M 18997

Reg. No. : .....

Name : .....

VIII Semester B.Tech. (Reg./Sup./Imp.) including Part-Time Degree Examination, April 2011
(2007 Admn.)
2K6CS801 : OPERATIONS RESEARCH

Time: 3 Hours Max. Marks : 100

1. A) Compute A_x, where $A = \begin{bmatrix} 2 & 3 & 4 \\ -1 & 5 & -3 \\ 6 & -2 & 8 \end{bmatrix}$ and $x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$. **5**

B) Find a basis for the null space of the matrix

$$A = \begin{bmatrix} -3 & 6 & -1 & 1 & -7 \\ 1 & -2 & 2 & 3 & -1 \\ 2 & -4 & 5 & 8 & -4 \end{bmatrix}$$ **5**

C) Three nutrient components, namely thiamine, phosphorus and iron are found in a diet of two food items 'A' and 'B'. The amount of each nutrient in each of the foods (in mg / found ie. mg/lb) in given below :

	A	B
Thiamine	3.0 mg/lb	2.0 mg/lb
Phosphorus	15.0 mg/lb	34.0 mg/lb
Iron	26.0 mg/lb	22.0 mg/lb

The cost of food 'A' and 'B' is Rs. 12/pound and Rs. 17.00 per pound respy. The minimum daily requirements of these nutrients are atleast 10 mg of thiamine, 75 mg of phosphorus and 100mg of iron. Formulate this as a linear programming problem. **5**

P.T.O.

D) A manufacturing firm has recently discontinued production of a certain product due to unfavorable market conditions resulting in considerable excess production capacity. The firm is planning to utilize this space capacity by increasing the production of the remaining one or more of the existing three products. The recently available capacities, are

Milling capacity : 300 machine hours / day

Lathe capacity : 225 machine hours / day

Grinder capacity : 100 machine hours / day

The numbers of machine hours required for each of the products are :

	Machine hours required		
Machine Type	**Product A**	**Product B**	**Product C**
Milling	12	3	4
Lathe	6	4	1
Grinding	3	1	2

The net profit realised from each of the three products are Rs. 200, Rs. 90 and Rs. 100 from A, B, C respectively. The production manager desires to allocate the available capacities amongst the three products for a maximum profit. Formulate the linear programming problem. **5**

E) Solve the following game by using the principle of eleminance.

		Player B					
		I	**II**	**III**	**IV**	**V**	**VI**
	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
Player A	3	4	3	7	–5	1	2
	4	4	3	4	–1	2	2
	5	4	3	3	–2	2	2

Find the value of the game. **5**

F) What are the methods for obtaining initial basic feasible solution ? Explain North-West corner rule. **5**

G) In a railway marshalling yard, goods train arrives at the rate 30 trains per day. Assume that the inter arrival time follows an exponential distribution and the service time is also to be assumed as exponential with a mean of 36 minutes. Calculate :

a) The probability that the yield is empty.

b) The average length assuming that the line capacity of the yard is 9 trains. **5**

H) A transport company has a single unloading berth with vehicles arriving in a poisson fashion at an average rate of three / day. The unloading time distribution for a vehicle with 'n' unloading workers is found to be exponentially with an average unloading time (1/2) x_n days. The company has a large labour supply without regular working hours and to avoid long waiting lines, the company has a policy of using as many unloading group of workers in a vehicle as there are vechicles waiting in time or being unloaded. Under these conditions, find

a) What will be the average number of unloading group of workers working at any time ?

b) What is the probability that more than 4 groups of workers are needed ? **5**

2. Show that the set 'S' = $\{t^2 + 1, t - 1, 2t + 2)$ is a basis for the vector space 'P_2'. **15**

OR

Find a basis for the solution space of the homogeneous system $(\lambda I_3 - A)\, x = 0$ for $\lambda = -2$ and

$$A = \begin{bmatrix} -3 & 0 & -1 \\ 2 & 1 & 0 \\ 0 & 0 & -2 \end{bmatrix}.$$ **15**

3. A pension fund manager is considering investing in two shares 'A' and 'B'. It is estimated that :

i) Share 'A' will earn a dividend of 12% per annum and share 'B' 4% per annum.

ii) Growth in the market value in one year of share 'A' will be 10 paisa per ₹1 invested and in 'B' 40 paisa per ₹1 invested. It requires to invest the minimum total sum which will give divident income of at least Rs. 600/annum, and growth in one year of at least ₹1000 on the total investment.

You are required to :

a) State the mathematical formulation of the problem.

b) Compute the minimum sum to be invested to meet the manager's objective by using the simple method on the dual problem. **15**

OR

Solve by using simple technique

$$\text{Max } Z = 10x_1 + 6x_2 + 4x_3$$

Subject to $x_1 + x_2 + x_3 \leq 100,$

$10x_1 + 4x_2 + 5x_3 \leq 600,$

$2x_1 + 2x_2 + 6x_3 \leq 300$

$x_1, x_2, x_3 \geq 0$ **15**

4. Solve the game shown below by L.P. method.

	B_1	B_2	B_3
A_1	6	–1	5
A_2	4	0	–4
A_3	1	7	10

15

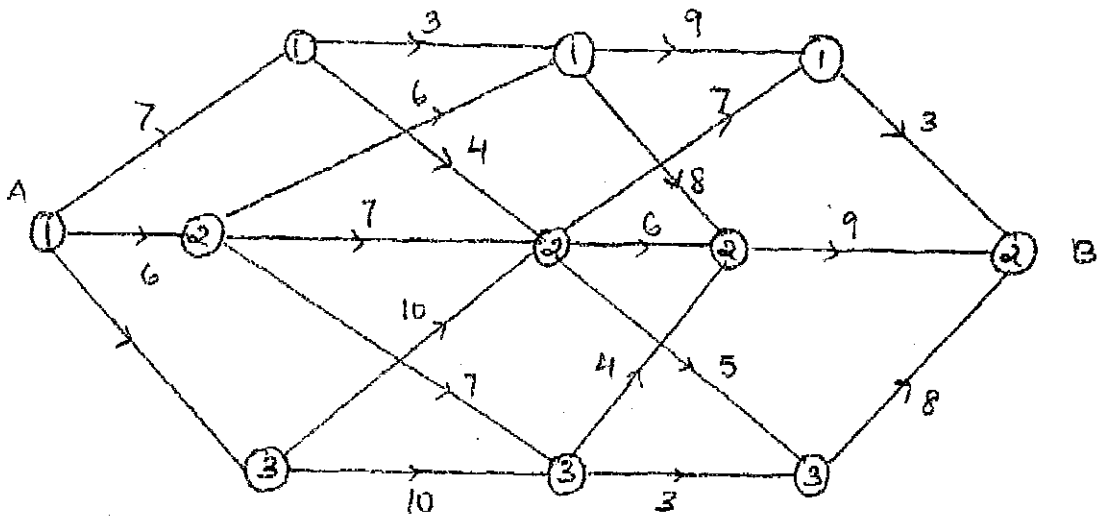
OR

Solve the following assignment problem :

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

15

5. The following figure shows the route map of various branch offices of a company. The marketing executive of the company should like to start from Head Office at 'A' and reach the branch office at 'B' by travelling shortest path and visiting as many as branch offices. Help him to plan his journey by using dynamic programming technique. **15**



OR

In 18th century, when transportation systems were not developed, a family wanted to travel from their home to reach a friend's house in other part of the country. They had a choice of alternative routes and haltages between their home and destination. The costs of travel from each point to the other point on route based on such factors as distance, difficulty, mode of transportation etc, are given below

	1	2	3	4	5	6	7	8	9	10
1	--	7	5	4	--	--	--	--	--	--
2	--	--	--	--	8	3	9	--	--	--
3	--	--	--	--	10	7	6	--	--	--
4	--	--	--	--	4	5	6	--	--	--
5	--	--	--	--	--	--	--	6	8	--
6	--	--	--	--	--	--	--	7	4	--
7	--	--	--	--	--	--	--	3	6	--
8	--	--	--	--	--	--	--	--	--	5
9	--	--	--	--	--	--	--	--	--	4

Find the safest route so that the total travelling cost is minium. **15**

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VIII Semester B.Tech. (Reg./Sup./Imp.) including Part Time Degree Examination, April 2011
(2007 Admn.)
2K6 CS 802 : CRYPTOGRAPHY AND NETWORK SECURITY

Time: 3 Hours Max. Marks : 100

1. i) Describe the GCD algorithm with a numerical example.

   ii) Describe the complete residue system with an example.

   iii) Describe the following substitution techniques :

   a) Playfair cipher

   b) Hill cipher

   c) Polyalphabetic cipher

   d) One-time padding.

   iv) Explain the following attacks on protocols :

   a) Known-key attack

   b) Replay

   c) Impersonation

   d) Dictionary

   e) Forward search.

   v) Explain Diffie-Hellman Key exchange problem.

   vi) Describe Asymmetric Key operation with relevant block diagrams.

   vii) TCP/IP Layers along with a block diagram.

   viii) Describe the SSL handshake protocol message types. **(8×5=40)**

P.T.O.

2. 1) a) State and prove fundamental theorem of arithmetic. **15**

b) Define and explain the theory of congruence with an example.

OR

2) State and prove the Chinese Remainder Theorem. Also explain the theorem with a suitable example. **15**

3. 1) Explain the following cryptographic security primitives : **15**

a) Unkeyed Primitives

b) Symmetric-key primitives

c) Public-key primitives.

OR

2) Explain the following substitution techniques with relevant example : **15**

a) Caesar Cipher

b) Monoalphabetic Cipher.

4. 1) Illustrate the working of RSA algorithm with an example of your own. **15**

OR

2) Describe the following asymmetric key cryptographic algorithms : **15**

a) Rabin cryptosystem

b) Elgamal cryptosystem

c) Elliptic curve crptosystem.

5. 1) a) With a block diagram explain the IP Security Architecture. **15**

b) Describe the applications of IP Security.

OR

2) Describe the following two sub-protocols of SSL : **15**

a) Handshake protocol

b) Record protocol.

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VIII Semester B.Tech. (Regular/Supplementary/Improvement) including Part-Time Degree Examination, April 2011

(2007 Admn.)

COMPUTER SCIENCE

2K6 CS 803 : Artificial Intelligence

Time: 3 Hours Max. Marks: 100

1. Define production system. What are the advantages of production system for AI ?
2. Name and define four categories of a production system.
3. Name and define the approaches of knowledge representations.
4. Name and define each component of script.
5. What is learning ? Write the differences between similarity based explanation based learning.
6. Write a brief note on supervised and unsupervised learning.
7. Write a short note on creating, changing and monitoring the PROLOG environment.
8. Define Prolog and Lisp. Write the differences between them. **(8×5=40)**
9. A) Write a short note on state space representation and explain the terms Goal test, path, initial state and successor function. **7**

   B) Explain forward chaining and backward chaining with a sales person problem example. **8**

OR

P.T.O.

10. A) Write and describe AO* algorithm, using a suitable example.

    B) Define Heuristic and Heuristic functions. Explain the role of Heuristics in search problems. **15**

11. Express the following in predicate logic :

    a) Chaminda was a witch

    b) Marcas was a Pompeian

    c) Marcas was born in 1840

    d) All men are mortal

    e) All pompeians dies in 1879

    f) The volcano erupted in 1879

    g) No mortal live longer than 120 years

    Alive means not dead

    If someone dies, then he is dead at all the time. **15**

    OR

12. A) Explain knowledge representation technique Semantic nets. Write the advantages and disadvantages of semantic network.

    B) Explain the following sentences using semantic nets :

    a) Sita is shorter than Geeta

    b) My chair is green

    c) Ram gave Sita a book

    d) Ram is an accountant

    e) Ram is 6 feet and wears shoes. **15**

13. Explain the general model of the learning process with a neat diagram. Give a detailed explanation of each dimension. **15**

OR

14. A) What is version space and concept space ? Write a brief note on role of generalization and specialization in defining version space.

B) Write candidate elimination algorithm and explain it. **15**

15. Explain how the following abstract data types will be built in PROLOG. **15**

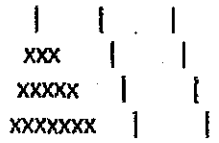
a) Stack

b) Queue

c) Priority queue.

OR

16. What is prolog ? Write a program for towers of Hanoi (three disk setup : shown in figure) in Prolog. The 3-disk setup is like this : **15**



M 18999

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VIII Semester B.Tech. (Reg./Sup./Imp.) Including Part Time Degree Examination, April 2011
(2007 Admission)
COMPUTER SCIENCE AND ENGINEERING
2K6 CS 804 : Advanced Computer Architecture

Time : 3 Hours Max. Marks : 100

I. a) What are the three technologies that are critical to modern computer implementation ? Explain any two of them in brief. **5**

b) Write a short note on optimizations performed by modern compilers. **5**

c) What is branch prediction buffer ? Explain. **5**

d) Write a short note on name dependences. **5**

e) What are the two strategies used for cache replacement ? Explain. **5**

f) Explain the terms throughput and response time. **5**

g) Write a note on routers and bridges. **5**

h) What are the advantages of shared-memory communication ? **5**

II. A) a) Explain the concept of memory hierarchy. **10**

b) Suppose that cache is 10 times faster than main memory, and that it can be used 90% of the time. How much speedup do we gain by using the cache ? **5**

OR

B) Explain the concept of exceptions in the implementation of pipelining. **15**

III. A) a) Explain the concept of Loop-Level parallelism. **10**

b) Using GCD test, determine whether dependences exist in the following loop : **5**

```
for (i = 1; i < = 100; i = i + 1) {
x [2 * i + 3] = x [2 * i] * 5.0;
}
```

OR

B) What are the limitations of Multiple – Issue processors ? Explain. **15**

P.T.O.

IV. A) a) Write a note on magnetic disk. **10**

b) What is the average time to read or write a 512-byte sector for a typical disk ? **5**

The average seek time is 9 ns, the transfer rate is 4 MB/sec, it rotates at 7200 RPM, and the controller overhead is 1 ms. Assume that the disk is idle so that there is no queuing delay.

OR

B) Write a note on main memory. Explain the various types of main memory. **15**

V. A) a) Explain the working of a circuit-switched network. **10**

b) Differentiate between connection-oriented connectionless communication. **5**

OR

B) Explain the technique of implementing locks using coherence. **15**

M 19001

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VIII Semester B.Tech. (Reg./Sup./Imp.) including Part Time Degree Examination, April 2011

(2007 Admn.)

COMPUTER SCIENCE AND ENGINEERING

2K6 CS 805 (D)/2K6 IT 805 (E) : Management Information Systems

Time : 3 Hours Max. Marks : 100

***Instruction** : All questions in Q. I are **compulsory**. In questions II, III, IV, V attempt **any one each**.*

I. 1) How does MIS differ from managerial accounting and operations research ? **5**

2) Comment on information as a strategic weapon. **5**

3) Define entity, attribute, schema, aggregation, generalization. **5**

4) Explain the characteristics of a data dictionary. **5**

5) Compare between TPS and MIS. **5**

6) Outline the success criteria for DSS/EIS. **5**

7) Explain the uses of prototyping in SDLC. **5**

8) What is structured analysis ? Briefly review the tools used. **5**

II. Answer **any one** among the following questions.

A) Why is feedback control such a necessity in open systems ? Can a closed system function for long without any effective feedback control ? **15**

B) Discuss the various approaches to M.I.S. system development. **15**

III. Answer **any one** from among the following.

A) Explain briefly Ethernet, Token Ring and Apple Talk. **15**

B) What do LAN, WAN and VAN stand for ? What are some of the differences between a LAN and a PBX ? Identify any two advantages of LANs. **15**

P.T.O.

IV. Answer **any one** from among the following.

A) List out the various tactical decisions to be taken before establishing an international airport. **15**

B) Explain the M.I.S. decisions to be taken by the manager of a newly launched catering service and event management group. **15**

V. Answer **any one** of the following.

A) A number of activities are carried out in implementation. Elaborate each of them. **15**

B) Discuss the five main phases of SDLC. Explain and identify the type of software systems for which SDLC approach is most appropriate. **15**