Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

Roll No. | | | | | | | |

(In figures as per admission card)

Roll No. _____

(In words)

Test Booklet No.

D–8705

PAPER–III
COMPUTER SCIENCE AND APPLICATIONS

Time : 2½ hours] **[Maximum Marks : 200**

Number of Pages in this Booklet : **40** Number of Questions in this Booklet : **26**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. Answers to short answer/essay type questions are to be given in the space provided below each question or after the questions in the Test Booklet itself.

   No Additional Sheets are to be used.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
   (i) To have access to the Test Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the question booklet will be replaced nor any extra time will be given.**
4. Read instructions given inside carefully.
5. One page is attached for Rough Work at the end of the booklet before the Evaluation Sheet.
6. If you write your name or put any mark on any part of the Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
7. You have to return the Test booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
8. **Use only Blue/Black Ball point pen.**
9. **Use of any calculator or log table etc. is prohibited.**
10. **There is NO negative marking.**

परीक्षार्थियों के लिए निर्देश

1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. लघु प्रश्न तथा निबंध प्रकार के प्रश्नों के उत्तर, प्रत्येक प्रश्न के नीचे या प्रश्नों के बाद में दिये हुये रिक्त स्थान पर ही लिखिये।

   इसके लिए कोई अतिरिक्त कागज का उपयोग नहीं करना है।
3. परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी। पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा उसकी निम्नलिखित जाँच के लिए दिये जायेंगे जिसकी जाँच आपको अवश्य करनी है :
   (i) प्रश्न-पुस्तिका खोलने के लिए उसके कवर पेज पर लगी सील को फाड़ लें। खुली हुई या बिना स्टीकर-सील की पुस्तिका स्वीकार न करें।
   (ii) **कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चैक कर लें कि ये पूरे हैं। दोषपूर्ण पुस्तिका जिनमें पृष्ठ / प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें। इसके लिए आपको पाँच मिनट दिये जायेंगे। उसके बाद न तो आपकी प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा।**
4. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
5. उत्तर-पुस्तिका के अन्त में कच्चा काम (Rough Work) करने के लिए मूल्यांकन शीट से पहले एक पृष्ठ दिया हुआ है।
6. यदि आप उत्तर-पुस्तिका पर अपना नाम या ऐसा कोई भी निशान जिससे आपकी पहचान हो सके, किसी भी भाग पर दर्शाते या अंकित करते हैं तो परीक्षा के लिये अयोग्य घोषित कर दिये जायेंगे।
7. आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और इसे परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
8. **केवल नीले / काले बाल प्वाईंट पैन का ही इस्तेमाल करें।**
9. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
10. **गलत उत्तर के लिए अंक नहीं काटे जायेंगे।**

COMPUTER SCIENCE AND APPLICATIONS

PAPER – III

NOTE: **This paper is of two hundred (200) marks containing four (4) sections. Candidates are required to attempt the questions contained in these sections according to the detailed instructions given therein.**

SECTION - I

Note : This section contains five (5) questions based on the following paragraph. Each question should be answered in about thirty (30) words and each carries five (5) marks.

(5x5=25 marks)

A BLOOD BANK CENTRE is in the heart of the city having a good reputation and so enjoys a continuous service day and night. At the front counter, details on stock status of blood, issue details and information about donors is readily made available to anxious relatives as and when they require.

The donors donate in another section of the Center-Section 'D'. The blood is collected in 1-liter bottles, which are sent to the laboratory for investigation. After various tests, the blood is either accepted or discarded. If accepted, the donor is paid as per blood group. Each blood group has a pre-determined price. These bottles are then sealed and sent for proper storage to another section. Inventory of different blood group types is maintained. If bottle reach a minimum pre- defined level, a replacement order is made and sent to section 'D' then the various donors are contacted from a donor database for immediate action.

New donors too are accepted regularly. Each donor is given an identity card and is called for monthly check up free of charge.

As a System Analyst, design the following :

1. Entity Relationship Diagram.

2. Physical Data Flow Diagram.

3. File Design.

4. Indexing.

5. State Transition Diagram.

SECTION - II

Note : This section contains fifteen (15) questions each to be answered in about thirty (30) words. Each question carries five (5) marks.

(5x15=75 marks)

6. What is the purpose of Interrupt Flag (IF) and Trap Flag (TF).

7. Describe the purpose of normalizing data and also list out the dependencies involved in the process of normalization.

8. What are distributed database design issues ?

9. Explain the terms : Refresh rate, Aspect ratio, Resolution.

10. Explain the need to overload the assignment operator.

11. Consider the following grammar G(S) :

$S \rightarrow AB$

$A \rightarrow aAb/ab$

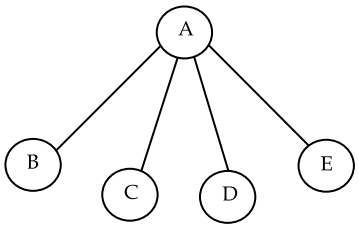
$B \rightarrow cBd/cd$

Find L(G(S)).

12. What are the advantages of using UDP over TCP ?

13. Transport bridges are always superior to source routed bridges, Justify.

14. Convert the following tree to Binary tree representation :



15. Describe how a validating parser is different from a non-validating parcer.

16. Differentiate between software verification and validation.

17. Give examples of the use of threads in a single user multiprogramming system.

18. If a process exits and there are still threads of that process running, will they continue to run ? Justify your answer.

19. Write AO* search algorithm.

20. Can we increase reliability through testing ? Comments.

SECTION - III

Note : This section contains five (5) Electives. The candidate has to choose one Elective and has to answer all the five questions from that Elective. Each question carries twelve (12) marks and is to be answered in about two hundred (200) words.

(12x5=60 marks)

Elective - I

21. Distinguish between the following : **(3x4=12)**

(a) DFA and NFA

(b) type-o and type-1 grammer

(c) NPDA and DPDA

22. Convert the following grammer to CNF **(12)**

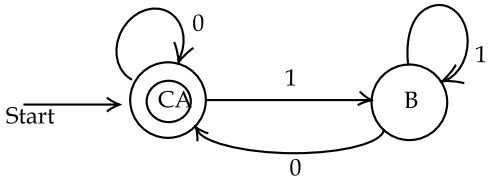
$S \rightarrow bA/aB$

$A \rightarrow bAA/aB/a$

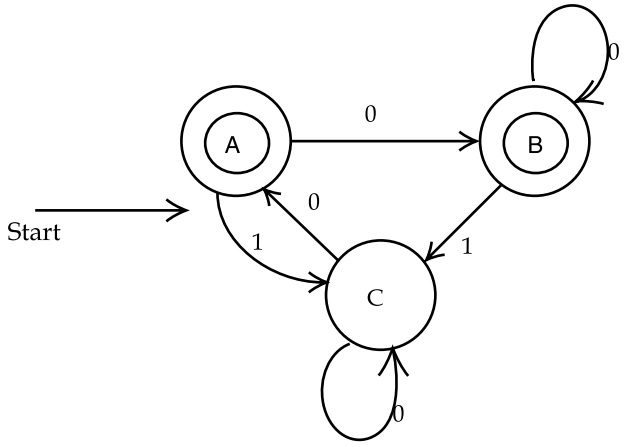
$B \rightarrow aBB/b\ S/b$

23. Give the Regular expressions of the following DFA'S. **(12)**

(i)



(ii)



24. Write context free grammer (CFG) which defines the language L, given by : **(12)**

$(a + b)^*$ bbb $(a + b)^*$

25. Construct a TM for a language $L = \{a^m b^n / m \geq n, n \geq 1\}$ **(12)**

OR

Elective - II

21. If w = 00110 is received over a BSC with P = 0.98, which of the following codwords, 01101, 10100,10101 was the most likely one sent ? Justify your result. **(12)**

22. Code a Codword C={000, 111}, prove that it can correct the error pattern $\cup$ = 010, but cannot correct the error pattern $\cup'$ = 110. **(12)**

23. A secondary storage media contains information in files with different formats. The frequency of different types of files is as follows : **(12)**

Exe (20), bin (75), bat (20), jpeg (85), dat (51), doc (32), sys (26), c (19), cpp (25), bmp (30), avi (24), prj (2g), lst (35), zip (37).

Construct the Huffman Code for this.

24. Explain how fourier transformation can be used for image restoration. **(12)**

25. Explain any one technique for sound compression. **(12)**

OR

Elective - III

21. Define : Slack variables, Surplus variables, Basic solution, Basic feasible solution, Optimal solution. **(12)**

22. Solve the following LPP by two-phase method. **(12)**

Min $Z = x_1 - 2x_2 - 3x_3$

S.t. $-2x_1 + x_2 + 3x_3 = 2$

$2x_1 + 3x_2 + 4x_3 = 1$

$x_1, x_2, x_3 \geq 0$

23. Solve the following transportation problem by matrix minima method. **(12)**

	D_1	D_2	D_3	D_4	Supply
S1	19	20	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

24. Explain Max-Flow, Min-cut theorem with example. **(12)**

25. Use the wolf's method to solve the following problem : **(12)**

Max $Z = 2x_1 + x_2 - x_1^2$

S.t $-2x_1 + 3x_2 \leq 6$

$2x_1 + x_2 \leq 4$

$x_1, x_2 \geq 0$

OR

Elective - IV

21. State perceptron learning Law. Write down on algorithm for perceptron network. (perception network). **(12)**

22. Explain with examples, the concept of generalization in feed forward Neural Network. **(12)**

23. What are desirable properties of activation function ? List the properties of sigmodial and tan hyperbolic functions. **(12)**

24. List out different methods of membership value assignments and explain each of them in brief with appropriate schematics for membership function. **(12)**

25. Discuss possibility distributions as fuzzy sets. **(12)**

OR

Elective - V

21. Write a program for echo server using thread and sockets. **(12)**

22. List any four important files of Unix Kernel and explain functions of each. **(12)**

23. What is multithreading ? Explain how thread synchronization can be achieved using events. **(12)**

24. Distinguish between model and modeless dialogs. Give the sequence of steps to be followed to create nodel dialog application. **(12)**

25. Compare in detail the Runtime behaviour of Dos and Windows. **(12)**

SECTION - IV

Note : This section consists of one question carrying (40) marks.

(40x1=40 marks)

26. For each of the following schedules, state whether the schedule is serializable, conflict serializable, view serializable, recoverable and whether it avoids cascading aborts :

(I) read (T_1, bal_x), read (T_2, bal_x), write (T_1, bal_x) write (T_2, bal_x), commit (T_1), commit (T_2)

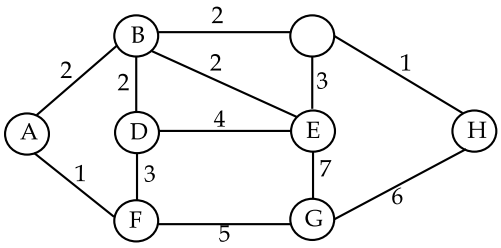
(II) read (T_1, bal_x), write (T_2, bal_x), write (T_1, bal_x), abort (T_2), commit (T_1)

(III) read (T_1, bal_x), write (T_2, bal_x), write (T_1, bal_x), read (T_3, bal_x), commit (T_1), commit (T_2), commit (T_3)

Draw a precedence graph for the above.

OR

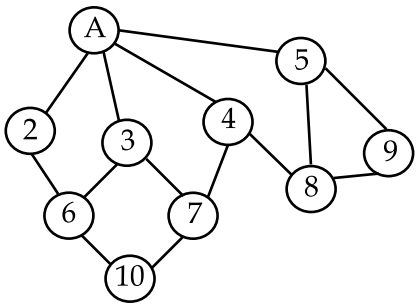
What is meant by centralised routing ? What is the role of routing control centre (RCC) ? What are the drawbacks of centralised routing algorithms ? Apply the Bellman-Ford's and DijKestra's algorithms to find the shortest path from A to G in the network shown here.



Will Bellman-Ford and DijKstra's algorithms always yeild the same solutions ? Why or why not ?

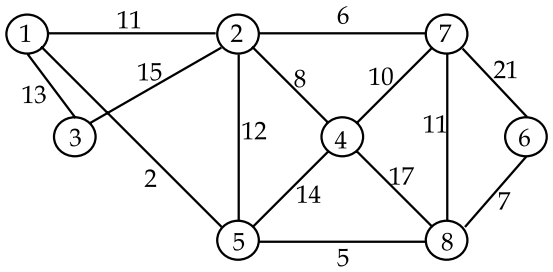
OR

(a) Give all stages of BFS and DFS on the graph **(13)**



(b) Explain divide and conqure strategy. Devise binary search algorithm using this strategy. State it's time complexity. **(13)**

(c) What is minimum spanning tree ? Apply Prim's and Kruskals algorithm to obtain minimum spanning tree of the graph. **(14)**



OR

What is Heuristic function ? How its helps in searching ? You are given two jugs, a 4 - gallon one and a 3 - gallon one. Neither has any measuring marks on it. There is a Pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4 - gallon jug ? **(40)**

FOR OFFICE USE ONLY							
Marks Obtained							
Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

Total Marks Obtained (in words) .....

(in figures) .....

Signature & Name of the Coordinator .....

(Evaluation) Date .....