) LR (k)	(D) LALR (k)
6. Grammar of the program is checked at _____ phase of compiler.

(A) Semantic analyzer	(B) Syntax analyzer
(C) Code optimization	(D) Code generator
7. The grammar $A \rightarrow AA|IA|\epsilon$ is not suitable for predictive parsing because the grammar is

(A) Ambiguous	(B) Left recursive
(C) Right recursive	(D) Operator grammar
8. An LALR(1) parser of a grammar 'G' can have SR conflicts if and only if

(A) The SLR(1) parser for G has S-R	(B) The LR(1) parser for G has S-R conflicts
(C) The LR(0) parser for G has S-R	(D) The LALR(1) parser for G has R-R conflicts

9. Consider the translation scheme shown below $S \rightarrow TR$ $R \rightarrow T\{print('+\')\}; Rle T \rightarrow n\{print(n.val)\}$; Here 'n' is a token that represents an integer and n.val represents the int.value. For an input string '9+5+2' this translation scheme will print
 (A) 9+5+2 (B) 95+2+
 (C) 952++ (D) ++952
10. In a bottom up evaluation of a syntax directed definition, inherited attributes can
 (A) Always be evaluated (B) Be evaluated only if the definition is L attributed
 (C) Be evaluated only if the definition has synthesized attributes (D) Never be evaluated
11. Type checking is normally done using
 (A) Syntax directed translation (B) Lexical analysis
 (C) Code optimization (D) Syntax analysis
12. Which of the following is not an intermediate code form?
 (A) Postfix notation (B) Syntax trees
 (C) Three address codes (D) Quadruples
13. The graph that shows basic blocks and their successor relationship is called
 (A) Flow graph (B) DAG
 (C) Hamiltonian graph (D) Control graph
14. DAG representation of a basic block allows
 (A) Automatic detection of local (B) Automatic detection of induction variables common sub expression
 (C) Automatic detection of loop variant (D) Automatic detection of state variables
15. Which of the following is peephole optimization techniques?
 (A) Loop optimization (B) Local optimization
 (C) Constant folding (D) Dataflow analysis
16. A compiler for a high level language that runs on one machine and produce code for different machine is called
 (A) Optimizing compiler (B) One pass compiler
 (C) Cross compiler (D) Multipass compiler
17. When a computer is rebooted, a special type of loads is executed called
 (A) Compiler and go loader (B) Bootloader
 (C) Bootstrap loader (D) Relocating loader
18. Which of the following symbols table implementation is based on the property of locality of reference?
 (A) Hash table (B) Search table
 (C) Self organizing list (D) Linear list
19. Reduction in strength means
 (A) Replacing runtime computation by compiler time computation (B) Removing loop variant computation
 (C) Removing common subexpression (D) Replacing a costly operation by a relatively cheaper one

(n.val); Here 'n' is a token that represents an integer and n.val represents the int.value. For an input string '9+5+2' this translation scheme will print
 (A) 9+5+2 (B) 95+2+
 (C) Peephole optimization (D) DFA and constant folding

- PART – B (5 × 4 = 20 Marks)**
- Answer ANY FIVE Questions
20. Local and loop optimization in turn provide motivation for
 (A) Dataflow analysis (B) Constant folding
 (C) Peephole optimization (D) DFA and constant folding

- PART – C (5 × 12 = 60 Marks)**
- Answer ALL Questions
21. How input buffering works in an lexical analyzer phase? Explain it with an example.
22. Define token, pattern, lexeme with example.
23. Compute the leading and trailing set for the following grammar
 $E \rightarrow E + T \mid T, T \rightarrow T * F \mid F, F \rightarrow (E) \mid id$
24. Differentiate inherited and synthesized attribute with an example.
25. Construct three address code for $a = b + c * f * d - 1.0$.
26. Brief about cross compiler.

27. Differentiate "call by value" and "call by reference".
- PART – C (5 × 12 = 60 Marks)**
- Answer ALL Questions
28. a. Explain the phases of compiler. Explain each phase using the statement $d = p * n * r / 100$.
 b. Construct DFA for the following regular expression $(a \mid b)^* abb$ and minimize it.

29. a. Consider the following grammar
 $S \rightarrow L = R \mid R$
 $L \rightarrow *R \mid id$

$R \rightarrow L$

Check whether the grammar is SLR(1) or not.

- (OR)**
- A → ad | b
 $S \rightarrow A A$
- And parse the string 'aaabaaa'.
- b. Construct CLR parsing table for
 $A \rightarrow ad \mid b$

30. a. What is three address code? Mention its types. How would you implement three address statements? Explain with an example.
(OR)
- b. Explain the syntax directed translation for Boolean expressions.

31. a. Write in detail the design issues of a code generator.

(OR)

b. Construct DAG and optimal target code for the statement

```
i = 1, s = 0
while (i <= 10)
{
    s = s + a[i][i];
    i = i + 1
}
```

32. a. Explain various code optimization techniques in detail.

(OR)

b. What are the different storage allocation strategies? Explain

* * * * *

Reg. No.											
----------	--	--	--	--	--	--	--	--	--	--	--

B.Tech. DEGREE EXAMINATION, DECEMBER 2018
1st to 6th Semester

15CS314J – COMPILER DESIGN

(For the candidates admitted during the academic year 2015-2016 to 2017-2018)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
- (ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. In a compiler, keywords of a language are recognized during

(A) Parsing of the program	(B) The code generation
(C) The lexical analysis of the program	(D) Dataflow analysis
2. The grammar $S \rightarrow aSa|bS|c$ is

(A) LL(1) but not LR(1)	(B) LR(1) but not LL(1)
(C) Both LL(1) and LR(1)	(D) Neither LL(1) nor LR(1)
3. Input to the LEX is

(A) Context free grammar	(B) Regular expressions
(C) Output of the preprocessor	(D) Assembly language
4. The error of missing right parentheses in the statement: $x\,y\,z(a, 2*(3+b)$ is detected in

(A) Lexical analysis phase	(B) Syntax analysis phase
(C) Code generation phase	(D) Semantic analysis phase
5. Which one of the following is a top-down parser?

(A) Recursive descent parser	(B) Operator precedence parser
(C) An LR(k) parser	(D) An LALR (k) parser
6. Consider the grammar with non-terminal $N = \{S, C, S1\}$, terminals $T = \{a, b, i, t, e\}$, with S as the start symbol and the following set of rules. $S \rightarrow iCtSS1 | a$ $S1 \rightarrow eS|t$ $C \rightarrow b$.
The grammar is not LL(1) because

(A) It is left recursive	(B) It is right recursive
(C) It is ambiguous	(D) It is not context-free
7. A compiler for a high-lever language that runs on one machine and produces code for a different machine is called

(A) Optimizing compiler	(B) One pass compiler
(C) Cross compiler	(D) Multi-pass compiler
8. A bottom up parser generates

(A) Right most derivation	(B) Right most derivation in reverse
(C) Left most derivation	(D) Left most derivation in reverse

9. Postfix notation for $a := b * -c + b * -c$ is

- (A) $a \ b \ c \ \text{assign} \ \text{uminus} \ * \ b \ c \ \text{assign}$
- (B) $a \ b \ c \ \text{uminus} \ * \ b \ c \ \text{assign} \ \text{uminus} \ * \ +$
- (C) $a \ b \ c \ \text{uminus} \ \text{assign} \ * \ b \ c \ \text{uminus} \ * \ +$
- (D) $a \ b \ c \ \text{uminus} \ * \ b \ c \ \text{uminus} \ * \ + \ \text{assign}$

10. A syntax directed definition is S-attributed if

- (A) Every attribute is inherited

- (B) Every attribute is synthesized
- (C) Both synthesized and inherited
- (D) There is implementation in action

11. Back patching is done for

- (A) Assignment statements
- (B) Case statements
- (C) Flow of control statements
- (D) Syntax tree generation

12. Which is true in case of using triples as intermediate codes

- (A) Use of more temporary storage
- (B) Storages are implicit
- (C) Storages are explicit
- (D) Does not store anything

13. The graph that shows basic blocks and their successor relationship is called

- (A) DAG
- (B) Flow graph
- (C) Control graph
- (D) Hamiltonian graph

14. The specific task storage manager performs

- (A) Allocation/ deallocation of storage to programs
- (B) Protection of storage area allocated to a program illegal access by other programs in the system
- (C) The status of each program
- (D) Both (A) and (B)

15. Which one is a local optimization technique?

- (A) Code motion
- (B) Frequency reduction
- (C) Strength reduction
- (D) Constant folding

16. Eliminating unreachable code is part of

- (A) Local optimization
- (B) Loop optimization
- (C) Peephole optimization
- (D) Global dataflow analysis

17. Which is not part of activation record during runtime environments?

- (A) Data types
- (B) Actual parameters
- (C) Control link
- (D) Access link

18. Register descriptor contents of a code generator will have

- (A) The names of operands and their contents
- (B) Contents of each register
- (C) Start location of heap and its length
- (D) Stack contents and its length

19. l-value refers to

- (A) Location of memory
- (B) Location of heap
- (C) Left side value
- (D) Left handled value

20. A dangling reference is

- (A) Pointer pointing to storage which is freed
- (B) Pointer pointing to nothing
- (C) Pointer pointing to storage which is still in use
- (D) Pointer pointing to un-initialized storage

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

21. Derive the string and construct a syntax tree for the input string *ceaaabhe* using the grammar $S \rightarrow Sd \mid A, A \rightarrow AbB \mid B, B \rightarrow cSd \mid e$

22. Construct leading and trailing set for the following grammar $E \rightarrow E + T \mid T, T \rightarrow T * F \mid F, F \rightarrow (E) \mid id$

23. Find out FIRST and FOLLOW for the following grammar $S \rightarrow a \mid T, T \rightarrow T, S \mid S$

24. Construct three address code for
 $\text{if}(a < b + c)$
 $a = a - c;$
 $c = b * c;$

25. Brief about the generic issues in the design of code generators.

26. Differentiate among lexeme, token and pattern.

27. Define cultivation tree. Draw the structure of activation record.

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

28. a. i. What are the various phases of a compiler? Explain in detail. (8 Marks)

ii. Illustrate how input buffering technique is used to implement lexical analyzer. (4 Marks)

(OR)

b. Obtain the NFA for the given regular expression $(a \mid b)^*abb(a \mid b)^*$ and construct minimized DFA for the same. (8 Marks)

29. a.i. Construct SLR parsing table for the grammar $S \rightarrow (L) \mid a, L \rightarrow L, S \mid S$. (8 Marks)

ii. Eliminate left recursion for the grammar $S \rightarrow Aa \mid b, A \rightarrow Ac \mid Sd \mid \epsilon$. (4 Marks)

(OR)

b. Design a LALR parser for the following grammar and parse the input sentence $w = *id \mid id$.
 $S \rightarrow L \mid R \mid R$
 $L \rightarrow *K \mid id$
 $R \rightarrow L$

30. a. Translate the arithmetic expression $(a + b)^* ((c - d) / (a + b)^* e)$ into the following notations

- (i) Syntax tree
- (ii) Postfix notation
- (iii) Three-address code
- (iv) Quadruples
- (v) Triples
- (vi) Indirect triples

(OR)

b.i. Write down the syntax-directed definition to produce three-address code for Boolean expressions.

ii. Explain about back patching with an example.

31. a.i. For the flow graph shown below write the three address statements and construct the DAG

- (1) $t1 := 4 * i$
- (2) $t2 := a[t1]$
- (3) $t3 := 4 * i$
- (4) $t4 := b[t3]$
- (5) $t5 := t2 * t4$
- (6) $t6 := prod + t5$
- (7) $prod := t6$
- (8) $t7 = i + 1$
- (9) $i := t7$
- (10) $if \ i \leq 20 \ goto \ (1)$

ii. Explain peephole optimization with example.

(OR)

b.i. What are the two classes of local transformations that can be applied to basic blocks? Explain each with example.

ii. Explore on the run-time storage management techniques.

32. a. Why do we need code optimization? Explain the principal sources of optimization.

(OR)

b. State the three storage-allocation strategies. Explain in detail.

* * * * *