

**DEPARTMENT OF TECHNOLOGY PROMOTION AND COORDINATION
UNIVERSITY OF COMPUTER STUDIES
FOURTH YEAR (B.C.Sc. & B.C.Tech.)
FIRST SEMESTER EXAMINATION**

MARCH, 2016

ENGLISH

ZONE IV

Answer All Questions.

Time Allowed: 3 Hours

I. Read the passages and answer the following questions. (20 Marks)

1. One of the UK's leading banks has been forced to admit that organised hacking gangs have been targeting its executives. For the past year, Royal Bank of Scotland has been fighting systematic attempts to break into its computer systems from hackers who have sent personalized emails containing keyloggers to its senior management. This has included executives up to board level and is now the subject of a separate investigation by the Serious and Organised Crime Agency.
2. The hackers are homing in on the trend for people to work from home. The hackers make the assumption that the computers being used outside the work environment are more vulnerable than those protected by a corporate IT department.

Growing threat

3. For companies it is a growing threat as home working increases: a recent survey from the Equal Opportunities Commission found that more than 60% of the UK's population wants the option of flexible working.

4. And the hackers are employing increasingly sophisticated techniques. Each email they send is meticulously built to make it attractive to its target, who the criminals have carefully researched by trawling the internet for information. Once the email is composed, the malware is just as carefully designed: it is often modified to avoid detection by security software.

5. The keylogger contained in the email installs itself automatically and then collects details of logins and passwords from the unsuspecting user. This means that hackers can, using the usernames and passwords stolen by the keyloggers, connect to VPNs, or Virtual Private Networks, which many companies use to create an encrypted pathway into their networks.

Once inside a bank's network, the hackers can communicate directly with computers holding account information and manipulate funds.

Has this actually happened? In some cases sources claim that the login details of VPNs have been obtained and used though there has been no confirmation that any losses have occurred as a result. The attacks are not believed to have focused on RBS but to have been across the whole of the banking industry.

8. Royal Bank of Scotland said that the bank had suffered no losses as a result of the attacks and added: "RBS has extremely robust processes in place in order to protect our systems from fraud. Trojan email attacks are an industry-wide issue and are not isolated to a particular area or a particular bank."

9. It is not just banks that have been targets. Last year attempts were made to steal information from the Houses of Parliament using malicious email. MessageLabs, the company responsible for monitoring much of the email traffic of the government and big business for suspect software, said at the beginning of the year that criminals have been evolving more sophisticated techniques to attack corporate networks.

10. According to Mark Sunner, chief technology officer of MessageLabs, the number of malicious emails targeted at individuals has been increasing. Two years ago they were being seen once every two months, but now they are seeing one or two a day. This has been accompanied by an increase in quality in the creation of Trojans and spyware.

11. "The hackers are now aiming to take over computers, particularly those of home users. Some of the malicious software that we are routinely seeing for that purpose will have its own antivirus system built into it so that they can kill off the programs of their competitors."

Increased vigilance

12. Tony Neate, the head of Get Safe Online, a government-funded organization set up to raise awareness among UK businesses of computer criminals, says: "There is now an attempt to target individuals within UK businesses – including the banking sector. What is happening is that crime is doing what it always does, which is look for the weakest link. Home working is where they perceive a weakness.

13. "This points to a need for increased vigilance and security by those working from home and by those responsible for letting them work from home. For home working to be effective, security needs to be as effective as if working in an office."

Questions 1-5

Answer the questions below using NO MORE THAN THREE WORDS from the passage for each answer.

1. What do the hackers use to attack the computer system of the Royal Bank of Scotland?

2. Which word is most likely to be used by hackers to describe home computers?

3. What do the majority of people in the UK prefer?

4. How do hackers collect information so as to compose emails?

5. What do hackers obtain illegally to gain access to banks' computer network?

Questions 6-10

Complete the sentences below with words from the passage. Use **NO MORE THAN THREE WORDS** for each answer.

6. The use of login details of VPNs by criminals does not necessarily result in any _____.
7. Royal Bank of Scotland claimed that they are not the only victim of _____.
8. Corporate networks will be another target of hackers with improved _____.
9. The attacks on individuals have been greatly increased within _____.
10. With _____, software used by criminals can eliminate its competing programs.

II. Fill in the spaces with the words below.

(10 Marks)

<i>impact</i>	<i>in particular</i>	<i>co-ordinate</i>	<i>accompany</i>	<i>conspicuous</i>
<i>crucial</i>	<i>influenced</i>	<i>cycles</i>	<i>shipment</i>	<i>advent</i>

According to archaeological evidence, at least 5,000 years ago, and long before the 1..... of the Roman Empire, the Babylonians began to measure time, introducing calendars to 2..... communal activities, to plan the 3..... of goods and, 4....., to regulate planting and harvesting. They based their calendars on three natural 5.....: the solar day, marked by the successive periods of light and darkness as the earth rotates on its axis; the lunar month, following the phases of the moon as it orbits the earth; and the solar year, defined by the changing seasons that 6.....our planet's revolution around the sun.

Before the invention of artificial light, the moon had greater social 7..... And, for those living near the equator in particular, its waxing and waning was more 8..... than the passing of the seasons. Hence, the calendars that were developed at the lower latitudes were 9.....more by the lunar cycle than by the solar year. In more northern climes, however, where seasonal agriculture was practised, the solar year became more 10..... As the Roman Empire expanded northward, it organised its activity chart for the most part around the solar year.

III.(A) Correct the mistakes in these sentences. Remember to rewrite the correct sentences.

(10 Marks)

1. The government promised lowering taxes.
2. At the meeting he asked was it possible to make progress in service.
3. During the speaking module, the examiner asked me what did I want to do in the future.
4. The manager urged the staff that they should work hard for the company.
5. Uncle invited his friends attending wedding ceremony.
6. The students felt very strongly about the issue and insisted in seeing the chancellor to discuss it.
7. I was very unhappy with service so I complained about the manager and he gave me a discount on my meal.
8. I asked him really nicely but he still refused helping me.
9. I met Tom and he said me he was getting married.
10. The company apologised to cut jobs.

III. (B) Report each of the sentences below using a verb from the box. Remember that you do not need to report the original words exactly.

(10 Marks)

agree	apologise	ask	ask	deny
encourage	persuaded	promise	refuse	suggest

1. 'We are going to create job opportunities.'
The organization
2. 'I really think you should learn English. You'd have a good chance of improving it.'
She
3. 'No, I won't borrow money for you. Do it yourself!'
He
4. 'Oh, okay, I'll accept the offer.'
She
5. 'I didn't break the glasses. It wasn't me.'
He

6. 'We are very sorry that we performed poorly.'
They
7. 'Why aren't there many competent workers in the company?'
He
8. 'Are you seeing the dentist tomorrow?'
She
9. 'Why don't you buy smart phone ? You could afford it.'
She
- 10.'Please stay with me, Maung. I really think you'll enjoy it'. 'Oh, alright then, Phawe.'
Phawe

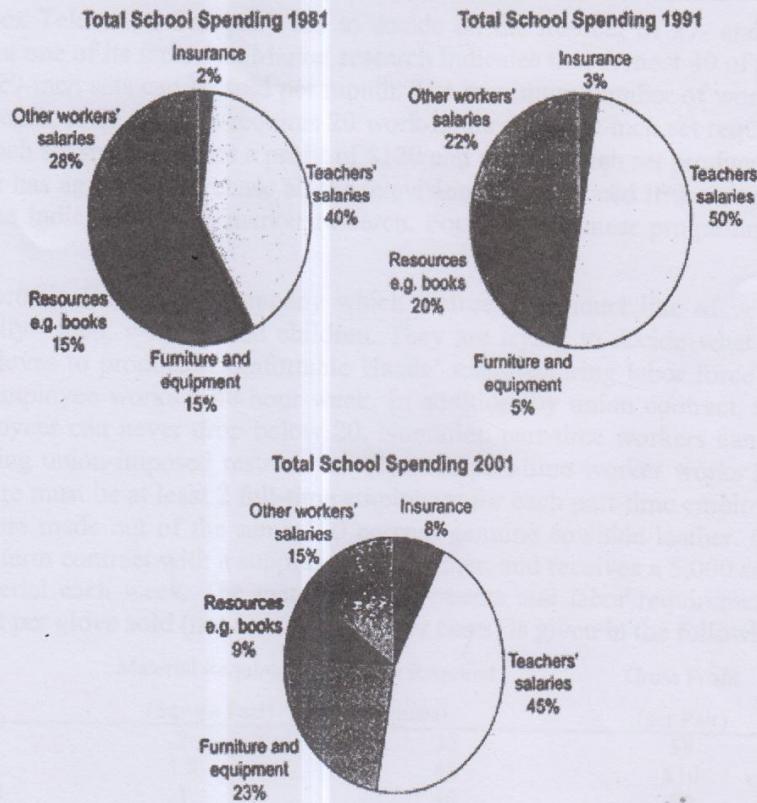
III. (C) Fill in the spaces with a preposition.

(10 Marks)

1. I wanted to make young people more aware current affairs.
2. He's good playing chess.
3. The recent increase hits on the website means that we can charge more for advertising space.
4. She took my book accident.
5. They have finished their first degree Oxford University.
6. She keeps in touch with her family email.
7. It was very kind you to help me.
8. Do you have experience repairing computers?
9. Do you think people are obsessed having the latest high tech equipment?
10. Is it easy to distinguish twins?

IV.(A) The three charts below show the changes in annual spending by a particular UK school in 1981, 1991 and 2001.

Summarise the information by selecting and reporting the main features and make comparisons where relevant. **(9 Marks)**



IV.(B) Describe a restaurant that you enjoyed going to .

(9 Marks)

You should write:

- where the restaurant was
- why you chose this restaurant
- what type of food you ate in this restaurant and explain why you enjoyed eating in this restaurant.

IV.(C)1.Do you think reading a newspaper or magazine in a foreign language is a good way to

learn the language? [Why/Why not?] **(2 Marks)**

V. Write about the following topic:

(20 Marks)

People attend college or university for many different reasons (for example, new experiences, career preparation, increased knowledge). Why do you think people attend college or university?

- You should give reasons for your answer using your own ideas and experience.

Department of Technology Promotion and Cooperation

University of Computer Studies

B.C.Sc.(Fourth Year)

First Semester Examination

Operations Research (CS-401)

March, 2016

Zone IV

Answer All Questions.

Time allowed: 3 hours

- (a) (i) The Apex Television Company has to decide on the number of 27- and 20-inch sets to be produced at one of its factories. Market research indicates that at most 40 of the 27-inch sets and 10 of the 20-inch sets can be sold per month. The maximum number of work-hours available is 500 per month. A 27-inch set requires 20 work-hours and a 20-inch set requires 10 work-hours. Each 27-inch set sold produces a profit of \$120 and each 20-inch set produces a profit of \$80. A wholesaler has agreed to purchase all the television sets produced if the numbers do not exceed the maxima indicated by the market research. Formulate a linear programming model for this problem. (6-marks)

- (ii) Comfortable Hands is a company which features a product line of winter gloves for the entire family—men, women, and children. They are trying to decide what mix of these three types of gloves to produce. Comfortable Hands' manufacturing labor force is unionized. Each full-time employee works a 40-hour week. In addition, by union contract, the number of full-time employees can never drop below 20. Nonunion part-time workers can also be hired with the following union-imposed restrictions: (1) each part-time worker works 20 hours per week, and (2) there must be at least 2 full-time employees for each part-time employee. All three types of gloves are made out of the same 100 percent genuine cowhide leather. Comfortable Hands has a long-term contract with a supplier of the leather, and receives a 5,000 square feet shipment of the material each week. The material requirements and labor requirements, along with the gross profit per glove sold (not considering labor costs) is given in the following table.

Glove	Material Required (Square Feet)	Labor Required (Minutes)	Gross Profit (per Pair)
Men's	2	30	\$8
Women's	1.5	45	\$10
Children's	1	40	\$6

Each full-time employee earns \$13 per hour, while each part-time employee earns \$10 per hour. Management wishes to know what mix of each of the three types of gloves to produce per week, as well as how many full-time and how many part-time workers to employ. They would like to maximize their net profit—their gross profit from sales minus their labor costs. Formulate a linear programming model for this problem. (9-marks)

- (b) Use the graphical method to solve the following LP problem.

(10-marks)

$$\begin{aligned} \text{Maximize } Z &= 2x_1 + x_2 \\ \text{Subject to } x_1 + 2x_2 &\leq 10 \\ x_1 + x_2 &\leq 6 \\ x_1 - x_2 &\leq 2 \\ x_1 - 2x_2 &\leq 1 \\ \text{and } x_1 &\geq 0, x_2 \geq 0. \end{aligned}$$

- (a) Work through the simplex method (in algebraic form) step by step to solve the following problem

$$\begin{aligned} \text{Maximize } Z &= 3x_1 + 5x_2 \\ \text{Subject to } x_1 &\leq 4 \\ 2x_2 &\leq 12 \\ 3x_1 + 2x_2 &\leq 18 \\ \text{and } x_1 &\geq 0, x_2 \geq 0 \end{aligned} \quad (10 \text{ marks})$$

$$\begin{aligned} x_1 &\leq 4 \\ 2x_2 &\leq 12 \\ 3x_1 + 2x_2 &\leq 18 \\ \text{and } x_1 &\geq 0, x_2 \geq 0 \end{aligned}$$

(b) Work through the simplex method step by step (in tabular form) to solve the following problem.

$$\text{Maximize } Z = 2x_1 - x_2 + x_3 \quad (10 \text{ marks})$$

$$\text{Subject to } 3x_1 + x_2 + x_3 \leq 6$$

$$x_1 - x_2 + 2x_3 \leq 1$$

$$x_1 + x_2 - x_3 \leq 2$$

$$\text{and } x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

3. (a) Convert the following LP problem to our standard form if necessary. Then write the dual of this problem. (10-marks)

$$(i) \text{ Maximize } Z = 2x_1 + 7x_2 + 4x_3$$

$$\text{Subject to } x_1 + 2x_2 + x_3 \leq 10$$

$$3x_1 + 3x_2 + 2x_3 \leq 10$$

$$\text{and } x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

$$(ii) \text{ Minimize } Z = -x_1 + 2x_2 + x_3$$

$$\text{Subject to } 3x_2 + x_3 \leq 120$$

$$x_1 - x_2 - 4x_3 \leq 80$$

$$-3x_1 + x_2 + 2x_3 \leq 100$$

(no non-negativity constraints).

(b) Write the dual of the following LP problem using SOB method. (10-marks)

$$(i) \text{ Maximize } Z = 2x_1 + 5x_2 + 3x_3$$

$$\text{Subject to } x_1 - 2x_2 + x_3 \geq 20$$

$$2x_1 + 4x_2 + x_3 = 50$$

$$\text{and } x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

$$(ii) \text{ Maximize } Z = -2x_1 + x_2 - 4x_3 + 3x_4$$

$$\text{Subject to } x_1 + x_2 + 3x_3 + 2x_4 \leq 4$$

$$x_1 - x_3 + x_4 \geq -1$$

$$2x_1 + x_2 \leq 2$$

$$x_1 + 2x_2 + x_3 + 2x_4 = 2$$

$$\text{and } x_2 \geq 0, x_3 \geq 0, x_4 \geq 0$$

(no non-negativity constraint for x_1)

4. Consider the following problem.

$$\text{Maximize } Z = 3x_1 + 2x_2$$

$$\text{Subject to } 3x_1 + x_2 \leq 12$$

$$x_1 + x_2 \leq 6$$

$$5x_1 + 3x_2 \leq 27$$

$$\text{and } x_1 \geq 0, x_2 \geq 0$$

(a) Solve by the original Simplex method (in tabular form). (7-marks)

(b) Solve the dual of this problem manually by using the dual Simplex method. (8-marks)

5. (a) The Gilbreth family drinks a case of Royal Cola every day, 365 days a year. Fortunately, a local distributor offers quantity discounts for large orders as shown in the table below, where the price for each category applies to every case purchased. Considering the cost of gasoline, Mr. Gilbreth estimates it costs him about \$5 to go pick up an order of Royal Cola. Mr. Gilbreth also is an investor in the stock market, where he has been earning a 20 percent average annual return. He considers the return lost by buying the Royal Cola instead of stock to be the only holding cost for the Royal Cola. (10-marks)

Discount Category	Quantity purchased	Price(per case)
1	1 to 49	\$4.00
2	50 to 99	\$3.90
3	100 or more	\$3.80

(i) Determine the optimal order quantity according to the EOQ model with quantity discounts. What is the resulting total cost per year?

(ii) With this order quantity, how many orders need to be placed per year? What is the time interval between orders?

(b) Suppose that production planning is to be done for the next 5 months, where the respective demands are $r_1 = 2$, $r_2 = 4$, $r_3 = 2$, $r_4 = 2$, and $r_5 = 3$. The setup cost is \$4000, the unit production cost is \$1000, and the unit holding cost is \$300. Use the deterministic periodic-review model to determine the optimal production schedule that satisfies the monthly requirements. (10-marks)

Department of Technology Promotion and Coordination

University of Computer Studies

B.C.Sc. / B.C.Tech. (Fourth Year)

First Semester Examination

Mathematics of Computing IV (CST-402)

March, 2016

Zone IV

Answer All Questions.

Time allowed: 3 hours

- (a) Apply the Euler's method to the initial value problem. Do 5 steps and use 6 decimals. Solve the problem exactly. Compute the errors. (10-marks)

$$y' = (y + x)^2, \quad y(0) = 0, \quad h = 0.1$$

- (b) Using the improved Euler's method to the initial value problem $y' = 2 - 2y, \quad y(0) = 0$ with $h=0.1$ and 5 steps. Find the exact solution and the error. (Used 6D) (10-marks)

1. Solve the initial value problem $y' = y, \quad y(0) = 1, \quad h = 0.1$ by the Adams-Moulton method. Do 7-steps. Compute the errors by using the exact solution. Use classical Runge-Kutta method for starting values of (y_1, y_2, y_3) . (Used 6D) (20-marks)

2. Apply Euler's method for the following initial value problem with step $h = 0.2$ for x from 0 to 1. Compare with the exact solution. (Used 6D) (20-marks)

(a) $y'' + 2y' + 0.75y = 0, \quad y(0) = 3, \quad y'(0) = -2.5$

(b) $y_1' = y_2, \quad y_2' = 2y_1 - y_2, \quad y_1(0) = 3, \quad y_2(0) = 0$

3. (a) (i) Find a 99% confidence interval for the mean of a normal population from the sample: melting point ($^{\circ}\text{C}$) of aluminium 660,667,654,663,662. (5-marks)

- (ii) Assuming normality, find a 95% confidence interval for the variance from the sample 145.3, 145.1, 145.4, 146.2. (5-marks)

- (b) (i) Using a sample of 10 values with mean 14.5 from a normal population with variance is 0.25, test the hypothesis $\mu_0 = 15.0$ against the alternative $\mu_1 = 14.5$ on the 5% level. (5-marks)

- (ii) Suppose that in the past the standard deviation of weights of certain 100.0-oz packages filled by a machine was 0.8 oz. Test the hypothesis $H_0: \sigma = 0.8$ against the alternative $H_1: \sigma > 0.8$ (an undesirable increase), using a sample of 20 packages with standard deviation 1.0 oz and assuming normality. Choose $\alpha = 5\%$. (5-marks)

4. (a) Eight samples of size 2 were taken from a lot of screws. The values (length in inches) are

Sample No	1	2	3	4	5	6	7	8
Length	3.50	3.51	3.49	3.52	3.53	3.49	3.48	3.52
	3.51	3.48	3.50	3.50	3.49	3.50	3.47	3.49

Assuming that the population is normal with mean 3.500 and variance 0.0004 and $\alpha = 1\%$, set up a control chart for the mean and graph the sample means on the chart. (5-marks)

- (b) Lots of kitchen knives are inspected by a sampling plan that uses a sample of size 20 and the acceptance number $c=1$. What is the probability of accepting a lot with 1%, 2%, 10% defectives (knives with dull blades)? Graph the OC curve of the plan, using the Poisson distribution. What are the producer's and consumer's risks if the AQL is 2% and the RQL is 15%. (10-marks)
- (c) If a service station had served 60, 49, 56, 46, 68, 39 cars from Monday through Friday between 1 P.M. and 2 P.M., can one claim on a 5% level that the differences are due to randomness? First guess. Then calculate. (5-marks)

Table A8 Normal Distribution

%	$z(\emptyset)$	$z(D)$	%	$z(\emptyset)$	$z(D)$	%	$z(\emptyset)$	$z(D)$
1	-2.326	0.013	41	-0.228	0.539	81	0.878	1.311
2	-2.054	0.025	42	-0.202	0.553	82	0.915	1.341
3	-1.881	0.038	43	-0.176	0.568	83	0.954	1.372
4	-1.751	0.050	44	-0.151	0.583	84	0.994	1.405
5	-1.645	0.063	45	-0.126	0.598	85	1.036	1.440

Table A9 t-Distribution

$F(z)$	Number of Degrees of Freedom									
	1	2	3	4	5	6	7	8	9	10
0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.32	0.29	0.28	0.27	0.27	0.26	0.26	0.26	0.26	0.26
0.7	0.73	0.62	0.58	0.57	0.56	0.55	0.55	0.55	0.54	0.54
0.8	1.38	1.06	0.98	0.94	0.92	0.91	0.90	0.89	0.88	0.88
0.9	3.08	1.89	1.64	1.53	1.48	1.44	1.41	1.40	1.38	1.37
0.95	6.31	2.92	2.35	2.13	2.02	1.94	1.89	1.86	1.83	1.81
0.975	12.7	4.30	3.18	2.78	2.57	2.45	2.36	2.31	2.26	2.23
0.99	31.8	6.96	4.54	3.75	3.36	3.14	3.00	2.90	2.82	2.76
0.995	63.7	9.92	5.84	4.60	4.03	3.71	3.50	3.36	3.25	3.17
0.999	318.3	22.3	10.2	7.17	5.89	5.21	4.79	4.50	4.30	4.14

Table A10 Chi-square Distribution

$F(z)$	Number of Degrees of Freedom									
	1	2	3	4	5	6	7	8	9	10
0.005	0.00	0.01	0.07	0.21	0.41	0.68	0.99	1.34	1.73	2.16
0.01	0.00	0.02	0.11	0.30	0.55	0.87	1.24	1.65	2.09	2.56
0.025	0.00	0.05	0.22	0.48	0.83	1.24	1.69	2.18	2.70	3.25
0.05	0.00	0.10	0.35	0.71	1.15	1.64	2.17	2.73	3.33	3.94
0.95	3.84	5.99	7.81	9.49	11.07	12.59	14.07	15.51	16.92	18.31
0.975	5.02	7.38	9.35	11.14	12.83	14.45	16.01	17.53	19.02	20.48
0.99	6.63	9.21	11.34	13.28	15.09	16.81	18.48	20.09	21.67	23.21
0.995	7.88	10.60	12.84	14.86	16.75	18.55	20.28	21.95	23.59	25.19

Department of Technology Promotion and Coordination

University of Computer Studies

Fourth Year (B.C.Sc.)

First Semester Examination

Algorithmic Analysis (CS-403)

March, 2016

Zone-IV

Answer all questions

Time allowed: 3 hours.

(8 marks)

1. (a) Define Any Four the followings:

- (i) Decision Tree
- (ii) Expected complexity
- (iii) Accumulator
- (iv) Recursion
- (v) Directed Graph

- (b) Briefly explain Any Three the followings:

- (i) Difference between RAM and RASP
- (ii) Turing Machine
- (iii) Divide-and-Conquer approach
- (iv) Dynamic Programming

(12 marks)

2. (a) Give Pidgin ALGOL and RAM program to compute $n!$ given input n .

(10 marks)

- (b) Analyze the time and space complexity of your RAM program under (i) uniform and (ii) logarithmic cost criteria.

(10 marks)

3. (a) Simulate the following RAM instruction in RASP.

- (i) SUB * i
- (ii) ADD * i

(8 marks)

- (b) Specify a Turing Machine which recognizes palindrome on the alphabet $\{x, y\}$ and analyze the time and space complexity.

(12 marks)

4. (a) Write a bitwise addition program to add two 3-bit numbers.

(6 marks)

- (b) Find the minimal number of operations in multiplying the following matrices.

(14 marks)

$$M = \begin{matrix} M_1 & * & M_2 & * & M_3 & * & M_4 \\ [20 \times 10] & & [10 \times 50] & & [50 \times 1] & & [1 \times 100] \end{matrix}$$

```
begin
  1. for i=1 until n to mii=0;
  2. for l=1 until n-1 do
  3.   for i=1 until n-l do
        begin
  4.     j=i+l;
  5.     mij=MIN(i<=k<=j)(mik+mk+1,j+ri-1* rk * rj)
        end;
  6.   write mln
```

5. (a) By using the Lexicographic sort algorithm, sort the following sequence of strings:
abca, bc, aac, abac, aab, baca, c (10 marks)
- (b) To find the 10th smallest element in the given list :
 $S=\{3,9,7,6,1,5,3,4,2,8,4,1,10,12,16,14,15,18,7,5,1,9,5,2\}$ using selection algorithm and to analyze the complexity. (10 marks)

**Department of Technology Promotion and Coordination
University of Computer Studies**

Fourth Year (B.C.Sc)

First Semester Examination

CS-404(DBMS)

March, 2016

Zone IV

Answer all questions.

Time allowed : 3hours

I. Write a short note on Any Five of the following. (25 marks)

- (a) Discretionary Access Control
- (b) Data Encryption Standard (DES) or Public Key Encryption
- (c) Referential Action
- (d) Triggered Procedure
- (e) Location Independence
- (f) Gate way

II. Consider the following relational schema :

CUSTOMER (CNO#, CNAME, CITY)

CUSTORDER (CUSTNO#, CNO#, DATE, VALUE)

PRODUCT (PNO#, PNAME, COLOR, WEIGHT, PRICE)

ORDERDETAIL (ONO#, CUSTNO#, PNO#, QTY)

(a) Write the following integrity constraints by using the hypothetical language. (8 marks)

- (i) There must exist at least one red product.
- (ii) No customer in London can be ordered any product in a quantity must be greater than 20.
- (iii) At least one red product must weigh less than 50 pounds.
- (iv) The average product price must be greater than \$100.
- (v) Customer order numbers must be unique.

(b) For each of your answers to above question 2(a), state whether the constraints is a type constraint or relvar constraint or database constraint. (11 marks)

(c) Write the following security constraints by using SQL language. (16 marks)

- (i) User Todd can see full privileges over tuples for Product 'Screw'.
- (ii) UserSmith INSERT privileges over customer entries relvar.

- (iii) Each customer RETRIEVE privileges over the customer's own tuple (only).
- (iv) User Misha can RETRIEVE privileges over total order quantity per each customer, but not individual's quantity.
- (v) User Jones UPDATE privileges for product that price less than \$20 or quantity is less than 100.

- III. (a) What are the twelve objectives of distributed database system and briefly explain any two of them. (8 marks)
- (b) What is gateway? Describe the functions of the gateway. (6 marks)

(c) Distributed Database

Student(S#, SNAME, CLASS) 10,000 stored tuples at Site A.

Book (B#, Title, Author) 100,000 stored tuples at Site B.

Lending (S#, B#) 1,000,000 stored tuples at Site A.

Query

Get student number for MCSc students lending book 'DBMS'.

Assumption : number of DBMS book = 10

Number of lending by MCSc class = 100,000

Data rate = 50,000 bit per second

Access delay = 0.1 second

Briefly examine six possible strategies for processing this query. Calculate total communication time $T(i)$. (6 marks)

- IV. (a) What do you understand optimization in relational system? State its advantages.

(b) List the stages in query processing and explain any two. (8 marks)

(c) Perform the optimization steps for a query. Get student name of students who lends book number 'B010'. (8 marks)

Database

STUDENT (S#, SNAME, CLASS, ADDRESS, PHOME)

LENDING(S#, B#, EXPIRY)

Assumption: STUDENT relation contains 100 records . Lending relation contains 100,00 records. Among them only 50 for book 'B010'. It is possible to hold up to 50 records in main memory.

Choose two possible methods in optimization and compare the methods on the result.

(or)

Get name of London suppliers who supply some red part weighing less than 25 pounds in a query greater than 200 by using detachment and tuple substitution.

Department of Technology Promotion and Coordination
University of Computer Studies
Fourth Year (B.C.Sc)
First Semester Examination
CS-405 (Software Engineering)
March, 2016
Zone IV

Answer all questions.

Time allowed : 3hours

I. Choose the correct answer from the following:

(15 marks)

1. V & V starts with requirements reviews and continues through design reviews and code inspections to product testing.
(a) True (b) False
2. The primary goal of release testing is to decrease the supplier's confidence that the system meets its requirements.
(a) True (b) False
3. In a cohesive group, members think of the group as more important than the individual in it.
(a) True (b) False
4. Function-related metrics are related to the number of delivered object code instructions.
(a) True (b) False
5. Quality planning is the process of developing a quality plan for a project.
(a) True (b) False
6. Process measurements are quantitative data about the software process.
(a) True (b) False
7. A configuration management plans describe the non-standards and procedures that should be used for configuration management.
(a) True (b) False
8. The objective of path testing is to ensure that each independent path through the program is executed at least once.
(a) True (b) False
9. Verification and validation processes are intended to establish the existence of defects in a -----
(a) software system (b) hardware system (c) project
10. ----- is the process of testing individual components in the system.
(a) Component testing (b) Structural testing (c) Interface testing
11. A ----- may emerge who effectively controls software production.
(a) group leader (b) technical leader (c) software engineer
12. The estimate of the code size in the post architecture model is computed using ----- component.
(a) two (b) three (c) four
13. ----- is the establishment of a framework of organizational procedures and standards that lead to high-quality software.
(a) Quality planning (b) Quality control (c) Quality assurance

14. A CMMI assessment involves examining the processes in an organization and rating these on a point scale that relates to the level of maturity in each process area.

- (a) four
- (b) five
- (c) six

15. An installation program that is used to help install the system on target -----.

- (a) software
- (b) hardware
- (c) file

II. Define any five terms from the following:

(15 marks)

- (a) What factors are affecting in software over testing?
- (b) Stages involved in static analysis.
- (c) Define major problems of capability maturity model.
- (d) Software Productivity
- (e) System-building CASE tools.
- (f) Number of factors that influence group working
- (g) Quality assurance

III. Write a short notes on any three from the following:

(15 marks)

- (a) Two distinct types of testing.
- (b) Describe four critical factors in people management.
- (c) Describe two metrics that have been used to measure programmer productivity.
- (d) Three types of documentation standard
- (e) Process improvement is a cyclical activity, describe the three principal stages.

IV. (a) Write a short note on the integration testing.

(5 marks)

- (b) Draw a flow graph for the binary search procedure in the figure, display the paths through the binary search flow graph and calculate the cyclomatic complexity of program flow graph.

(10 marks)

```
classBinSearch {
    public static void search (int key, int[] elemArray, Result r)
    {
        1.     Int bottom=0;
        2.     Int top= elemArray.length-1;
        3.     Int mid;
        4.     r.found=false;
        5.     r.index=-1;
        6.     while (bottom<=top)
        {
        7.         mid=(top + bottom)/2;
        8.         If (elemArray[mid]==key)
        {
        9.             r.index=mid;
        10.            r.found=true;
        return;
        }
        else
        {
```

```
11.     If(elemArray [mid]<key)
12.         bottom=mid+1;
13.     else
14.         Top=mid-1;
    }
}//while loop
14. } //search
} //BinSearch
```

Figure : Binray Search

- ks) V. (a) Briefly describe the key stages in software measurement process. (10 marks)
(b) Process change involves making modifications to the existing process. Discuss about the key stages in the process change process. (10 marks)
- ks) VI. (a) Describe the process of Cleanroom strategy. (10 marks)
(OR)
Briefly explain about the COCOMO model.
(b) The P-CMM can be used as a framework for improving the way in which an organization manages its human assets. Explain the P-CMM model. (10 marks)

ks) OR

Explain briefly about the configuration management planning.

Department of Technology Promotion and Coordination

University of Computer Studies

Fourth Year (B.C.Sc.)

First Semester Examination

Artificial Intelligence (CS 406)

March, 2016

Zone IV

Answer all questions

Time allowed: 3 hours

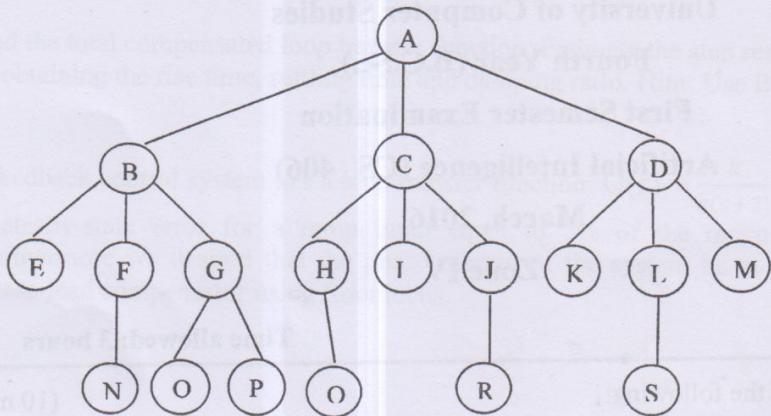
-
1. Define **ANY FIVE** of the following: (10 marks)
 - (i) Minimum remaining value
 - (ii) Stochastic Beam Search
 - (iii) Semi dynamic
 - (iv) Autonomy
 - (v) Rational Agent
 - (vi) Branching factor

 2. Answer any **FOUR** of the following: (20 marks)
 - (i) List the measurement problem solving performance
 - (ii) Five components of a Node
 - (iii) Write a short note on breadth-first search
 - (iv) Three reasons for Hill Climbing search often gets stuck
 - (v) Write two key advantages of local search algorithm.

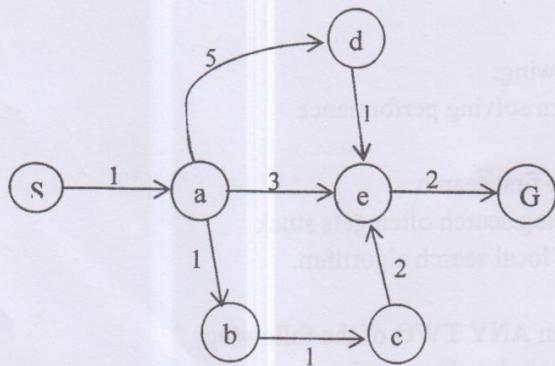
 3. Describe the differences between **ANY TWO** of the following: (10 marks)
 - (i) Bounds Propagation and Constraints Propagation
 - (ii) Unary constraint and Binary constraint.
 - (iii) Search cost & total cost

 4. (a) For Interactive Learning agents, develop a PEAS description of the task environment. (5 marks)
(b) For each of the following agents, develop a PEAS description of the task Environment
(i) Internet DVD shopping
(ii) Chess without a clock (10 marks)

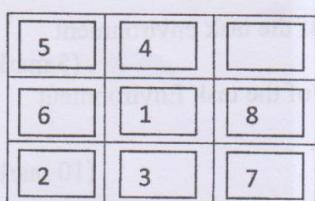
 5. (a) Give the initial state, goal test, successor function and cost function for the following:
A 3-foot tall monkey is in a room where some bananas are suspended from 8 foot ceiling. He would like to get the bananas. The room contains two stackable, movable, climbable 3-foot high crates. (4 marks)
(b)(i) List the order in which nodes will be visited for breadth first search, depth-first search, depth-limited search with limit 3, and iterative deepening search. The goal state is Q. (7 marks)



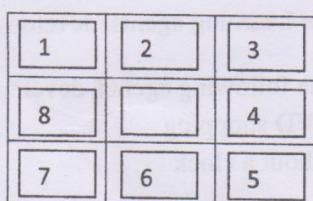
- (ii) A search graph with start state S, goal state G and integer costs on the arcs. Find the possible order of node expansion with uniform cost search algorithm for the following search graph. (4 marks)



6. (a) (i) Briefly explain about minimizing the total estimated solution cost. (3 marks)
(ii) Calculate misplaced tiles and Manhattan distance for the following 8-puzzle problem. (4 marks)



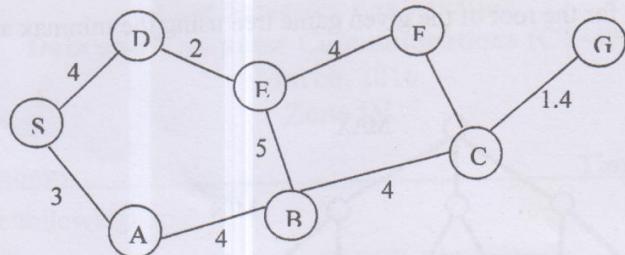
(a) Initial State



(b) Goal State

- (b) In the following graph, S denotes the starting state and G denotes the goal state. The number attached to each edge in the graph represents the cost of traversing the edge. Assume also that the ESTIMATED distances to the goal are given by the following table, by using hill

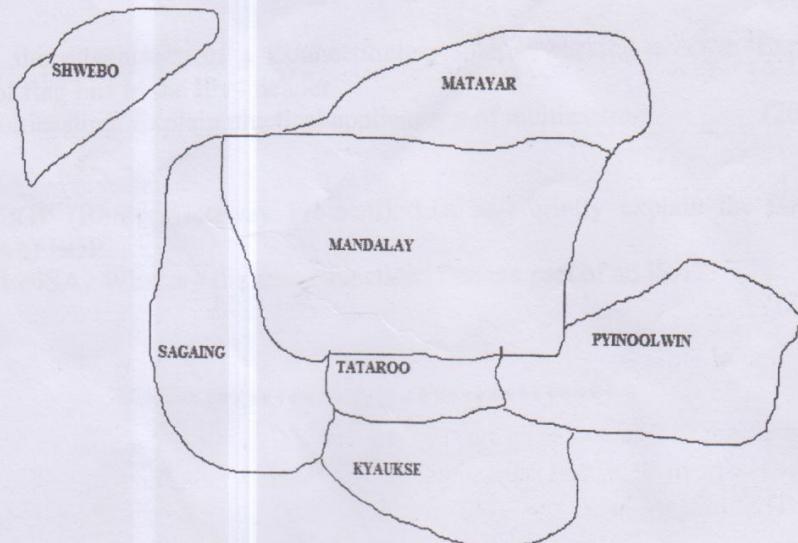
climbing search, show the search tree as it is expanded by the method until it finds a path from S to G.
 (8 marks)



FROM	TO	ESTIMATED DISTANCE
S	G	10
A	G	8
B	G	5
C	G	1.4
D	G	9
E	G	6
F	G	2
G	G	0

7(a) The following Mandalay Map is given to Color each region either WHITE, GREEN or BLACK in such a way that no neighboring regions have the same color. (10 marks)

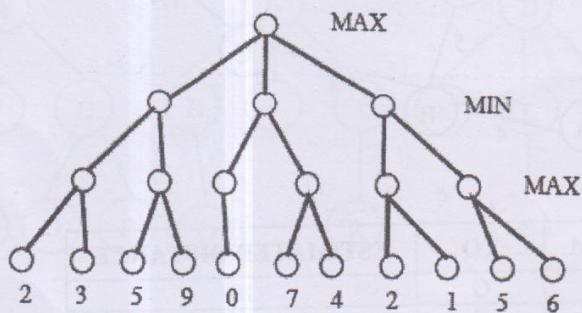
- (i) Draw the Constraint graph for the figure.
- (ii) What are variables, values and constraints?
- (iii) How many solutions are there?



2 mark question about minimax algorithm and choose one word among minmax
(choose 3)

(b) Find the best move for the root of the given game tree using the minmax algorithm.

(5 marks)



Ans

1

- (a)
- (b)
- (c)
- (d)
- (e)

2

- (a)
- (b)
- (c)
- (d)
- (e)
- (f)
- (g)
- (h)

3 (a)

Department of Technology Promotion and Coordination

University of Computer Studies

Fourth Year (B.C.Tech.)

First Semester Examination

Artificial Intelligence (CT-401)

March, 2016

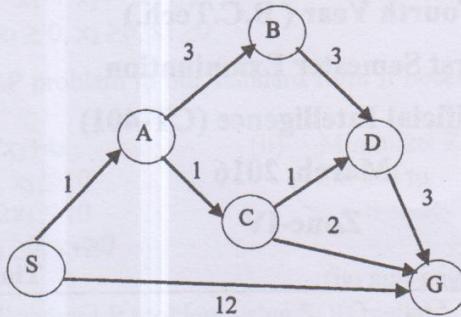
Zone-IV

Answer all questions

Time allowed: 3hours.

1. Define Any Five the following terms. (10 marks)
 - (a) Agent function
 - (b) Rationality .
 - (c) Degree heuristic
 - (d) Recursive best-first search
 - (e) Forward pruning
 - (f) Constraint Propagation
2. Write short notes Any Four of the following. (20marks)
 - (a) Absolute Constraints for Constraints Satisfaction Problem
 - (b) Depth limited search
 - (c) Explain Utility-based agent with diagram.
 - (d) Write short notes on relaxed problem.
 - (e) Min conflicts
3. Differentiate Any Two of the following. (10 marks)
 - (a) Discuss Greedy best-first search and A* search.
 - (b) First Choice Hill Climbing and Random Restart Hill Climbing
 - (c) Full observable and Partially observable
4. (a) For Autonomous Mars rover agents, develop a PEAS description of the task environment. (6 marks)
(b) Give the characteristics of the task environment for the following. (9 marks)
 - (i) Medical diagnosis system
 - (ii) Crossword puzzle
5. (a) Give the initial state, goal test, successor function and cost function for the Vacuum Cleaner World. (4 marks)
(b) (i) Consider a state space where start state is number 1 and the successor function for a state returns two state number $2n$ and $2n+1$.
 - Draw the portion of the state space for states 1 to 15.
 - Suppose the goal state is 11, list the order in which nodes will be visited for Breadth First Search, Depth First Search and Iterative Deepening Search.(7 marks)

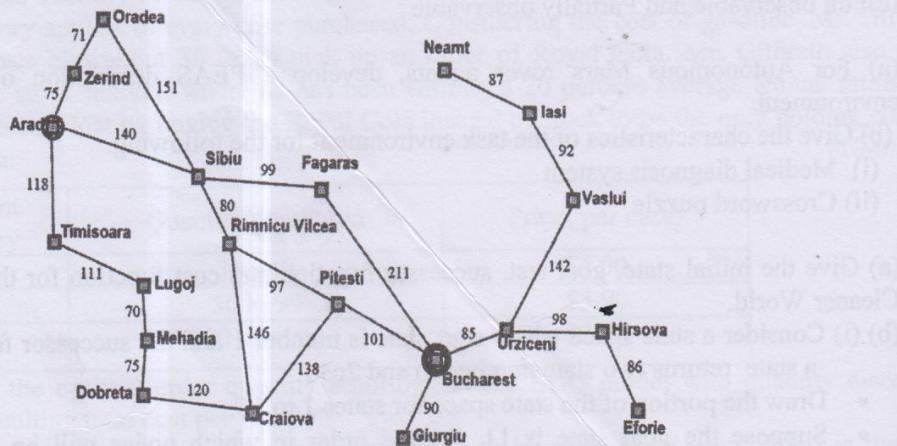
- (ii) A search group with start state S, goal state G and integer costs on the arcs. Find the possible order of node expansion with Uniform cost search algorithm for the following search graph. (4 marks)



6. (a) Device a state space in which A* using GRAPH-SEARCH returns a suboptimal solution with an $h(n)$ function that is admissible but inconsistent. (4 marks)
 (b) race the operation RBFS search applied to the problem of getting to Bucharest from Arad using the straight-line distance heuristic. That is show the sequence of nodes that the algorithm will consider and the f , g and h score for each node. (11 marks)

Mehadia	241
Neamt	234
Oradea	380
Pitesti	100
Rimnicu Vilcea	193
Sibiu	253
Timisoara	329
Urziceni	80
Vaslui	199
Zerind	374

Arad	366
Bucharest	0
Craiova	160
Drobeta	242
Eforie	161
Fagaras	176
Giurgiu	77
Hirsova	151
Iasi	226
Lugoj	244



7. (a) Solve a cryptarithmetic problem by cryptarithmetic puzzles and Draw the constraint hypergraph of this problem for the following.

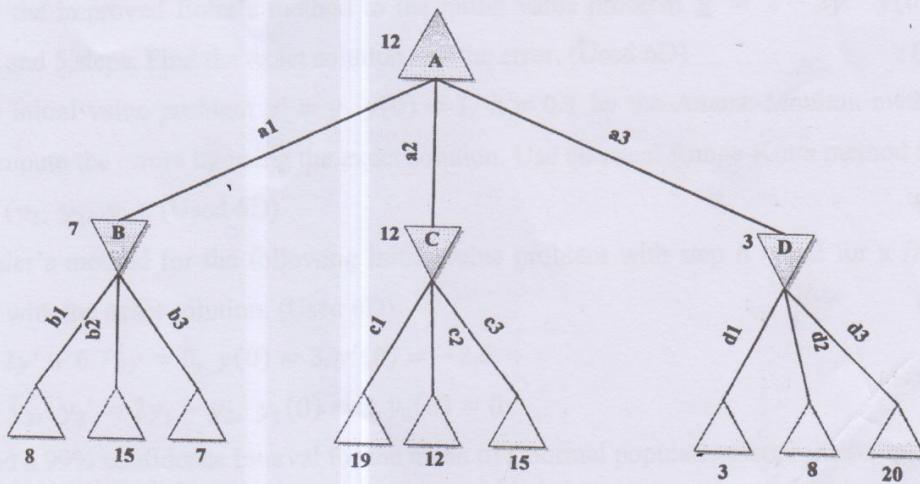
$$\begin{array}{r} \text{T W O} \\ \text{T W O} \\ \hline \text{F O U R} \end{array}$$

Each letter stands for a distinct digit; the aim is to find a substitution of digits for letters such that the resulting sum is arithmetically correct, with the added restriction that no leading zeroes are allowed.

(7 marks)

- (b) Draw the stages in the calculations of the optimal decision for the root of the given game tree by using Alpha-Beta pruning.

(8 marks)



Department of Technology Promotion and Coordination
University of Computer Studies
Fourth Year (B.C.Tech.)
First Semester Examination
Electronic Devices II (CT-403)
March, 2016
Zone IV

Answer all questions.

Time allowed: 3 hours

1. (a) Determine the approximate Q-point for the JFET with voltage-divider bias in Fig-1(a-1), given that this particular device has a transfer characteristic curve as shown in Fig-1(a-2). Find V_s and V_D using the Q-point values. (10-marks)
- (b) (i) Determine the actual gate-to-source voltage in Fig-1(b) by taking into account the gate leakage current I_{GSS} . Assume that I_{GSS} is 50 pA and I_D is 1 mA under the existing bias condition. If the V_{GS} measurement voltage is 3.2 V, determine the drain-to-source voltage and drain current. (4-marks)
- (ii) For a certain D-MOSFET, $I_{DSS} = 18 \text{ mA}$ and $V_{GS(\text{off})} = +10 \text{ V}$. Is this an n-channel or a p-channel? Determine I_D at $V_{GS} = +4 \text{ V}$. Determine I_D at $V_{GS} = -4 \text{ V}$. (6-marks)

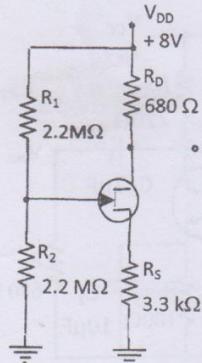


Fig-1(a-1)

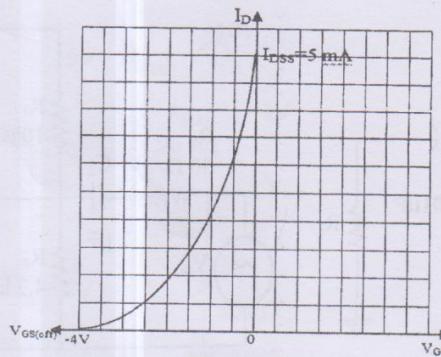


Fig-1(a-2)

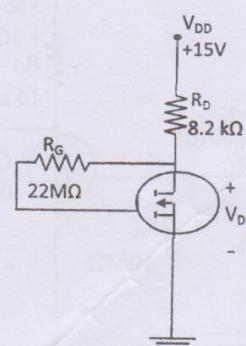


Fig- 1(b)

2. (a) A common-source amplifier using an E-MOSFET is shown in Fig-2(a). Find V_{GS} , I_D , V_{DS} , and the ac output voltage. Assume that for this particular device, $I_{D(on)} = 200 \text{ mA}$ at $V_{GS} = 4 \text{ V}$, $V_{GS(\text{th})} = 2 \text{ V}$, and $gm = 23 \text{ mS}$. $V_{in} = 25 \text{ mV}$. (10-marks)
- (b) For the common-source amplifier in Fig-2(b), determine I_D , V_{GS} , and V_{DS} for a centered Q-point. $I_{DSS} = 9 \text{ mA}$, and $V_{GS(\text{off})} = -3 \text{ V}$. (10-marks)

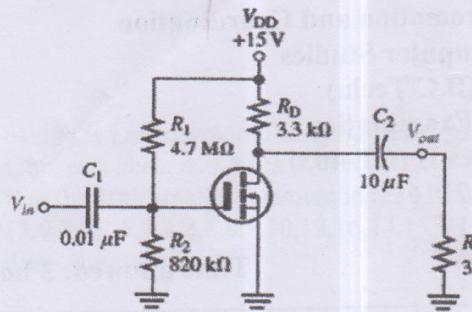


Fig-2(a)

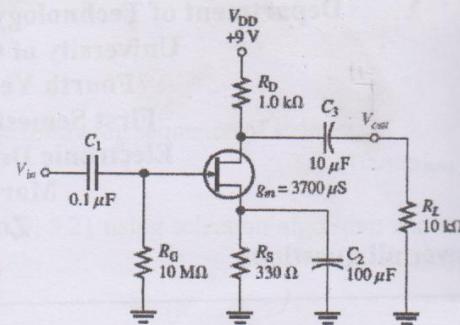


Fig-2(b)

3. (a) Determine the lower-frequency response of the FET amplifier in Fig-3(a). What is the phase shift introduced by this circuit at the critical frequency? Identify the dominant critical frequency of this FET amplifier. Assume that the load is another identical amplifier with the same R_{in} . The data sheet shows $I_{GSS}=100 \text{ nA}$ at $V_{GS}=-12 \text{ V}$.

(10-marks)

- (b) Determine the critical frequencies associated with the high-frequency response of the amplifier in Fig-3(b). Identify the dominant critical frequency and sketch the Bode plot. The transistor's data sheet provides the following: $\beta_{DC}=\beta_{ac}=125$, $C_{bc}=10 \text{ pF}$, and $C_{be}=25 \text{ pF}$.

(10-marks)

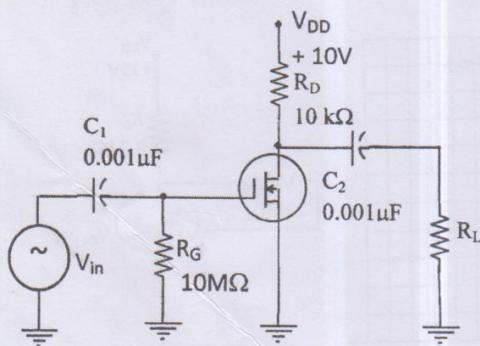


Fig-3(a)

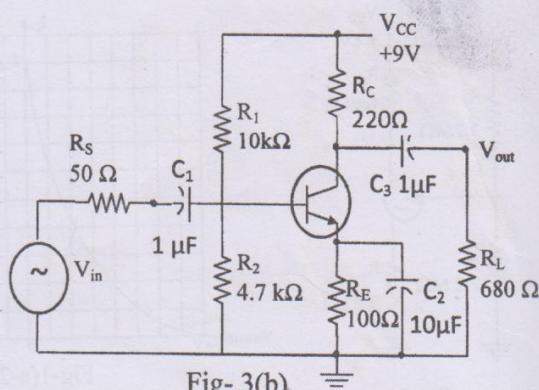


Fig-3(b)

4. (a) Determine the critical frequencies associated with the low-frequency response of the FET amplifier in Fig-4(a). Indicate the dominant critical frequency. $C_{iss}=10 \text{ pF}$, $C_{rss}=4 \text{ pF}$, $I_{GSS}=50 \text{ nA}$, $V_{GS}=-10 \text{ V}$, $V_{GS(\text{off})}=-6 \text{ V}$ and $I_{DSS}=15 \text{ mA}$.

(6-marks)

- (b) The OTA in Fig-4(b) functions as an amplitude modulation circuit. Determine the output voltage waveform for the given input waveform assuming $K=16 \mu\text{S}/\mu\text{A}$.

(14-marks)

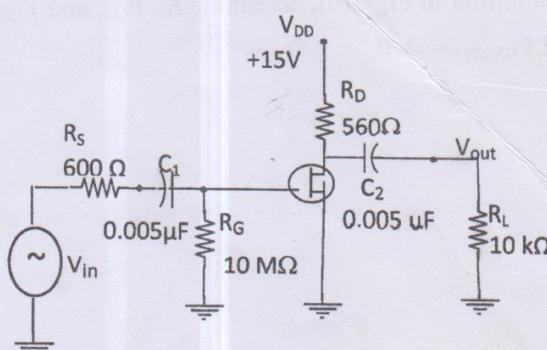


Fig-4(a)

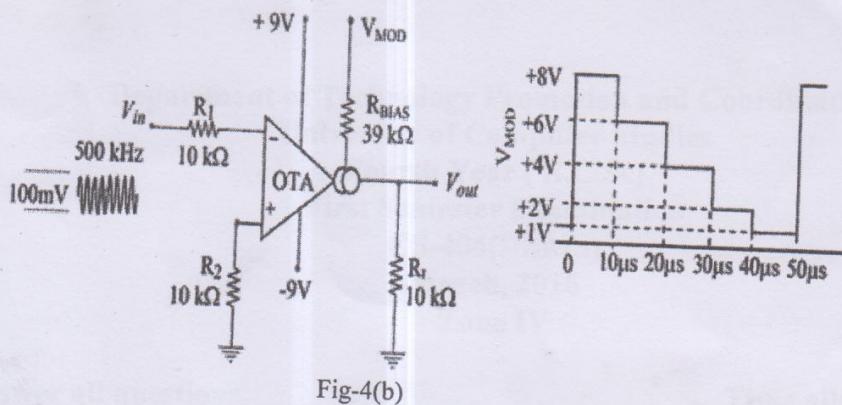


Fig-4(b)

- 5.(a) The input to the OTA amplitude modulator in Fig-5(a) is a 10mV peak-to-peak 1MHz sine wave. Determine the output signal, given the modulation voltage shown is applied to the bias input. Draw the resulting output voltage waveform. (10-marks)
- (b) Explain how Chebyshev and Bessel responses differ. Determine the critical frequency in Fig-5(b). (10-marks)

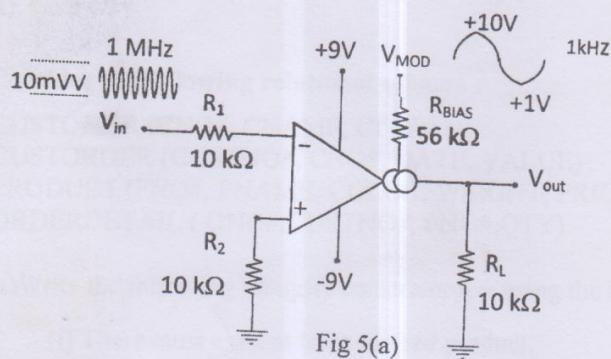
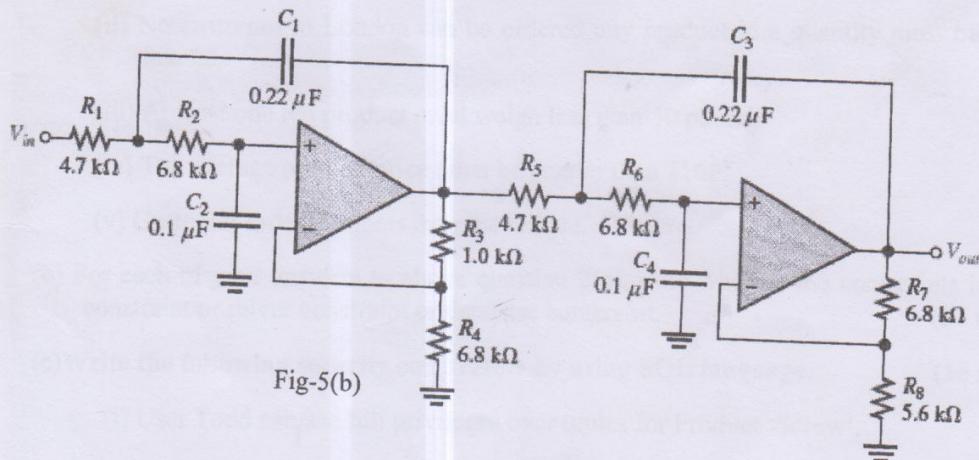


Fig 5(a)



Department of Technology Promotion and Coordination
University of Computer Studies
Fourth Year (B.C.Tech.)
First Semester Examination
Computer Architecture and Organization (CT-404)

March, 2016

Zone IV

Time allow: 3hours

Answer all question.

- 1.(a) Draw the design of a 16-bit adder composed of 4-bit adders linked by
 - (i) carry-lookahead.
 - (ii) Define the logical equation to produce generate g and propagate p . (8 marks)
- (b) Design the n bit two-complement adder-subtractor. It can compute any of the three operations $X+Y$, $X-Y$, or $Y-X$, as specified by a 2-bit MODE control input. (8 marks)

- 2.(a) An n -bit adder-substracter as shown in Fig 2(a) has been designed for two's-complement numbers. It computes $Z=X+Y$ when $SUB=0$ and $Z=X-Y$ when $SUB=1$. An overflow flag v is to be added to the circuit, but it is not possible to access internal lines. In other words, only those data and control lines appearing in the figure can be used to compute v . Construct a suitable logic circuit for v . (8 marks)
- (b) Use the multiplier cell (M) shown in Fig 2(b) to construct a combinational array multiplier for 5-bit unsigned numbers. Draw the logic diagrams for this multiplier and show all the signals (including constant signals) applied to every cell. (8 marks)

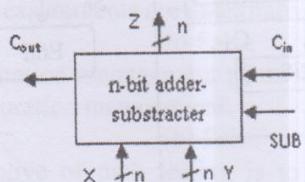


Fig-2(a)

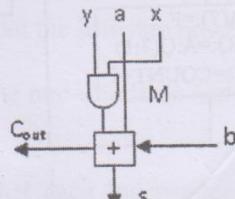


Fig-2(b)

- 3.(a) Design a register file that stores eight 32-bit numbers and has one read port A and one write port B. (4 marks)
- (b) Illustrate the behavior of the adder pipeline with four stages when performing a sequence of N floating-point addition of the form $x_i + y_i$ for the case $N=6$. From this illustration, determine the speed up factor of this pipeline. (12 marks)

- 4.(a) Describe the algorithm for floating-point addition. Illustrate the algorithm described for the addition of two floating point numbers where,
 $X = 0\ 0111111\ 10000000000000000000000000000000$
 $Y = 0\ 10000111\ 00101011010000000000000000000000$. (12 marks)
- (b) Draw a 16-bit combinational ALU composed of four 74181s linked by ripple-carry propagation. (4 marks)

- 5.(a) Design the simple processor composed of a datapath unit (DP) and control unit (CU). Describe three types of control signals that implements an addition instruction of the form ADD A, B. (10 marks)
- (b) Construct the general state tables for a finite-state machine with Mealy type and Moore type. (8 marks)
6. The flow chart for the twos complement classical multiplier is shown in Fig 6.
- Construct a Moore type state table for this multiplier control unit.
 - Drive the next-state equations and output equations.
 - Design all-NAND one-hot design for the multiplier control unit.
- (18 marks)

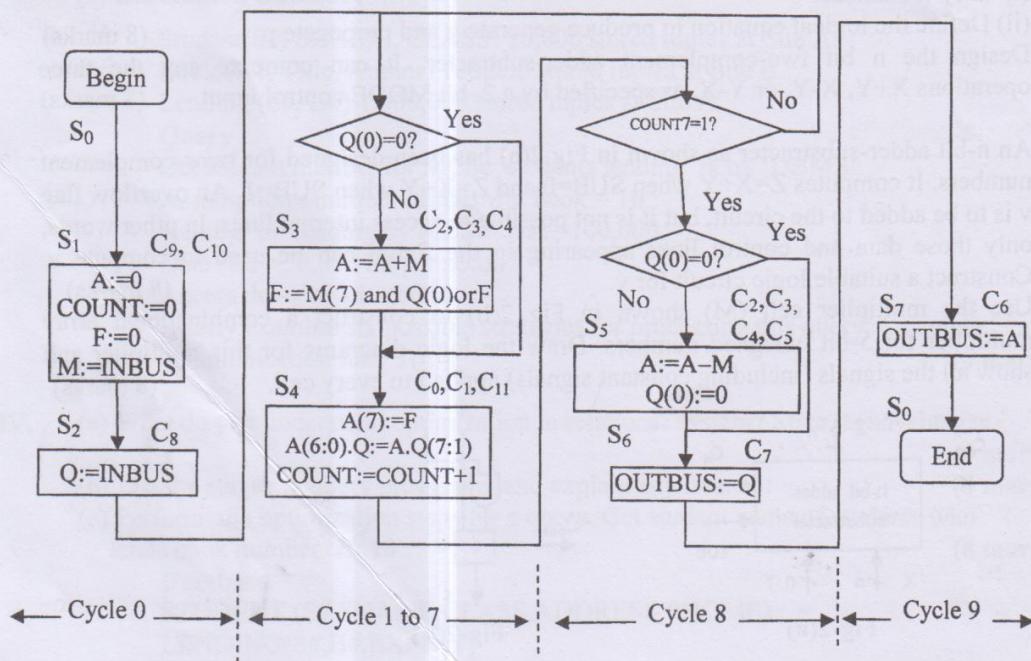


Fig- 6

Answe

1. Cho
2. The
3. In
4. Fun
5. Qua
6. Proc
7. A co
8. The
9. Verifi
10. -----
11. A -----
12. The est
13. -----

Department of Technology Promotion and Coordination

University of Computer Studies

Fourth Year (B.C.Tech.)

First Semester Examination

Linear Control System (CT-405)

March, 2016

Zone IV

Answer all questions.

Time allowed: 3 hours

- I.** A unity feedback system has a loop transfer function

$$L(s) = G_C(s)G(s) = \frac{K}{s(s+3)(s^2+6s+64)}$$

- (i) Determine the angle of departure of the root locus at the complex poles.
- (ii) Sketch the root locus.
- (iii) Determine the gain K when the roots are on the $J\omega$ -axis and determine the location of these roots.

(18-marks)

- II.** The characteristic equation of a dynamic system is $s^3 + 3s^2 + \alpha s + 3s + 6 = 0$

- (i) Determine the angle of departure of the root locus
- (ii) Sketch the root locus as α varies.

(16-marks)

- III.** A robotic arm has a joint-control loop transfer function

$$L(s) = G_C(s)G(s) = \frac{300(s+100)}{s(s+10)(s+40)}$$

Sketch the Bode diagram, Show that the frequency equals 28.3 rad/s when the phase angle of $L(j\omega)$ is -180 degree.

Find the magnitude of $L(j\omega)$ at that frequency.

(16-marks)

- IV.** Consider a unity feedback system with a loop transfer function

$$G_c(s)G(s) = \frac{10(1 + 0.4s)}{s(1 + 2s)(1 + 0.24s + 0.04s^2)}$$

- (a) Plot the **Bode** diagram.
- (b) Find the gain margin and the phase margin.

(16-marks)

- V.** The unity feedback control system has an open-loop transfer function: $G(s) = \frac{K}{s^2}$,

$H(s) = 1$. Determine the damping ratio T_s , GM and PM for the uncompensated system. The lead compensation network is added to get the following specifications:

- (i) Settling time $\leq 4 \text{ sec}$
(ii) System damping constant ≥ 0.45 .

Find the total compensated loop transfer function. Estimate the step response of the system by obtaining the rise time, settling time and damping ratio. Hint: Use Bode diagram.

(16-marks)

6. A feedback control system has a loop transfer function: $G(s) = \frac{k}{s(s+2)}$. It is desired have a steady-state error for a ramp input equal to 5% of the magnitude of the ramp. Furthermore we desired that the phase margin of the system be at least 45° . Design a phase-lead compensator using Root locus.

(18-marks)

Answer

1. Design
(i) L
(ii) P
(iii) V
(iv) T
(v) W
(vi) Z

2. Answer
(i) L
(ii) P
(iii) V
(iv) T
(v) W

3. Description
(i) B
(ii) U
(iii) S

4. (a) Frequency response
(b) Frequency response

5. (a) Gain margin
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(b)(i) de

**Department of Technology Promotion and Coordination
University of Computer Studies
Fourth Year (B.C.Tech.)
First Semester Examination
Data and Computer Communications (CT-406)
March, 2016
Zone IV**

Answer All Questions.

Time Allowed: 3 hours

- | | |
|--|---|
| 1 Define the following: | (20 marks) |
| (a) ALOHA
(b) Gigabit Ethernet
(c) Bridge
(d) End System
(e) Tunnel | (f) BGP-4 Messages
(g) Mobile node
(h) DS Domain
(i) FIFO
(j) SLA |
| 2 Answers ANY Four of all followings: | (20 marks) |
| (a) Full-duplex operation in the context of Ethernet Explain ARP work.
(b) How many different VLANs can IEEE 802.1Q trunk support?
(c) List the requirement for an internetworking facility.
(d) Briefly explain the three types of IPv6 addresses.
(e) Mobile IP
(f) Describe the characteristics of Autonomous System
(g) Briefly explain RSVP goal and characteristics.
(h) What is different between elastic and inelastic? | |
| 3 (a) What is CSMA/CD? Which topology most commonly used in CSMA/CD? Write CSMA/CD rules and operating of CSMA/CD explanation with figure.
(b) What is subnetworking? Given a network address of 128.168.0.0 and a subnet-mask of 255.255.248.0, how many subnets are created and how many hosts are there per subnet? | (20 marks) |
| 4 (a) Describe the advantages of a Connectionless Internetworking scheme. Explain the function of flag bits in the IPv4 header.
(b) Define Multicasting. Explain practical applications of multicasting. | (20 marks) |
| 5 (a) Define BGP (Border Gateway Protocol). List and briefly explain the three main functions of BGP.
(b) What is the ISA? What are the major functions that are part of an ISA? | (20 marks) |

***** End *****