UNIVERSITY OF THE PUNJAB

Roll No. in Fig. ....

B.S. in Computer Science Fourth Year : Annual – 2021

Roll No. in Words. ....

Subject: Computer Networks

Paper: 18-N   Time: 30 Min. Marks: 15

....

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.
Division of marks is given in front of each question.
This Paper will be collected back after expiry of time limit mentioned above.

Q.1.   Encircle the right answer cutting and overwriting is not allowed. (10x1.5=15)

1. The _____ layer is responsible for end-to-end delivery of packets.
    i. Physical
    ii. Network
    iii. Datalink
    iv. Transport

2. Fast Ethernet refers to _____ coax LAN.
    i. 10BaseT
    ii. 10Base5
    iii. 10Base2
    iv. 100BaseT

3. How many bits can fit a link with delay of 4ms and bandwidth of 2.5 Mbps?
    i. 10
    ii. 100
    iii. 1000
    iv. 10000

4. The protocol that maps physical/MAC addresses to IP addresses is called _____.
    i. ARP
    ii. RARP
    iii. ICMP
    iv. Both (i) and (ii)

5. The length of the logical address in IPv6 is_____ bits.
    i. 64
    ii. 32
    iii. 48
    iv. 128

6. The following fields are related to fragmented packets in IP header.
    i. Identification
    ii. Fragmentation offset
    iii. Checksum
    iv. Both (i) and (ii)

7. The maximum header length of an IP packet can be
    i. 20 bytes
    ii. 60 bytes
    iii. 80 bytes
    iv. 16 bytes

8. What is the bit rate of a signal with bit duration of 0.005s?
    i. 200 bps
    ii. 500 bps
    iii. 2 bps
    iv. 2 kbps

9. IGMP stands for
    i. Internet Gateway Message Protocol
    ii. Internet Group Manage Protocol
    iii. Internet Group Message Protocol
    iv. None of the above

10. _____ refers to a set of procedures used to restrict the amount of data that the sender can send before waiting for acknowledgment.
    i. Error Control
    ii. Congestion Control
   iii. Flow Control
    iv. Connection control

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2 Match the following functions to one or more layers of OSI Model. [2x10=20]

Services	Layer Name
Format and Code Conversion services	
Transmission of bit stream across physical medium	
Defines Frames	
Reliable process to process message delivery	
Route selection	
Provides user services such as e-mail and file transfer	
Ensures reliable transmission of data	
Flow control	
Interface to transmission media	
Error Correction and retransmission	

Q.3 (a) What are packet headers and why are they needed? [2]

(b) Consider the following network with 5 nodes (routers) labeled 1-5 connecting sender host A and receiver host B. How many headers of each of the following layers are appended to a packet traversing this network from A to B? [3x2=6]
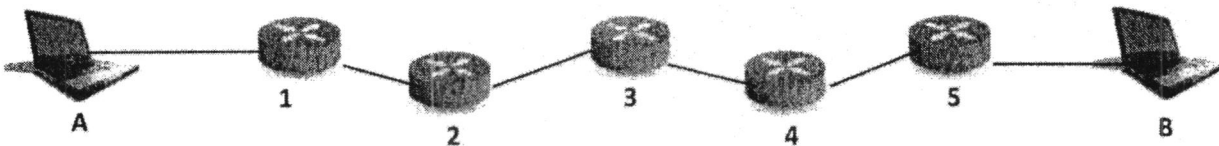
a. Network Layer
b. Datalink Layer
c. Transport Layer

Q.4 (a) What is encoding and decoding in a communication system? Give examples of different types of digital encoding schemes. [3+5]

(b) Suppose you wish to transmit your student ID number over some form of wired medium. First you will need to convert your student ID from decimal to binary representation. Let the student ID be 109. Using clearly labeled diagrams, show an encoding of your student ID using,

a. an NRZ-I encoding [4]

b. a Manchester encoding [4]

c. a bipolar-AMI encoding [4]

Q.5 Which two services are provided by the Transport layer for host-to-host delivery of segments? Explain in detail the characteristics of both and differentiate them with respect to the application layer protocols that they are used for. [2+5+5]

NOTE: Attempt any FIVE Questions in all while Question No. 1 is compulsory.
All questions carry equal marks.

Question 1: (20 marks)

Explain the following concepts with examples. **(Compulsory Question)**

A. Aggregation
B. Use Case Instance
C. Domain Model Entity
D. Inheritance
E. Linear Process Model

Question 2: (20 marks)

Define "Iterative Process Model"? Use an example to explain you answer? Also write advantages and disadvantages of the Model?

Question 3: (20 marks)

Write a short note on "Requirement Recording" of Requirement Engineering models?

Question 4: (20 marks)

Write names of four UML diagrams? Define and explain Domain Model Diagram in detail with suitable example?

Question 5: (20 marks)

Carefully consider the following table of Domain Model Entities and draw a Domain Model Diagram based on them. Also apply relationships and cardinality in the diagram?

SR#	Entity Name	Entity Description
1	User	Makes Payment and views Invoice/Receipt
2	Payment	The amount paid for Order/Invoice
3	Invoice	Contains information on Order placed by the User
4	Cashier	Checks Payment and creates Receipt/Invoice
5	Receipt	Contains information on Payment made by the User

Question 6: (20 marks)

Define "Grey-Box" software testing technique from Software Testing Techniques in detail with suitable example?

Question 7: (20 marks)

Write names of GRASP patterns? Define the role of CONTROLLER with suitable example in detail?

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Question # 2.   **[10 + 10 = 20 Marks]**

   a. Write down a program that will get a number 'x' from user and display the first 'x' multiples of that number in a file.

   b. Write a program that takes a string as command line argument and tells the number of words in it.

Question # 3.   **[20 Marks]**

A client wants to know the multiples of any number.

So, for this purpose, you have to make a server-client application, in which client sends a number to server and server responds it with first 10 multiples of that number.

(Do your task with serialization method in which either you can use built-in class Integer or make your own integer class).

For example:

Client sends message to server: 4

Server response: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40

Question # 4.   **[5 x 4 = 20 Marks]**

   a. In which scenarios, multi-level inheritance is allowed in java?
   b. What are the benefits of Threads?
   c. What is the purpose of transient keyword?
   d. Differentiate package and public access modifiers.

Question # 5.   **[5 x 4 = 20 Marks]**

   a. Elaborate the life cycle of Java Servlets.
   b. How can we take benefit by using AJAX in our web application?
   c. What do you meant by Session Handling?
   d. What is the difference between Forward and Include Request Dispatcher?

Question # 6.   **[5 + 15 = 20 Marks]**

   a. How can we differentiate the Send-Redirection and Request Dispatcher?
   b. Write a JSP page, which will dynamically create a table with CORONA Information stored in the database. Table contains 4 columns i.e. Country_Name, Total_Cases_Count, Recovered_Cases_Count and Death_Cases_Count.

DB Name: Database

Table name: CORONA [country_name(varchar(50), new_cases_count(int),
                recovered_cases_count(int), death_cases_count(int)
        ]

Question # 7.   **[10 + 10 = 20 Marks]**

   a. What do you meant by CSS page? How CSS helps other web pages? Explain your concept precisely.
   b. Write a JavaScipt function prime(no), if no. is prime display "Prime Number" as alert otherwise display "Not Prime Number" as alert.

UNIVERSITY OF THE PUNJAB

B.S. in Computer Science Fourth Year : Annual – 2021

Subject: Internet Programming
Paper: 21

Time: 30 Min. Marks: 20

Roll No. in Fig. ....

Roll No. in Words. ....

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.
Division of marks is given in front of each question.
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Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x2= 20)

1. Super keyword can be used for calling constructor of parent class.
   a. True
   b. False

2. request is the implicit object of HttpServletRequest in JSP.
   a. True
   b. False

3. In CSS which type of styles has lowest priority?
   a. Internal Style Sheets
   b. Inline Styles
   c. External Style Sheets
   d. All has same priority

4. Navigator object in JavaScript, is used for _____.
   a. Maintaining web page
   b. Defining the path in web documents
   c. Detecting the browser information
   d. None of these

5. A technique used for getting information from server without refreshing the web page is known as _____.
   a. Request Dispatcher
   b. Request Re-direction
   c. Asynchronous JavaScript and XML
   d. Synchronous JavaScript and XML

6. In java, _____ is an Immutable Object.
   a. int
   b. double
   c. String
   d. None of these

7. In java, _____ keyword is used for constants.
   a. this
   b. super
   c. final
   d. None of these

8. Load of destructors are managed by _____ in Java.
   a. User
   b. Programmer
   c. JVM
   d. Anyone from above can handle it

9. Only _____ operator is overloaded in java.
   a. *
   b. |
   c. +
   d. &

10. We can write multiple constructors.
   a. True
   b. False

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

NOTE: *Attempt any FOUR questions. All questions carry equal marks.*

Q.2. Perform Alpha-beta-pruning [heuristics in games] to the given game-tree. Also list the utility value for max-player given the tree. **[Marks distribution 16 + 4 = 20]**
[In the given tree, simple triangle denotes max-player move while inverted triangle represents min-player move.]
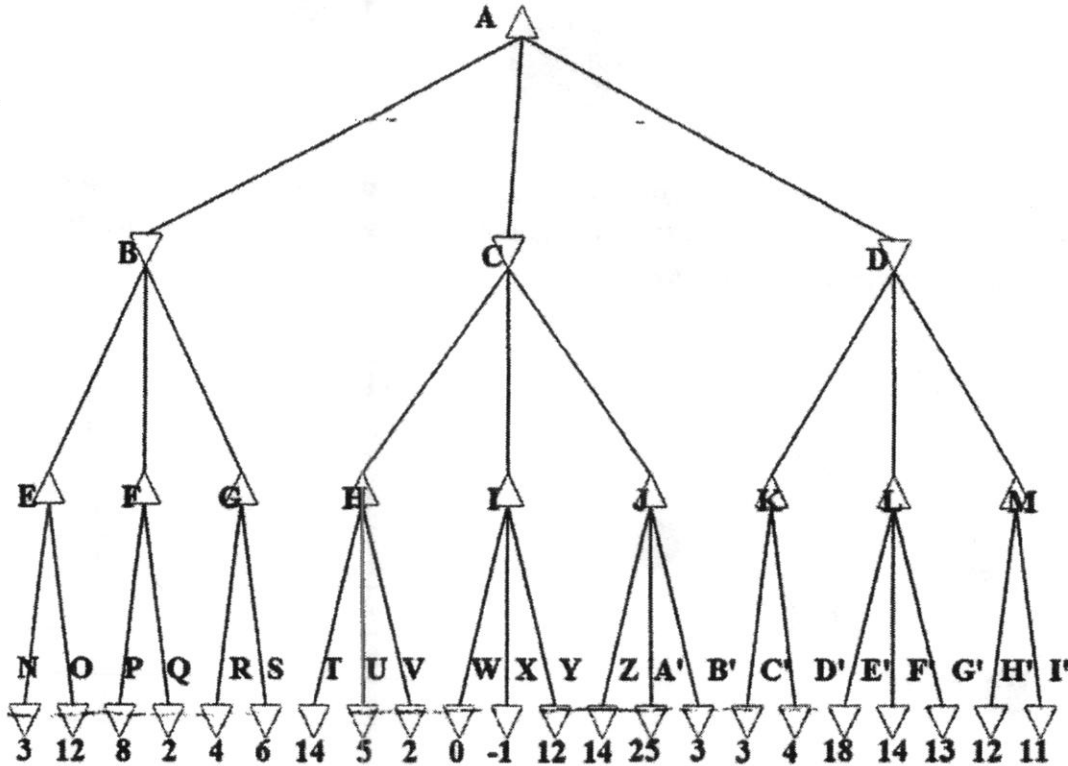
Q.3. Calculate entropy and information gain for each attribute provided in the given table, where last column represents the class to be predicted. **[Marks distribution 5 + 5 + 5 + 5 = 20]**

Student	Reviews	Age	Income	Buys_Tablet?
No	Fair	<=10	High	No
No	Fair	<=10	Medium	No
Yes	Fair	10	Low	Yes
No	Fair	>20	Medium	Yes
Yes	Fair	>20	Low	Yes
Yes	Excellent	>20	Low	No
Yes	Excellent	11...20	Low	Yes
Yes	Excellent	<=10	Medium	Yes
No	Excellent	11...20	Medium	Yes
Yes	Fair	>10	Medium	Yes
No	Excellent	>20	Medium	No
No	Excellent	<=10	High	No
Yes	Fair	11...20	High	Yes
No	Fair	11...20	High	Yes

Q.4. Run a single execution of forward propagation and backward propagation on the given neural network. Actual output is zero. Assume sigmoid function as activation function on all neurons that is given below. **[Marks distribution 5 + 15 = 20]**

$$\sigma(x) = \frac{1}{1+e^{-x}}$$
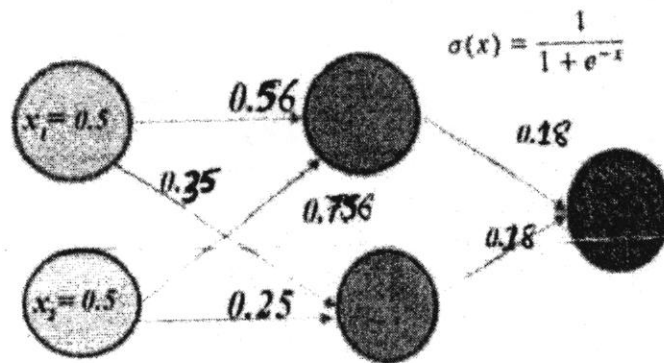
Q.5. Use the following graph and apply **BFS, DFS and A*** on it. Heuristic function values are provided in table separately. Run A* using both heuristics mentioned and discuss which heuristic function is better and why. **[Marks distribution 4 + 4 + 6+ 6 = 20]**
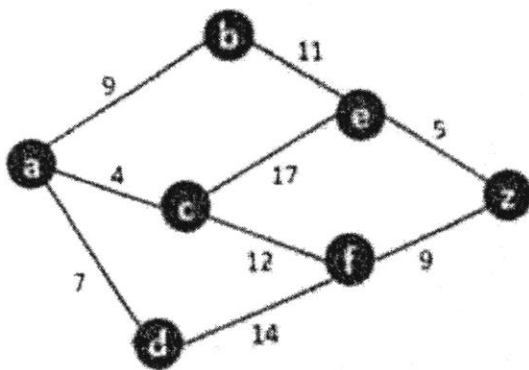
Nodes	h1	h2
a	21	10
b	14	7
c	18	7
d	18	2
e	5	1
f	8	1
z	0	0

Q.6. Suppose a genetic algorithm uses chromosomes x of the form **x = a b c d e f g h i** with a fixed length of **nine genes.** Each gene can have any digit value between 0 and 9. Let the fitness value of an individual chromosome x be calculated with the following **fitness function:**

f(x) = (a + b) – (c + d) + (e + f) – (g + h * i)

and let the initial population consist of four individuals with the following chromosomes:

x1 = 5 5 4 1 3 5 3 2 1   x2 = 6 7 1 2 6 6 0 1 0   x3 = 9 3 9 2 1 2 8 5 0   x4 = 0 1 8 5 2 0 9 4 1

With this information, perform the following operations: **[Marks distribution 12 + 5 + 3 = 20]**

   i.   Calculate the fitness value and perform evaluation on each chromosome using the provided fitness function.

   ii.   Also perform two-point crossover after cut-points 2 and 4 using the two fittest chromosome genes.

   iii.   Lastly, perform mutation on x4 by mutating gene at location 5 with the value of 8, and calculate its fitness.

Q.7. Answer the following questions briefly. **[Marks distribution 10+10 = 20]**

   i.   When should we apply backward-chaining and forward chaining? Explain the difference between the two.

   ii.   Explain the following concepts with examples:

      a. Entropy

      b. Dempster-Shafer theory of evidence in Fuzzy logic

UNIVERSITY OF THE PUNJAB

B.S. in Computer Science Fourth Year : Annual – 2021

Subject: Artificial Intelligence

Paper: 20

Time: 30 Min. Marks: 20

Roll No. in Fig. ....

Roll No. in Words. ....

....

Signature of Supdt.:

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Q.1.   Encircle the right answer cutting and overwriting is not allowed. (10x2= 20)

1. Data driven search is also called:
   a. Forward chaining
   b. Backward chaining
   c. Data-oriented search
   d. None of the mentioned

2. Plausibility can range from:
   a. –1 to 1
   b. -∞ to ∞
   c. 0 to 1
   d. None of the mentioned

3. Use of knowledge in the Meta-Dendral can be qualified as an example of:
   a. Deductive learning
   b. Inductive learning
   c. Both of the mentioned
   d. None of the mentioned

4. Evaluation of knowledge representation languages can be performed using the dimension of:
   a. Expressiveness
   b. Efficiency
   c. Both of the mentioned
   d. None of the mentioned

5. Artificial intelligence is concerned with organizing large and varied amounts of knowledge than implementing a single, well-defined algorithm than. This statement is:
   a. True
   b. False

6. _____ is the study of the ways in which language is used and its effects on the listener.
   a. Morphology
   b. Phonology
   c. Semantics
   d. None of the mentioned

7. successor (X, Y) :- Y is X + 1: the answer for ?- successor (4,3) will be?
   a. Yes
   b. No
   c. Error
   d. Failure

8. ? member(X, [b, a, c)), the answer to the query will be?
   a. X=a
   b. X=b
   c. X=c
   d. Yes
   e. No
   f. All three a,b,c
   g. Both b and d

9. _____ provides ease while manipulating expressions written in the language syntax in both LISP and PROLOG.
   a. Meta-interpreters
   b. Expression Manipulator
   c. Expression Generator
   d. Expression Synthesizer

10. Artificial intelligence is concerned with quantitative rather than qualitative problem solving. This statement is:
    a. True
    b. False