

2018

COMPUTER APPLICATION**Paper : MCA-401****(Computer Graphics)**

Full Marks : 70

Time : 3 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in
their own words as far as practicable.*Answer any **five** questions.

1. a) Describe Bresenham's Line drawing algorithm for positive slope less than 1.
- b) A line is to be drawn on the screen starting from (5, 4) to (10, 8) using the above line drawing algorithm, find out which pixels would be needed to show on the screen. 7+7
2. a) Define a pivot point and derive an expression for pivot point rotation of a two dimensional object.
- b) Explain homogeneous co-ordinate representation.
- c) Derive a matrix of pivot point rotation in a

[Turn over]

clockwise direction and apply the rotation matrix to the triangle ABC, where the coordinates of ABC are A = (2, 3), B = (7, 5), and C = (0, 0). Consider the angle of rotation 90 degrees and pivot point is (1, 1). Sketch the transformed figure. 4+3+7

3. a) What is clipping?
b) Explain the acceptance and rejection test using bit codes in the Cohen-Sutherland line clipping algorithm.
c) List the steps of the algorithm. 2+5+7

4. a) Describe the scan-line algorithm for scan-conversion of polygons.
b) Explain aliasing vs. anti-aliasing effects with suitable illustration.
c) Suppose you are given coordinates (x, y) of N successive vertices of a polygon and a scan line $Y = c$, where c is a constant. Devise an algorithm which will output the polygon edges which are intersected by the scan line.

6+3+5

5. a) What do you understand by a projection?
b) What are the different types of projection?

- c) Generate a homogeneous matrix representation for orthogonal projection and oblique projection of coordinate position $P(x, y, z)$ onto the xy-plane. 2+5+7
6. a) Explain mid-point ellipse drawing algorithm to find points present in the first octant of an ellipse.
- b) Explain Weiler-Atherton polygon clipping algorithm and state its advantage over the Sutherland-Hodgeman polygon clipping algorithm. 7+7
7. Explain the followings: (any two) 7+7
- a) LCD displays vs. CRT displays
 - b) B-spline curves vs. Bezier curves
 - c) Reflection of a point object about a line
 $y = x+2$
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2018

COMPUTER APPLICATION**Paper : MCA-402****(Java & Web Technology)**

Full Marks : 70

Time : 3 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in
their own words as far as practicable.*Answer **Q.No. 1** and any **four** from the rest.1. Answer any **five** questions: $2 \times 5 = 10$

- a) What is static variable?
- b) What is byte code in the context of Java?
- c) How does Java implement platform independence?
- d) State the difference between a class member and an instance member.
- e) What is adapter class?
- f) What is user-defined exception?
- g) What is the advantage of importing a package?

[Turn over]

- h) What is thread priority?
2. a) State the main differences between Java platform and other platforms.
- b) Explain polymorphism with suitable example.
- c) Write a program to take three integers as input and print the largest among them. 5+5+5
3. a) Differentiate between final, finally and finalize keyword.
- b) What are checked and unchecked exceptions? Explain with proper examples.
- c) Write a program that welcomes a person whose name is passed to as a parameter. Write the exception handling code to handle the case when no name is passed to the application.
- 5+4+6
4. a) What do you mean by constructor overloading? Give suitable example.
- b) Write a program by creating objects to calculate the volume of a box by passing parameters.
- c) Create a Java program that will search an element from an array. 3+6+6

5. a) Explain *for-each* statement in Java with example.
- b) Define a package.
- c) Discuss the various levels of access protection available for packages and their implications.
- d) Why Dynamic method dispatch is used in Java?
Explain the mechanism with suitable example.

3+2+5+5

6. a) What is a thread?
- b) What is the difference between Runnable state and Running state of the thread?
- c) What are the different identifier states of a thread?
- d) Write a program using thread to show deadlock.

2+2+6+5

7. a) What are the attributes of applet tag?
- b) Differentiate between Java application and Java applet.
- c) Explain any four controls supported by AWT.

4+3+8

2018

COMPUTER APPLICATION**Paper : MCA-403****(Computer Networks)**

Full Marks : 70

Time : 3 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer Q.No. 1 is **Compulsory** andany **four** from the rest.1. Answer in short (any **seven**): $2 \times 7 = 14$

- a) What is routing? What can be probable path costs for any network?
- b) What are top level domains servers and authoritative domain servers?
- c) Name the different layers of ISO-OSI model.
- d) What is the minimum-width channel that could possibly transmit 80 Kbps in the presence of a signal-to-noise ratio of 15:1?

- e) What is meant by topology? Name four topologies used in modern day network.
- f) Give the range of Class B and Class D IPv4 address.
- g) Give two examples of application layer protocols with their port numbers.
- h) Compute the checksum of the words: 1011010011101000, 0110111011000111 and 1110011100111000.
- i) Give difference on how Go-back-N and selective repeat handles acknowledgement.
2. a) Name the layers in TCP/IP protocol. How does the layers of TCP/IP matches with ISO-OSI model?
- b) Explain the functions of session layer and presentation layer of ISO-OSI model.
- c) What are the advantages of UDP over TCP?
Draw a neat figure showing UDP frame format and explain its different fields.
- d) What does the following codes in HTTP protocol stand for: 200, 400, 301, 404?

4+4+4+2

3. a) Explain the Amplitude shift keying (ASK) and frequency shift keying (FSK) for modulation of signals to transmit digital data with analog signals.
- b) We need to send 265 kbps over a noiseless channel with a bandwidth of 20 kHz. How many signal levels do we need?
- c) Draw the digital waveform corresponding to the NRZ-L, NRZI, Manchester, Differential Manchester, Bipolar AMI encoded version of this sequence of 0s and 1s. 00110101.
- d) What information does Shannon capacity and Nyquist theorem gives with respect to signals? 4+3+5+2
4. a) Explain the connection establishment and termination in TCP protocol.
- b) Explain ARP and RARP protocols of IP layer.
- c) What is the difference between public and private key encryption? Give the algorithm of RSA encryption and decryption technique.
- d) What is broadcast and loopback address? 4+4+4+2

5. a) Suppose a receiver using the CRC generator polynomial x^4+x^2+1 receives the sequence of bits 010010101101. Were they received correctly? If so, what was the transmitted message? If not, can you tell how many bit errors occurred? Show your work.
- b) What are bridges, routers, hub and switch with respect to Network layer of ISO-OSI model?
- c) Explain the working of Virtual Circuit for packet switching.
- d) What is routing? Explain the different fields of routing table. 4+4+4+2
6. a) What are the services provided by Link Layer?
- b) Explain the working of Selective Repeat ARQ with a diagram.
- c) Suppose two stations are using CSMA/CD protocol for sharing the media, How does the stations coordinates to share the media.
- d) What is the use of framing? Explain the Byte oriented and Bit oriented framing.

2+4+4+4

7. Write short notes on any **two**: $7 \times 2 = 14$

- a) Guided and Unguided media of transmission
 - b) TCP/IP protocol
 - c) Link state routing
 - d) Different component of e-mail services
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2018

COMPUTER APPLICATION

Paper : MCA-404

(Software Engineering)

Full Marks : 70

Time : 3 Hours

The figures in the right-hand margin indicate marks.

*Candidates are required to give their answers in
their own words as far as practicable.*

Answer any **seven** questions.

1. a) Draw a diagram for pure waterfall life cycle.
- b) Explain the different phases involved in waterfall life cycle. $2+8=10$
2. a) What is feasibility study? What are the contents we should contain in the feasibility report?
- b) What is data modelling? Give five examples for data modelling. $(2+3)+(2+3)=10$
3. a) What is user acceptance testing? Explain different testing in user acceptance testing.

[Turn over]

- b) What are functional and non-functional requirements?
- c) Explain the steps involved in the prototyping.

$$3+2+5=10$$

4. a) What is cardinality? Give examples.
- b) What is generalization? Give an example of generalization.
- c) Define Software Engineering. $3+5+2=10$

5. a) What is process framework?
- b) What are the Generic Framework Activities?
- c) Define Stakeholder.
- d) How the Process Model differ from one another? $2\frac{1}{2} \times 4 = 10$

6. a) What are the drawbacks of RAD Model?
- b) Why formula Methods are not widely used?
- c) What is cross Cutting Concerns?
- d) What are the different phases of Unified Process? $2\frac{1}{2} \times 4 = 10$

7. a) Define the terms:
- i) Agility
- ii) Agile Team

- b) What is the use of Process Technology Tools?
c) Define the term Scripts.
d) What is the objective of the project planning process? $2\frac{1}{2} \times 4 = 10$

8. a) What are the Decomposition Techniques?
b) What is an Object Point?
c) What is the difference between the "Known Risks" and "Predictable Risks"?
d) List out the basic principles of software Project Scheduling. $2\frac{1}{2} \times 4 = 10$

9. a) What are objective of Requirement Analysis?
b) What are the two additional feature of Hayley Pribhai Model?
c) Define System Context Diagram (SCD).
d) Define System Flow Diagram (SFD).

$$2\frac{1}{2} \times 4 = 10$$

10. a) What are objective of Requirements Engineering Process Functions?
b) What are two Baseline Criteria in SCM?
c) Define Status Reporting.

- d) What is the origin of changes that are requested for software? $2\frac{1}{2} \times 4 = 10$
11. a) How do you define Software Quality?
- b) Define the terms:
- i) Quality of Design
 - ii) Quality of Conformance
- c) Define Software Reliability.
- d) What are the factors of Software Quality?
- $2\frac{1}{2} \times 4 = 10$

2018

COMPUTER APPLICATION

Paper : MCA-405

(Artificial Intelligence)

Full Marks : 70

Time : 3 Hours

The figures in the right-hand margin indicate marks.

*Candidates are required to give their answers in
their own words as far as practicable.*

Illustrate the answer wherever necessary.

Answer any **seven** questions.

- ✓1. a) What are the features of intelligence? What are the limitations of human intelligence?
- b) Describe Turing test for judging the intelligence of a machine. (4+2)+4
- ✓2. a) What do you understand by a task environment? Differentiate between the following environments with example:
- i) Fully observable vs. partially observable
 - ii) Discrete vs. continuous

b) What is state-space model of a search problem? Design the state-space model for the traveling salesman problem.

(1+2+2)+(2+3)

3. a) What is meant by optimality and completeness of a search algorithm?

b) Determine the time and space complexities of Depth-first search and Iterative deepening search. Comment on their optimality and completeness.

2+(4+4)

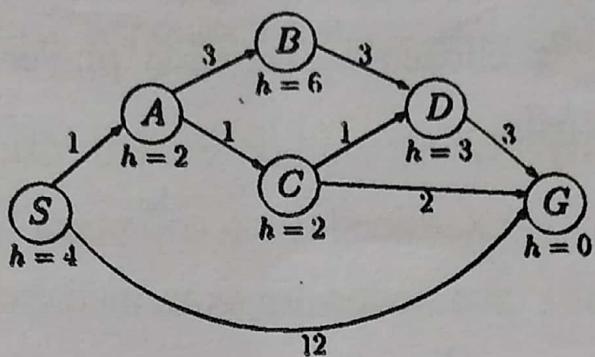
4. a) When is a heuristic called admissible? Illustrate with example, two admissible heuristic functions for *missionaries and cannibals* problem. What is the domination relationship among them?

b) Prove that every consistent heuristic is also admissible.

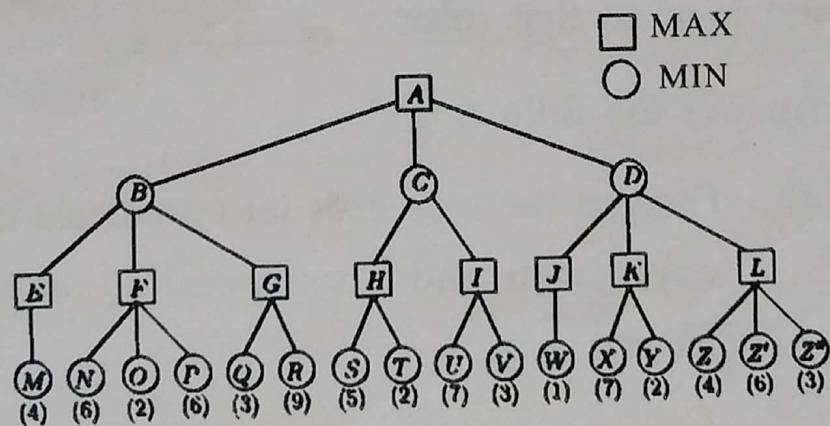
(1+4+1)+4

5. a) Consider the following directed weighted graph. Nodes S and G represent the source node and the goal node, respectively. The heuristic function (h) value are given for each node. Apply A* search on this graph to find the path from start to goal node. Show the

search tree and the states evaluated. Mark the path on the search tree.



- b) Prove that A* search always returns optimal path to goal provided the used heuristic function is admissible. 6+4
6. a) What is adversarial search? Design a heuristic evaluation function which can be used by a MAX player (who starts the game with 'x') in tic-tac-toe game with example.
- b) Consider the following game tree in which the heuristic evaluation scores (in brackets) are all from the first player's (MAX) point of view.



11. Write short notes on the following (any **two**):

$$5 \times 2 = 10$$

- a) Gradient descent search
 - b) Resolution refinement strategies
 - c) Horn clauses
 - d) Standard fuzzy membership functions
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