

DEPARTMENT OF HIGHER EDUCATION
UNIVERSITY OF COMPUTER STUDIES
FOURTH YEAR (B.C.Sc. & B.C.Tech.)
MIDTERM EXAMINATION
MARCH, 2017
ENGLISH

ZONE IV

Answer All Questions.

Time Allowed: 3 Hours

■ Read the passage and answer the following questions. (20 Marks)

English primary school pupils subjected to more tests than in any other country.

English primary school pupils have to deal with unprecedented levels of pressure as they face tests more frequently, at a younger age, and in more subjects than children from any other country, according to one of the biggest international education inquiries in decades. The damning indictment of England's primary education system revealed that the country's children are now the most tested in the world. From their very earliest days at school they must navigate a set-up whose trademark is 'high stakes' testing, according to a recent report.

Parents are encouraged to choose schools for their children based on league tables of test scores. But this puts children under extreme pressure which could damage their motivation and self-esteem, as well as encouraging schools to 'teach to the test' at the expense of pupils' wider learning, the study found. The findings are part of a two-year inquiry – led by Cambridge University – into English primary schools. Other parts of the UK and countries such as France, Norway and Japan used testing but it was, 'less intrusive, less comprehensive, and considerably less frequent', Cambridge's Primary Review concluded.

England was unique in using testing to control what is taught in schools, to monitor teaching standards and to encourage parents to choose schools based on the results of the tests, according to Kathy Hall, from the National University of Ireland in Cork, and Kamil Ozerk, from the University of Oslo, who conducted the research. 'Assessment in England, compared to other reviewed countries, is pervasive, highly consequential, and taken by officialdom and the public more generally to portray objectively the actual quality of primary education in schools,' their report concluded. Teachers' leaders said the testing regime was 'past its sell-by date' and called for a fundamental review of assessment.

Steve Sinnott, General Secretary of the National Union of Teachers, said England's testing system was having a devastating impact on schools. 'Uniquely, England is a country where testing is used to police schools and control what is taught,' he said. When it comes to testing in England, the tail wags the dog. It is patently absurd that even the structure and content of education is shaped by the demands of the tests. I call on the Government to initiate a full and independent review of the impact of the current testing system on schools and on children's learning and to be prepared to dismantle a system which is long past its sell-by date.'

John Dunford, General Secretary of the Association of School and College Leaders, claimed that the tests were having a damaging effect on pupils. 'The whole testing regime is governed by the need to produce league tables,' he said. 'It has more to do with holding schools to account than helping pupils to progress.' The fear that many children were suffering intolerable stress because of the tests was voiced by Mick Brookes, General Secretary of the National Association of Head Teachers. There are schools that start rehearsing for key stage two SATs

[Standard Assessment Tests] from the moment the children arrive in September. "That's just utterly ridiculous," he said. There are other schools that rehearse SATs during Christmas week. These are young children we are talking about. They should be having the time of their lives at school not just worrying about tests. It is the breadth and richness of the curriculum that suffers. The consequences for schools not reaching their targets are dire – heads can lose their jobs and schools can be closed down. With this at stake it's not surprising that schools let the tests take over.'

David Laws, the Liberal Democrat schools spokesman, said: 'The uniquely high stakes placed on national tests mean that many primary schools have become too exam focused.' However, the Government rejected the criticism. "The idea that children are over-tested is not a view that the Government accepts", a spokesman said. The reality is that children spend a very small percentage of their time in school being tested. Seeing that children leave school up to the right standard in the basics is the highest priority of the Government.

In another child-centred initiative, both major political parties in the UK – Labour and the Conservatives – have announced plans to make Britain more child-friendly following a report by UNICEF which ranked the UK the worst place to be a child out of 21 rich nations. Parents were warned that they risked creating a generation of 'battery-farmed children' by always keeping them indoors to ensure their safety. The family's minister, Kevin Brennan, called for an end to the 'cotton wool' culture and warned that children would not learn to cope with risks if they were never allowed to play outdoors.

Questions 1-5

Complete the sentences.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

1. According to the inquiry, the amount of testing puts a lot of _____ on young children.
2. The education report describes testing in England as _____ testing.
3. Parents often select their children's schools after studying test results in _____.
4. Kathy Hall and Kamil Ozerk believe testing in England is also used to evaluate _____ in schools.
5. The major political parties have promised to make Britain _____ in view of the UNICEF report.

Questions 6-9

Do the following statements agree with the information given in Reading Passage? Write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

6. Steve Sinnott says what is taught at school should be more tightly controlled.
7. According to John Dunford, children would make more progress with much shorter and easier tests.
8. Mick Brookes wants to see earlier student preparation for SATs.
9. David Laws agrees with the opinions of Mick Brookes.

Question 10

Choose the correct letter, A, B, C or D.

10. What does the government argue?

- A There is not enough testing at present.
- B Tests at primary school are too easy.
- C Tests are not given too frequently.
- D Teachers should take more tests.

Fill in each numbered blank with a word from the list given.

(10 Marks)

Write down only the number of the blank and the word that fills it.

<i>demand</i>	<i>as</i>	<i>eliminating</i>	<i>but</i>	<i>the</i>
<i>at</i>	<i>but</i>	<i>unblemished</i>	<i>an</i>	<i>which</i>
<i>than</i>	<i>ground</i>	<i>across</i>	<i>a</i>	<i>and</i>
<i>spinning</i>	<i>with</i>	<i>through</i>	<i>of</i>	<i>that</i>

Glass, 1..... has been made since the time of the Mesopotamians and Egyptians, is little more than a mixture of sand, soda ash 2..... lime. When heated to about 1500 degrees Celsius (°C) this becomes a molten mass 3..... hardens when slowly cooled. The first successful method for making clear, flat glass involved 4..... This method was very effective 5..... the glass had not touched any surfaces between being soft and becoming hard, so it stayed perfectly 6....., with a 'fire finish'. However, the process took a long time and was labour intensive.

Nevertheless, 7..... for flat glass was very high and glassmakers 8..... the world were looking for a method of making it continuously. The first continuous ribbon process involved heating molten glass 9..... two hot rollers, similar to 10..... old mangle. This allowed glass of virtually any thickness to be made non-stop, 11..... the rollers would leave both sides of the glass marked, and these would then need to be 12..... and polished. This part of the process rubbed away around 20 per cent 13..... the glass, and the machines were very expensive. The float process for making flat glass was invented by Alistair Pilkington. This allows the manufacture of clear, tinted and coated glass for buildings, and clear and tinted glass for vehicles. Pilkington had been experimenting 14..... improving the melting process, and in 1952 he had the idea of using a bed of molten metal to form the flat glass, 15..... altogether the need for rollers within the float bath. The metal had to melt 16..... a temperature less 17..... the hardening point of glass (about 600°C), 18..... could not cool 19..... temperature below 20..... temperature of the molten glass (about 1500°C). The metal for the job was tin.

11a) Choose the most suitable words.

(15 Marks)

on holiday survey

1 *This/That* survey aimed to find out about 2 *people's / the people's* ideal holidays. We

3 *the interviews / interviews* and 4 *the questionnaires / questionnaires* to collect 5 *our/*

6 *Both/All* of 7 *those/these* methods of data collection were quick and simple to carry

8 *neither/none* of them were too demanding of the public. 9 *Our findings / Findings*

10 *This/The* view was reinforced by 11 *the people /people* involved in 12 *a survey / the*

13 *The beach holidays / Beach holidays* were the most popular, particularly in 14 *the*

15 *Spain or 15 the France / France*.

III.(B) Choose the correct form of the verbs.

(5 Marks)

1. All the information *is / are* interesting and well presented, but we need to consider the whole situation very carefully before we reach a decision.
2. There *was / were* some important news about the proposed new hospital in the local paper today.
3. The data *show / shows* that the numbers of people buying mobile phones has remained stable for the past two years.
4. There *was / were* no facilities like running water or electricity in the village.
5. The ideas in the report *was / were* presented in a very clear way.

III. (C) Fill in the gaps with words from the list given.

(10 Marks)

*both that each every my neither
none this that their those*

My home town is smaller than London, but there are some similarities. *1.....* of the two cities is famous for its architecture. For example, *2.....* Kuala Lumpur and London have tall, modern buildings, set amongst older historical buildings. Although both cities have rivers running through them, *3.....* city is by the sea, which is a shame, as I think some of the most beautiful cities in the world are by the sea.

4..... major city in the world has one thing in common - being large and busy - and *5.....* is true of both London and Kuala Lumpur. In fact, some people don't like the city because it is so noisy and busy, but *6.....* is one reason why I love it. A lot of city markets take place in the day-time, but in *7.....* home city they don't open until it's dark! Malaysians tend to buy all their groceries at the night markets. In London people tend to use supermarkets for *8.....* food shopping.

It is always hot in Kuala Lumpur, but London can get very cold. *9.....* 's probably why you get outdoor restaurants all over Kuala Lumpur all year round whereas in London they are almost *10.....* in the winter.

IV.(A) Describe a time when you were asked to give our opinion in a questionnaire or survey.

You should write:

(8 Marks)

what the questionnaire/survey was about
why you were asked to give your opinions
what opinions you gave
and explain how you felt about giving your opinions in this questionnaire/survey

IV. (B) 1. What would the advantages for schools be if they asked students their opinions?

(2 Marks)

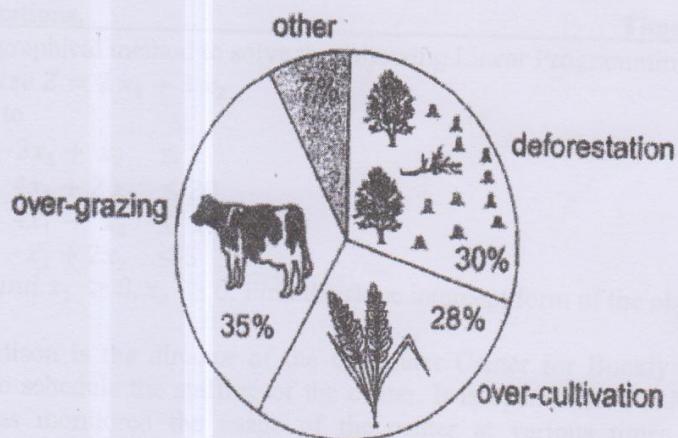
2. What kinds of problem do people sometimes have with their neighbours?

(2 Marks)

IV.(C) The pie chart below shows the main reasons why agricultural land becomes less productive. The table shows how these causes affected three regions of the world during the 1990s.

Summarise the information by selecting and reporting the main features, and make comparisons where relevant. (8 Marks)

Causes of worldwide land degradation



Causes of land degradation by region

Region	% land degraded by...			
	deforestation	over-cultivation	over-grazing	Total land degraded
North America	0.2	3.3	1.5	5%
Europe	9.8	7.7	5.5	23%
Oceania*	1.7	0	11.3	13%

* A large group of islands in the South Pacific including Australia and New Zealand

V. Write about the following topic:

(20 Marks)

Some people say that computers have made life easier and more convenient.

Other people say that computers have made life more complex and stressful.

What is your opinion? Use specific reasons and examples to support your answer.

Give reasons for your answer and include any relevant examples from your own knowledge or experience.

**Department of Higher Education
University of Computer Studies
Fourth Year (B.C.Sc.)
Mid Term Examination
Operation Research (CS-401)**

March, 2017

Zone IV

Answer all questions.

Time allowed: 3 hours

1. (a) Use the graphical method to solve the following Linear Programming problem.

$$\begin{aligned} \text{Maximize } Z &= 2x_1 + 3x_2 \\ \text{Subject to} \end{aligned}$$

$$\begin{aligned} -3x_1 + x_2 &\leq 1 \\ 4x_1 + 2x_2 &\leq 20 \\ 4x_1 - x_2 &\leq 10 \\ -x_1 + 2x_2 &\leq 5 \end{aligned}$$

and $x_1 \geq 0, x_2 \geq 0$. Find the slope intercept form of the object function.

- (b) Larry Edison is the director of the Computer Center for Buckley College. He now needs to schedule the staffing of the center. It is open from 8 A.M. until midnight. Larry has monitored the usage of the center at various times of the day, and determined that the following number of computer consultants are required:

Time of day	Minimum number of Consultants Required to be on duty
8 A.M - noon	4
Noon - 4 P.M	8
4 P.M - 8 P.M	10
8 P.M - midnight	6

Two types of computer consultants can be hired: full-time and part-time. The full-time consultants work for 8 consecutive hours in any of the following shifts: morning (8 A.M- 4 P.M), afternoon (noon – 8 P.M), and evening (4 P.M – midnight). Full-time consultants are paid \$ 14 per hour.

Part-time consultants can be hired to work any of the four shifts listed in the above table. Part-time consultants are paid \$12 per hour.

An additional requirement is that during every time period, there must be at least 2 full-time consultants on duty for every part-time consultant on duty.

Larry would like to determine how many full-time and how many part-time workers should work each shift to meet the above requirements at the minimum possible cost. Formulate a linear programming model for this problem.

(20-marks)

2. (a) Solve the following linear programming problem by using Two Phases method.

$$\begin{aligned} \text{Minimize } Z &= 2x_1 + x_2 + 3x_3 \\ \text{Subject to} \end{aligned}$$

$$5x_1 + 2x_2 + 7x_3 = 420$$

$$3x_1 + 2x_2 + 5x_3 \geq 280$$

and $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

- (b) Solve the following linear programming problem by using Big-M method.
- Maximize $Z = 2x_1 + 5x_2 + 3x_3$*
- Subject to

$$x_1 - 2x_2 + x_3 \geq 20$$

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

and $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

3. (a) Construct the dual problems for the following primal problems. (20-marks)

(i) *Maximize $Z = x_1 + 2x_2$*
Subject to

$$x_1 + 3x_2 \leq 8$$

$$x_1 + x_2 \leq 4$$

and $x_1 \geq 0, x_2 \geq 0$

(ii) *Maximize $Z = 6x_1 + 8x_2$*
Subject to

$$5x_1 + 2x_2 \leq 20$$

$$x_1 + 2x_2 \leq 10$$

and $x_1 \geq 0, x_2 \geq 0$

- (b) Consider the following problem.

Maximize $Z = 3x_1 + 5x_2$
Subject to

$$x_1 \leq 4$$

$$2x_2 \leq 12$$

$$3x_1 + 2x_2 \leq 18$$

and $x_1 \geq 0, x_2 \geq 0$

- (i) Construct the dual problem for this primal problem.
(ii) Solve the primal problem graphically. Identify the CPF solution and corner point infeasible solutions for this problem. Calculate the objective function values for all these solutions.
(iii) Use the information obtained in part (ii) to construct a table listing the complementary basic solutions for these problems.

4. Consider the following problem. (30-marks)

Maximize $Z = 3x_1 + 2x_2$

Subject to

$$3x_1 + x_2 \leq 12$$

$$x_1 + x_2 \leq 6$$

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

and $x_1 \geq 0, x_2 \geq 0$

Solve the dual of this problem manually by the dual simplex method. Identify the basic solution for the primal problem in each iteration. (10-marks)

5. (a) Sarah operates a concession stand at a downtown location throughout the year. One of her most popular items is circus peanuts, selling about 200 bags per month. Sarah purchases the circus peanuts from Peter's Peanut Shop. She has been purchasing 100 bags at a time. However, to encourage larger purchases, Peter now is offering her discounts for larger order sizes according to the following price schedule, where the price for each category applies to every bag purchased.

Sarah wants quantity short of the cost of \$4 for

(i) For each calculate total cost

(ii) For each optimal

(iii) How many orders?

(b) Suppose that respective demand is \$4,000, the unit deterministic price satisfies the mo

Discount Category	Order Quantity	Price(per bag)
1	1 to 199	\$1.00
2	200 to 499	\$0.95
3	500 or more	\$0.90

(20-marks)

Sarah wants to use the EOQ model with quantity discounts to determine what her order quantity should be. For this purpose, she estimates an annual holding cost rate of 17 percent of the value (based on purchase price) of the peanuts. She also estimates a setup cost of \$4 for placing each order.

- For each discount category, use the EOQ formula for the basic EOQ model to calculate the value of Q (feasible or infeasible) that gives the minimum value of the total cost per year.
- For each discount category, calculate the total cost per year and determine the optimal order quantity and the corresponding optimal value of TC .
- How many orders need to be placed per year? What is the time interval between orders?
- 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 \$4,000, the unit production cost is \$1,000, and unit holding cost is \$300. Use the deterministic periodic review model to determine the optimal production schedule that satisfies the monthly requirements.

(20-marks)

on and consecutive functions

ble listing

(31-marks)

Department of Higher Education
University of Computer Studies
Fourth Year (B.C.Sc. /B.C.Tech.)
Mid Term Examination
Mathematics of Computing IV (CST-402)
March, 2017
Zone IV

All Questions.

Time allowed: 3 hours

Q1 Solve exactly. Compute the error with Improved Euler and Range Kutta method.
 $-xy^2 = 0, y(0) = 1, h = 0.1.$ (Used 8D) (20-marks)

Q2 Solve the initial value problem $y' = 2xy, y(0) = 1, h = 0.1,$ (1.010050, 1.040811, 1.094175) by the Adams-Moulton method. Do 7-steps. Compute the errors by using the exact solution.

Q3 Apply Euler's method for the following initial value problem. Calculate the errors. (Used 5D)
 $y'' + \frac{1}{4}y = 0, y(0) = 1, y'(0) = 0, h = 0.2, 5 \text{ steps}$ (20-marks)

Q4 Derive the maximum likelihood estimator for $\mu.$ Apply it to the sample (10, 25, 26, 17, 10, 4), giving numbers of minutes with 0-10, 11-20, 21-30, 31-40, 41-50, more than fliers per minutes, respectively, checking in at some airport check-in. (Using Poisson distribution)

Q5 Determine a 99% confidence interval for the mean of a normal population, using the sample 32, 33, 32, 34, 35, 29, 29, 27. (20-marks)

Q6 Find a 95% confidence interval for the variance of a normal population from the sample length of 20 bolts with sample mean 20.2 cm and sample variance $0.04 \text{ cm}^2.$

Q7 Test $\mu = 0$ against $\mu > 0,$ assuming normality and using the sample 0, 1, -1, 3, -8, 6, 1 (deviations of the azimuth [multiples of 0.01 radian] in some revolution of a satellite.) Choose $\alpha = 5\%.$

Q8 Using a sample of 10 values with mean 14.5 from a normal population with variance $\sigma^2 = 0.25,$ test the hypothesis $\mu_0 = 15.0$ against the alternative $\mu_1 = 14.5$ on the 5% level.

Q9 The tensile strength of a sample of $n = 16$ manila ropes (diameter 3 in) was measured. The sample mean was $\bar{x} = 4482 \text{ kg}$ and the sample standard deviation was $s = 115 \text{ kg}.$ Assuming that the tensile strength is a normal random variable, test the hypothesis $\mu_0 = 4500 \text{ kg}$ against the alternative $\mu_1 = 4400 \text{ kg}.$ Choose $\alpha = 5\%.$ (20-marks)

Q10 Assume the thickness X of washers to be normal with mean 2.75 mm and variance $0.00024 \text{ mm}^2.$ Set a control chart for mean μ and graph the means of the five samples (2.74, 2.76), (2.74, 2.74), (2.78, 2.81), (2.78, 2.76), (2.71, 2.75) on the chart.

Q11 Suppose that certain tool bits are packaged 20 to a box and the following sampling plan is used. A sample of two tool bits is drawn and the corresponding box is accepted if and only if both bits in the sample are good. What are the producer's and consumer's risks if the AQL is 0.1 and the RQL is 0.01?

Q12 If 1000 flips of a coin result in 40 heads and 60 tails, can we assert on the 5% level that the coin is fair? (20-marks)

Table A8 Normal Distribution

%	$z(\Phi)$	$z(D)$	%	$z(\Phi)$	$z(D)$	%	$z(\Phi)$	$z(D)$
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
	11	12	13	14	15	16	17	18	19	20
0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
0.7	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53
0.8	0.88	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.86
0.9	1.36	1.36	1.35	1.35	1.34	1.34	1.33	1.33	1.33	1.33
0.95	1.80	1.78	1.77	1.76	1.75	1.75	1.74	1.73	1.73	1.72
0.975	2.20	2.18	2.16	2.14	2.13	2.12	2.11	2.10	2.09	2.09
0.99	2.72	2.68	2.65	2.62	2.60	2.58	2.57	2.55	2.54	2.53
0.995	3.11	3.05	3.01	2.98	2.95	2.92	2.90	2.88	2.86	2.85
0.999	4.02	3.93	3.85	3.79	3.73	3.69	3.65	3.61	3.58	3.55

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
	11	12	13	14	15	16	17	18	19	20
0.005	2.60	3.07	3.57	4.07	4.60	5.14	5.70	6.26	6.84	7.43
0.01	3.05	3.57	4.11	4.66	5.23	5.81	6.41	7.01	7.63	8.26
0.025	3.82	4.40	5.01	5.63	6.26	6.91	7.56	8.23	8.91	9.59
0.05	4.57	5.23	5.89	6.57	7.26	7.96	8.67	9.39	10.12	10.85
0.95	19.68	21.03	22.36	23.68	25.00	26.30	27.59	28.87	30.14	31.41
0.975	21.92	23.34	24.74	26.12	27.49	28.85	30.19	31.53	32.85	34.17
0.99	24.72	26.22	27.69	29.14	30.58	32.00	33.41	34.81	36.19	37.57
0.995	26.76	28.30	29.82	31.32	32.80	34.27	35.72	37.16	38.58	40.00

z(D)	
1.311	
1.341	
1.372	
1.405	
1.440	

9	10
0.00	0.00
0.26	0.26
0.54	0.54
0.88	0.88
1.38	1.37

1.83	1.81
2.26	2.23
2.82	2.76
3.25	3.17
4.30	4.34
19	20

1.73	1.72
2.09	2.06
2.54	2.53
2.86	2.85
3.58	3.55

9	10
1.73	2.06
2.09	2.56
2.70	3.25
3.33	3.94

16.92	18.31
19.02	20.40
21.67	23.22
23.59	25.59
19	20

6.84	7.40
7.63	8.32
8.91	9.59
10.12	10.88
30.14	30.44

32.85	34.07
36.19	37.07
38.58	40.00

**Department of Higher Education
University of Computer Studies**

Fourth Year (B.C.Sc)

Analysis of Algorithms (CS – 403)

Mid Term Examination

March, 2017

Zone-IV

Answer All Questions .

Time allowed: 3 hours

1.(a) Define Any four the followings: (8 marks)

- (i) Straight-Line Program
- (ii) Heapsort
- (iii) Decision tree
- (iv) Bitwise computation
- (v) Time complexity

(b) Briefly explain Any Three of the following: (12 marks)

- (i) Worst – case complexity and Expected complexity
- (ii) Divide-And-Conquer Approach
- (iii) Random Access Stored Program Machine (RASP)
- (iv) Turing Machine

2. (a) Give Pidgin ALGOL and RAM program to accept all input of the form 1^n2^n0 . (10 marks)

(b) Analyze the time and space complexity of your program under the uniform and logarithmic cost. (10 marks)

3. (a) Proof that,if costs of instructions are either uniform or logarithmic, for every RAM program of time complexity $T(n)$ there is a constant k such that there is an equivalent RASP program of time complexity at most $KT(n)$. (6 marks)

(b) Specify a Turing machine which when given two binary integers on tape 1 and 2 will print their sum on tape 3. You may assume the left end of the tapes are marked by a special sample \$. (14 marks)

4. (a) $P(x) = a_nx^n + a_{n-1}x^{n-1} + \dots + a_1x + a_0$ by using straight-line programs corresponding to Horner's rule. (6marks)

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

$$M = M_1 * M_2 * M_3 * M_4 \quad (14 \text{ marks})$$

$$[20 \times 10] \quad [10 \times 30] \quad [30 \times 100] \quad [100 \times 1]$$

Department of Higher Education
University of Computer Studies

Fourth Year (B.C.Tech.)

Mid Term Examination

Electronic II (CT-403)

ZONE IV

March, 2017

Answer ALL questions.

Time allowed: 3 hours

- (10 marks)
in sequence
and m-l, m-
(10 marks)
- (a) Set up a midpoint bias for a JFET with $I_{DSS}=14\text{mA}$ and $V_{GS(\text{off})}=-10\text{V}$. Use a 24V dc source as the supply voltage. Show the circuit and resistor values. Indicate the values of I_D , V_{GS} and V_{DS} . (10marks)
- (b) Determine I_D and V_{GS} for the JFET with voltage divider bias in Figure-1 given that for this particular JFET the parameter values are such that $V_D \approx 7\text{V}$. (10 marks)
- (a) For the unloaded amplifier in Figure-2(a) , find V_{GS} , I_D , V_{DS} and the rms output voltage V_{DS} . $I_{D(\text{on})}= 8\text{ mA}$ at $V_{GS}= 12\text{V}$, $V_{GS(\text{th})}=4\text{V}$ and $g_m=4500\text{S}$. (10 marks)

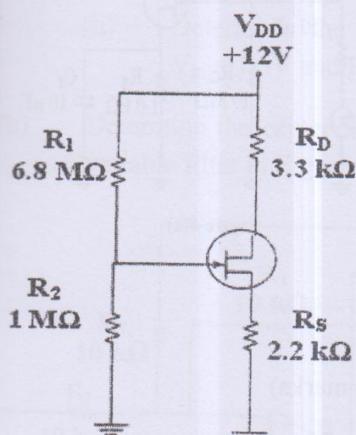


Figure-1

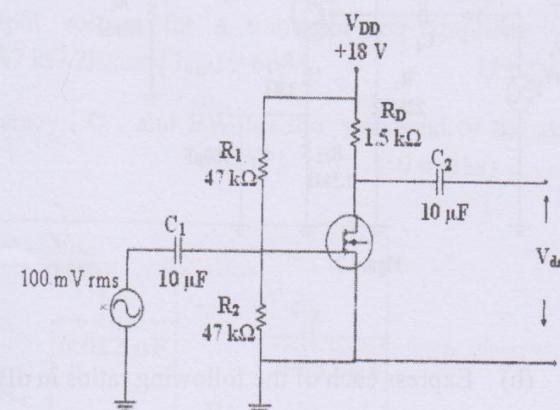


Figure-2(a)

- (b) Determine the voltage gain of each amplifier in Figure-2(b) and Figure-2(c).

(10 marks)

```

begin
1. for i = 1 until n do 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 = MINi <= k < j (mik + mk+1,j + ri-1 * rk * rj);
end;
6. write m1n;

```

- 5.(a) Sort the sequence $S = \{6, 3, 7, 9, 4, 5, 2\}$ using **Heapsort** algorithm. (10 marks)
- (b) Prove that the lexicographic sort (fixed-length) algorithm sorts a length n sequence of k tuples, where each component of a k -tuple is an integer between 0 and $m-1$, in time $O((m+n)k)$. (10 marks)

Answer A

- 1 (a) S
d
v
(b) D
fo
- 2 (a) Fo
vo

R_1
6.8 M Ω

R_2
1 M Ω

- (b) Deter

Department of Higher Education
University of Computer Studies
Fourth Year (B.C.Sc)
Mid Term Examination
Database Management System (CS-404)
March, 2017
Zone IV

Answer all questions.

Time allowed: 3 hours

- I** Write a short note on **Any FIVE** of the followings: (25 Marks)
- (a) Triggered Procedure
 - (b) Audit Trails
 - (c) Global Deadlock
 - (d) ACID Properties
 - (e) Two-phase Commit
 - (f) Data Access Protocol
 - (g) Inconsistent analysis problem
- II** Consider the following relational schema:
- Employee { Emp#, Ename, Address, Phone-No }
Product { Prod#, Pname, Color, Price }
Sale { Emp#, Prod#, Qty }
- (a)** Write the following security constraints by using hypothetical syntax. (15 Marks)
- (i) User 'Alex' INSERT and RETRIEVE privileges over the Employee relvar.
 - (ii) User 'John' RETRIEVE and UPDATE privileges over the Pname and Price (only) attributes of Product relvar.
 - (iii) User 'Blake' full privileges (RETRIEVE, UPDATE, INSERT, DELETE) over tuples for 'Samsung' product.
 - (iv) User 'Clark' can RETRIEVE and DELETE privileges over Product information, but only for products which was sold by 'Cathy'.
 - (v) User 'David' can RETRIEVE total shipment quantity per employee, but not individual quantities.
- (b)** Using the hypothetical syntax, write integrity constraints. (15 Marks)
- (i) Product price must be in the range 5000 to 10000.
 - (ii) Every employee number in the sale relvar also exists in the employee relvar.
 - (iii) The products 'Acer' with color red are sold by 'Rose'.
 - (iv) Every 'Samsung' product must be sold by 'Pinky'.
 - (v) The only legal product names are Samsung, Acer, Dell, Apple, MSI, Lenovo, HP.

Q How do you understand a transaction by using sample transaction in pseudo code?

(5Marks)

(b) Describe the details of the encryption algorithm with the following plaintext and key.
 Plaintext: WE ARE COMPUTER STUDENTS
 Encryption key: FOURTH

IV. (a) Define the definitions of lock types X, S, IX, IS, SIX. (10 Marks)

(b) Suppose outside sources that Apple's type is iphone with model-no 6S. Write a sequence of statistical queries that will reveal Apple's price using individual tracker. (5 Marks)

Mid	MName	Type	Model-No	Country	Price
M1	Huawei	Honor	8	China	\$250
M2	Lenovo	Vibe	A	Malaysia	\$ 300
M3	Apple	Iphone	6S	Japan	\$800
M4	Apple	Iphone	6S plus	Japan	\$900
M5	Samsung	Galaxy	J7	Korea	\$500
M6	Apple	Ipad	Pro 9.7	Japan	\$ 650
M7	Vivo	Vivo	Y51	China	\$ 350

V. (a) List the twelve objectives of distributed database system and briefly explain about local autonomy.

(b) Consider the following supplier-part database: (7 Marks)

S {S#, CITY} (8 Marks)

P {P#, COLOR} 10,000 stored tuples at London site

SP { S#, P#} 100,000 stored tuples at Paris site

1,000,000 stored tuples at London site

Assume that every stored tuple is 25 byte long.

Estimated cardinalities of certain intermediate result:

Number of red parts = 10

Number of shipments by London supplier = 100,000

Communication Assumption:

Date rate = 50,000 bits per second

Access delay = 0.1 second

Describe the possible distributed query processing strategies and examine which is the best strategies for the query "Get supplier numbers for London suppliers who supply at least one red parts".

Answer

1.(a) (i)

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(ii) V
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(b) Desi

(i) ri

(iii) D

2.(a) What
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(b) (i)Desi

(ii)Illustr
fractions

Department of Higher Education
University of Computer Studies

Third Year (B.C.Sc.)

Mid Term Examination

Software Engineering (CS-405)

March, 2017

Zone IV

Answer all Questions

Time allowed : 3hours

I. Choose the correct answer from the following:

(15marks)

1. Validation: Are we building the product right?
(a) True (b) False
2. Program inspections are reviews whose objective is program defect detection.
(a) True (b) False
3. Where customers are involved in release testing, this is sometimes called acceptance testing.
(a) True (b) False
4. Interface testing is the process of testing individual components in the system.
(a) True (b) False
5. To satisfy esteem needs, you need to give people time to meet their co-workers and to provide places for them to meet.
(a) True (b) False
6. Programs are regarded as group property rather than personal property.
(a) True (b) False
7. Good support technology such as CASE tools and configuration management system can improve productivity.
(a) True (b) False
8. Productivity estimates are usually base on measuring attributes of the software and dividing this by the total effort required for development.
(a) True (b) False
9. Predictor metrics are usually associated with software processes.
(a) True (b) False
10. Dynamic metrics that are collected by measurements made of representations of the system such as the design, program or documentation.
(a) True (b) False

11. Another name for black-box testing is _____.
(a) glass-box testing (b) functional testing (c) clear-box testing
12. _____ people are motivated by the presence and actions of coworkers.
(a) Task-oriented (b) Self-oriented (c) Interaction-oriented
13. _____ involves making modifications to the existing process.
(a) Process measurement (b) Process analysis (c) Process change
14. _____ model assumes that systems are created from reusable components, scripting or database programming.
(a) An application-composition (b) A reuse (c) A post-architecture
15. In _____, the component is given an explicit, unique version number.
(a) Version numbering (b) Attribute-based identification (c) Change-oriented identification

II. Define any five terms from the following. (15marks)

- (a) Defecting testing
(b) Task-oriented people
(c) Size-related metrics
(d) Integration testing
(e) Product standard
(f) Quality control
(g) Managed processes

III. Write short note on any three from the following. (15 marks)

- (a) Three major advantages of inspection over testing
(b) Discuss about four classes of software processes.
(c) Briefly explain about algorithmic cost modeling technique.
(d) What are the numbers of factors that influence group working?
(e) Explain about three main activities from software quality management for large system.

IV. (a) Write a short note on three classes of interface errors. (5 marks)

- (b) Draw a flow graph for the following algorithm display the paths through the flow graph and calculate the Cyclomatic Complexity of program flow graph. (10 marks)**

V. (a) Expla

(b) Brief

```

public double calculate (int amount)
{
    1. double rushCharge = 0;
    2. if (nextday.equals("yes"))
    {
        3. rushCharge =14.50;
    }
    4. Double tax= amount * .0725;
    5. if (amount >=1000)
    {
        6. shipcharge= amount * .06 + rushCharge;
    }
    7. else if (amount >=200)
    {
        8. shipcharge= amount * .08 + rushCharge;
    }
    9. else if (amount >=100)
    {
        10. shipcharge= 13.25 + rushCharge;
    }
    11. else if (amount >=50)
    {
        12. shipcharge= 9.95 + rushCharge;
    }
    13. else if (amount >=25)
    {
        14. shipcharge= 7.25 + rushCharge;
    }
    else
    {
        15. shipcharge=5.25 +rushCharge;
    }
    16. total= amount + tax + shipcharge;
    17. return total;
    } //end calculate
}

```

V. (a) Explain about debugging process.

(10 marks)

(b) Briefly discuss the P-CMM model.

(10 marks)

VI. (a) In the development of large, embedded real-time systems, suggest five factors that are likely to have a significant effect on the productivity of the software development team. (10 marks)

(OR)

Why are documentation standards important in a software project? Explain about any two types of these standards. (10 marks)

Answer

1. A tape

(b) List the stages of process change process and briefly explain these stages. (10 marks)

(OR)

Explain why an attribute-based version identification system makes it easier to discover all of the components making up a specific version of a system. (10 marks)

(a) Sketch
K=6.5. (b)
step input.

2. Sketch the

(a) Find the
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3. The tendo
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and -30dB at

4. A system ha

Plot the Bode
approximately

5. The single-lo
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network is add

(i) Settling tim

(ii) System da

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compensating. E
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Design a

**Department of Higher Education
University of Computer Studies
Fourth Year (B.C.Sc.)
Mid Term Examination
Artificial Intelligence (CS-406)
March, 2017
Zone IV**

Answer all questions.

Time allowed: 3 hours

1. (a) Define ANY FIVE of the following: (10 marks)
 - (i) Rational agent
 - (ii) Successor function
 - (iii) Abstraction
 - (iv) Plateaux
 - (v) Back jumping
 - (vi) Path consistency
(b) Explain the distinction between the following: (10 marks)
 - (i) Local beam search and Simulated annealing search
 - (ii) Fully observable and Partially observable

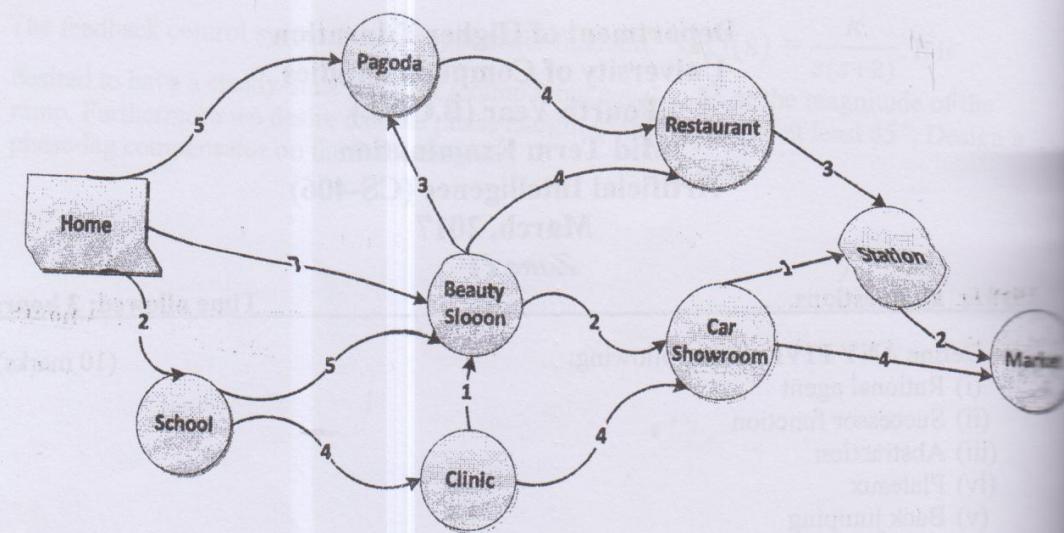
2. Write short notes on followings: (20 marks)
 - (a) Types of absolute constraints
 - (b) Measuring Problem Solving Performance
 - (c) Recursive Best First Search
 - (d) Genetic algorithm with examples

3. (a) Draw general model of learning agents and discuss about it.
(b) Give the characteristics of task environment for Crossword puzzle agent.
(c) Develop a PEAS description of the task environment for Internet book shopping agent. (15 marks)

4. (a) Give the initial state, goal test, successor function, and cost function for the Vacuum Cleaner World.

(b) Consider the state space where start state is number 1 and the successor function for a state returns two state number $3n$ and $3n+1$. Draw the portion of state space for state 1 to 19.
Suppose the goal state is 16, list the order in which nodes will be visited for Breadth first search and Iterative deepening search.

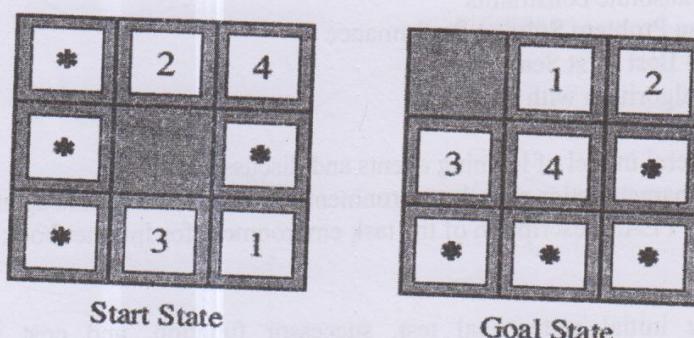
(c) Marry just moved to a new home and has to figure out the shortest paths to various places from her new place. Draw the search tree for the depth first search approach for finding a route from Home to Market, assuming a graph search algorithm.
 - (i) How many nodes are expanded by this search?
 - (ii) What is the cost of the route found by this search?



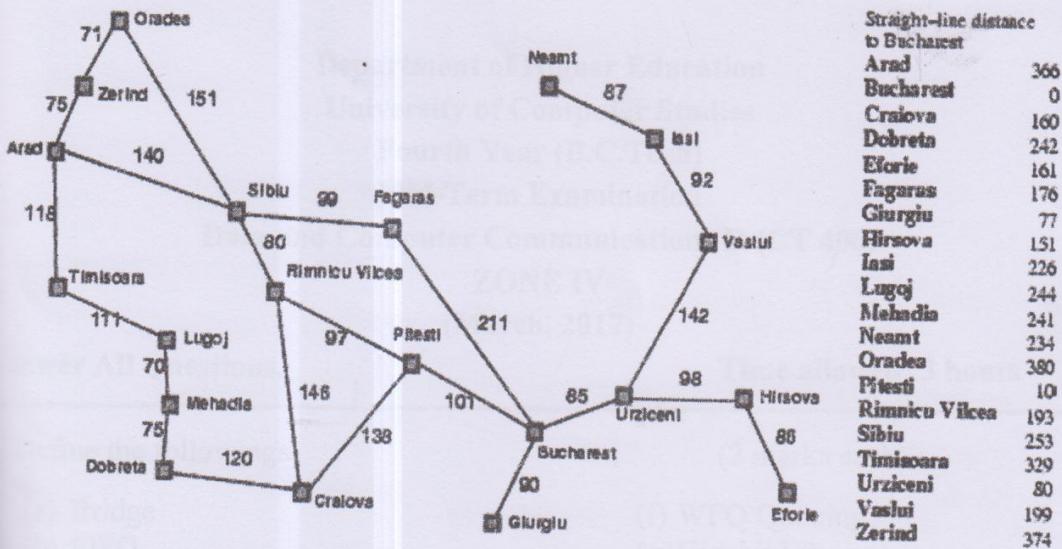
(15 marks)

- 5.(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.

(b) What is Heuristic function? Calculate the misplaced tiles and Manhattan distance for the following 8-puzzle problem.



- (c) Trace the operation Recursive Best First Search applied to the problem of getting to Bucharest from Oradea using 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.



(15 marks)

(15 marks)

6. (a) Define Forward Checking and detail explain with example.

(b) In solving Constraint Satisfaction Problems how many heuristic function can be applied to decide which variable is better than the others? List and define them.

(c) In Cryptarithmetic problem, each letter stands for a distinct digit (0-9). The aim is to find a substitution of digits for letter such that the resulting sum is arithmetically correct, with the added restriction that no leading zero are allowed.

 - (i) Draw constraint graph for the figure.
 - (ii) What are variable, value and constraints?
 - (iii) How many solutions are there?

$$\begin{array}{r} \text{TWO} \\ + \text{TWO} \\ \hline \text{FOUR} \end{array}$$

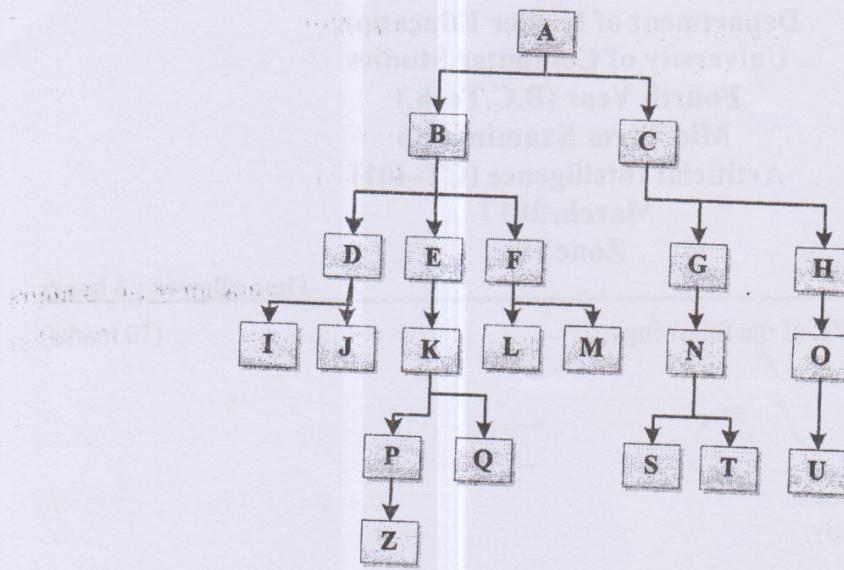
(15 marks)

**Department of Higher Education
University of Computer Studies
Fourth Year (B.C.Tech.)
Mid Term Examination
Artificial Intelligence (CT-401)
March, 2017
Zone IV**

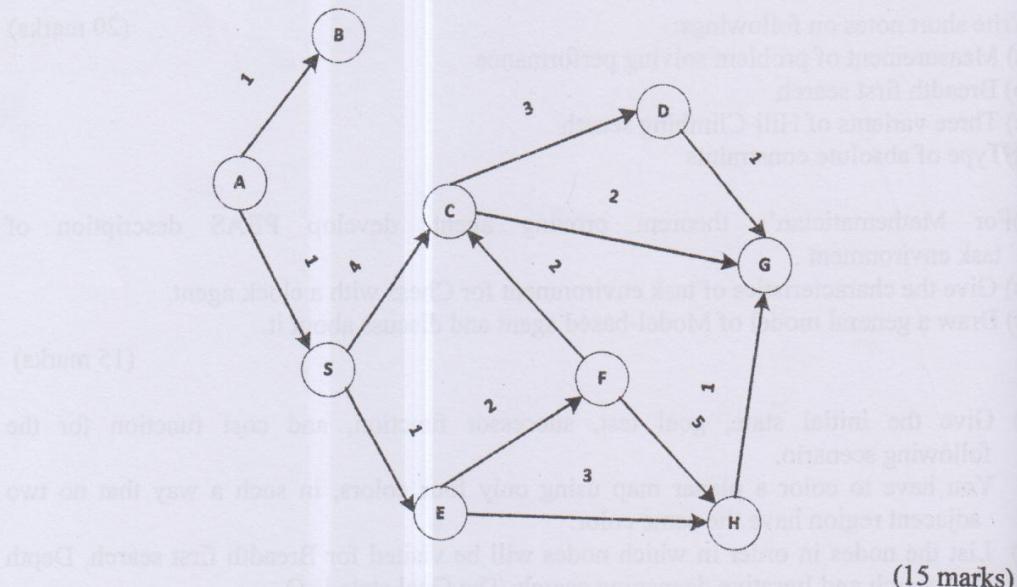
Answer all questions.

Time allowed : 3 hours

- Q. (a) Define ANY FIVE of the following (10 marks)**
- i. Intelligent
 - ii. Fringe
 - iii. Abstraction
 - iv. Plateaux
 - v. Relaxed Problem
 - vi. Commutatively
- Q. (b) Differentiate the following. (10 marks)**
- i. State space and Search tree
 - ii. Constraint propagation and Bound propagation
- Q. Write short notes on followings: (20 marks)**
- (a) Measurement of problem solving performance
 - (b) Breadth first search
 - (c) Three variants of Hill-Climbing search
 - (d) Type of absolute constraints
- Q. (a) For Mathematician's theorem proving agent, develop PEAS description of task environment. (15 marks)**
- (b) Give the characteristics of task environment for Chess with a clock agent.
- (c) Draw a general model of Model-based agent and discuss about it.
- Q. (a) Give the initial state, goal test, successor function, and cost function for the following scenario. (15 marks)**
- You have to color a planar map using only four colors, in such a way that no two adjacent region have the same color.
- Q. (b) List the nodes in order in which nodes will be visited for Breadth first search, Depth first search and Iterative deepening search. The Goal state is Q. (15 marks)**

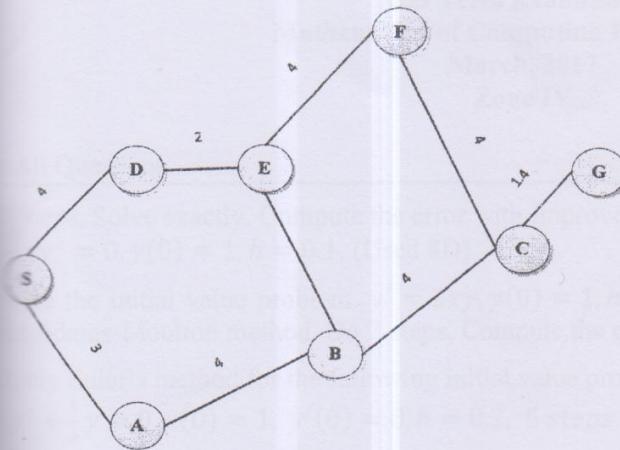


- (c) A search graph with start state S, goal state G and integer costs on the arcs. Find the possible order of node expansion with Uniform Cost search algorithm for the following search graph.



(15 marks)

5. (a) Write two key advantages of local search algorithm.
 (b) Prove that Breadth first search, Depth first search and Uniform cost search are special case of Best first search.
 (c) In the following graph, S denotes starting state and G denote the goal state. The number attached to each edge in the graph represents the cost of traveling the edge. Assume also that the ESTIMATED distances to the goal are given by the following table, by using Hill-Climbing search, show the tree as it is expanded by the method until it finds a path from S to G.

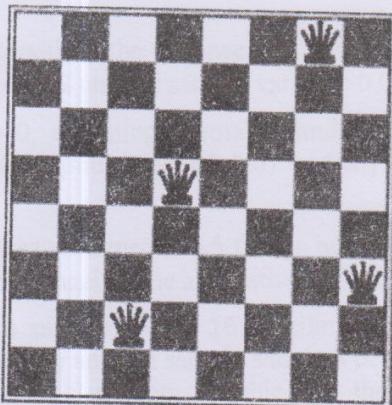


From	To	Estimated Distance
S	G	10
A	G	8
B	G	5
C	G	1.4
D	G	9
E	G	6
F	G	2
G	G	0

(15 marks)

- i. (a) What are types of absolute variables in Constraint Satisfaction Problems?
 (b) The following figure shows a complete state formulation of 8-queens problem. Assume this state as an initial state and find solution step by step by using Min-conflicts heuristic.

Find the following



- (c) The following Australia map is given to color each region either RED, GREEN, BLUE or ORANGE in such a way that no neighboring regions have the same color.
 i. Draw the constraint graph for the figure.
 ii. What are variables and values and constraint?
 iii. How many solutions are there?

15 marks)

are special

be number
same also
by using
ads a path



(15 marks)

**Department of Higher Education
University of Computer Studies**

Fourth Year (B.C.Tech.)

Mid Term Examination

Electronic II (CT-403)

ZONE IV

March, 2017

Answer ALL questions.

Time allowed: 3 hours

- 1 (a) Set up a midpoint bias for a JFET with $I_{DSS}=14\text{mA}$ and $V_{GS(\text{off})} = -10\text{V}$. Use a 24V dc source as the supply voltage. Show the circuit and resistor values. Indicate the values of I_D , V_{GS} and V_{DS} . (10marks)

(b) Determine I_D and V_{GS} for the JFET with voltage divider bias in Figure-1 given that for this particular JFET the parameter values are such that $V_D \approx 7\text{V}$. (10 marks)

2 (a) For the unloaded amplifier in Figure-2(a) , find V_{GS} , I_D , V_{DS} and the rms output voltage V_{DS} . $I_D(\text{on})= 8\text{ mA}$ at $V_{GS}= 12\text{V}$, $V_{GS(\text{th})}=4\text{V}$ and $g_m=4500\text{S}$. (10 marks)

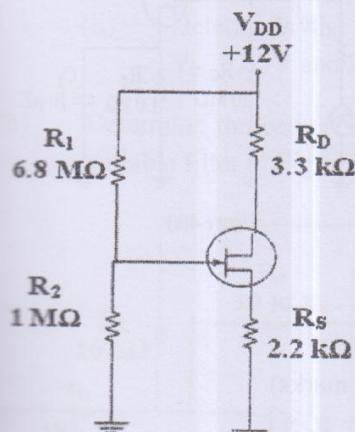


Figure-1

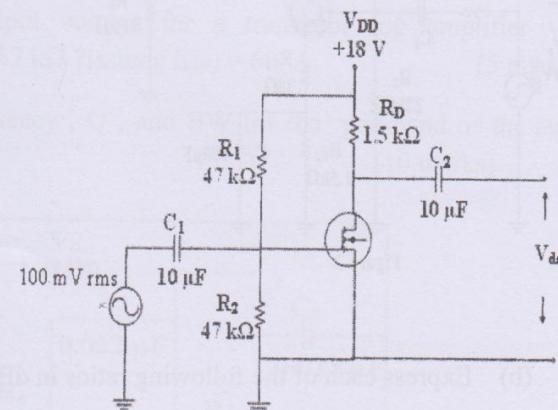
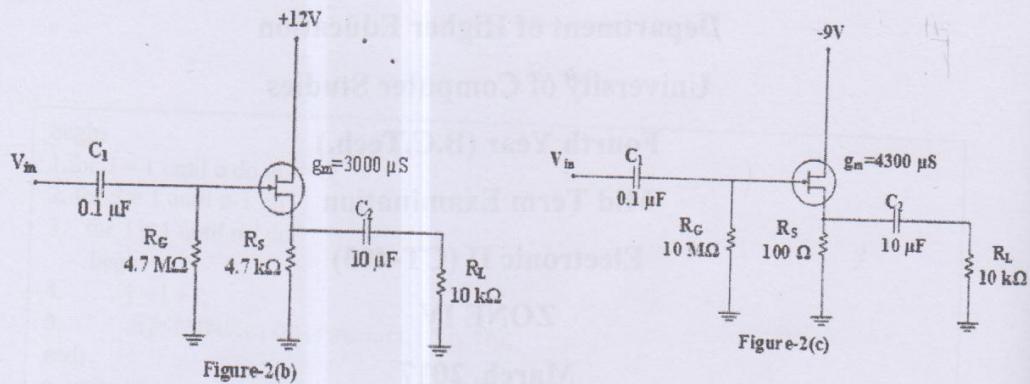


Figure-2(a)

- (b) Determine the voltage gain of each amplifier in Figure-2(b) and Figure-2(c).

(10 marks)



- 3 (a) For the circuit form Figure-3, determine the midband gain in decibels and draw the Bode plot, showing each of the lower critical frequencies. Assume $r_e = 9.6 \Omega$, $\beta = 200$. (14-marks)

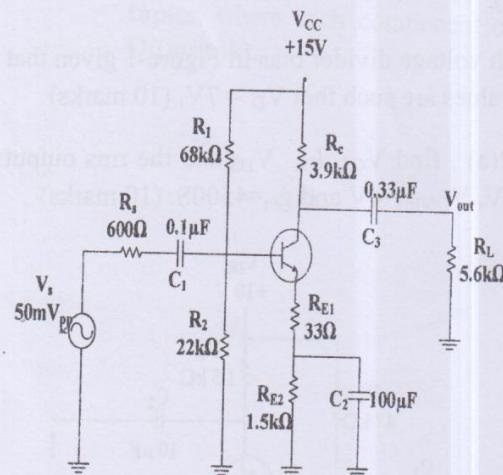


Figure 3

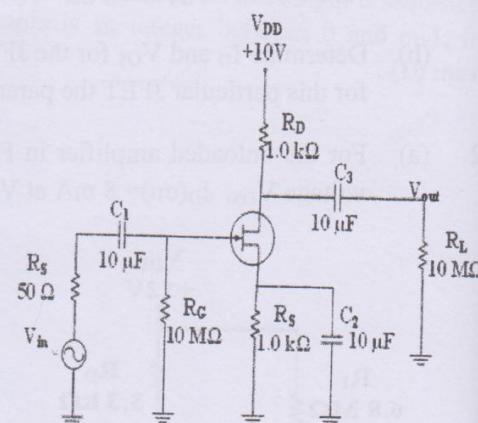


Figure 4(a)

- 5 (a)
- (b)

- (b) Express each of the following ratios in dB. (6 marks)

$$(i) \frac{P_{out}}{P_{in}} = 250$$

$$(ii) \frac{P_{out}}{P_{in}} = 10$$

$$(iii) A_v = 10$$

$$(iv) \frac{V_{out}}{V_{in}} = 0.707$$

V_{in} 10

- 4 (a) Find the upper critical frequency of the input RC circuit for the the FET amplifier in Figure-4(a). $C_{iss} = 8pF$, $C_{rss}=3pF$ and $g_m = 6500 \mu S$. (10 marks)

- (b) The input to the OTA amplitude modulator in Figure-4(b) is a 50mV peak-to-peak, 1MHz sine wave. Determine the output signal, given the modulation voltage shown is applied to the bias input. Assume constant K is approximately $16\mu\text{S}/\mu\text{A}$. (10 marks)

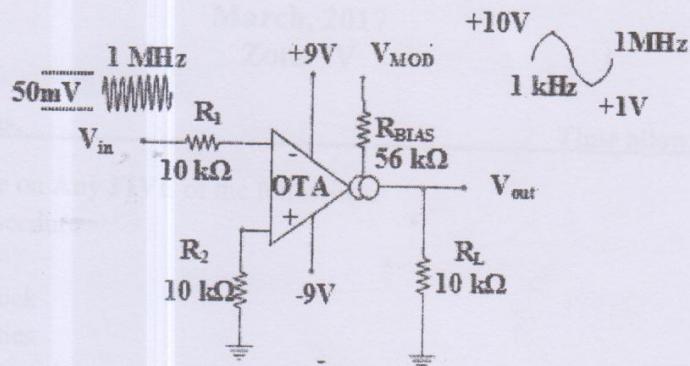


Figure-4(b)

- 5 (a) (i) What is the output voltage of a certain log amplifier with a diode in the feedback path when the input voltage is 3V? The input resistor is $82\text{k}\Omega$ and the reverse leakage current is 100nA . (5 marks)
- (ii) Determine the output voltage for a transistor log amplifier with $V_{in} = 1.5\text{V}$ and $R_i = 47\text{k}\Omega$? Assume $I_{EBO} = 60\text{nA}$. (5 marks)
- (b) Determine the center frequency, Q , and BW for the passband of the state-variable filter in Figure-5. (10 marks)

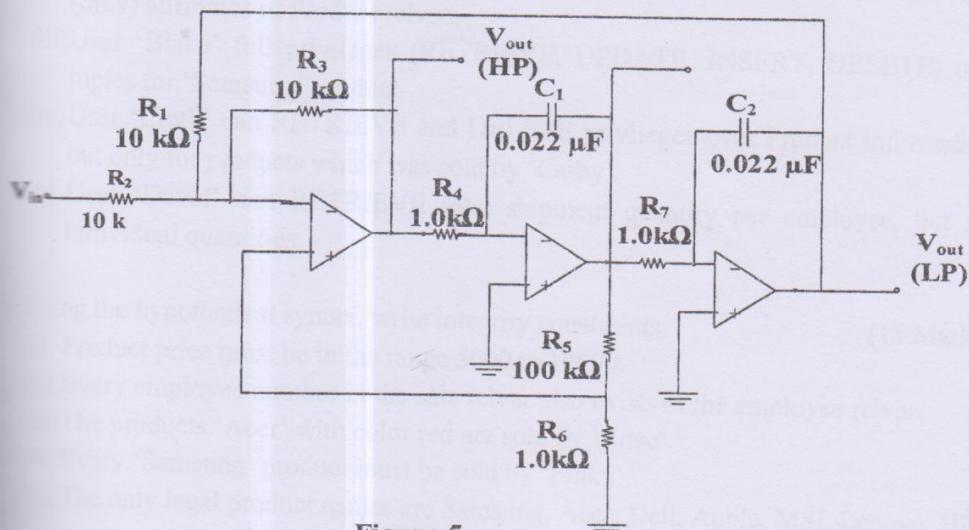


Figure-5

**Department of Higher Education
University of Computer Studies**

Fourth Year(B.C.Tech.)

Mid Term Examination

Computer Architecture and organization(CT-404)

March,2017

Zone IV

Answer all Questions

Time allowed:3 hours

- (i) A 1-bit or full subtracter implements the arithmetic equation $b_i z_i = x_i - y_i - b_{i-1}$ where z_i and b_i denote the difference and borrow functions respectively. Derive a pair of logic equations defining z_i and b_i . Design an n -bit subtracter whose operation is analogous to that of a ripple-carry adder.

(ii) Write a four-stage carry-lookahead equation, c_i can be expressed as a sum-of-products function of the p and g .

(b) Design of a 16 bit adder composed of 4-bit adders linked by

 - (i) ripple-carry propagation
 - (ii) carry-lookahead
 - (iii) Define the logical equation to produce generate g and propagate p .

2.(a) What are the differences between the restoring division and non-restoring division? Suppose the restoring array divider of 3 bit unsigned number using cell D. That has the integer operands $D=100110$ and $V=101$. Determine the results Q and R , as well as the vertical output signals generated by every D cell when the array computes D/V . fig(2.b) A cell B for array implementation of restoring division.

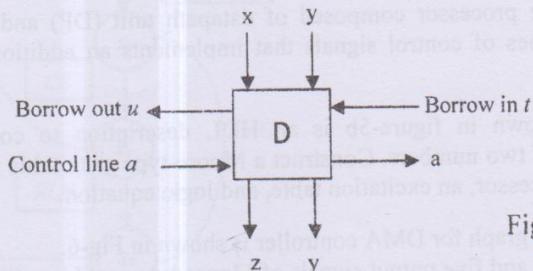


Fig 2.a

- (b) (i) Design the datapath of the twos-complement multiplier.
(ii) Illustrate the Robertson multiplication algorithm for multiplying twos-complement fractions where multiplier = 10110011 and multiplicand = 11010101.

- 3.(a) Design a register file in the style of two access ports logic diagram (register file stores eight 32-bit numbers and has one read portA and one write portB).

Suppose the register file RF_{16} is to be built out of four identical slices denoted RF_4 , Give a register-level diagram showing the internal structure of RF_4 .

- (b) (i) Describe how the ALU can easily be designed for expansion to handle operands of size $n = km$.
(ii) If the micro-operations performed by the 2901 is given in Table1, determine the microinstruction for (i) $R[6] := R[7] - R[6]$. (ii) $Y := R[6]$.

Table 1: Microoperations performed by the 2901

I_S	Inputs			Function	I_D	Y	Outputs	
	R	S	I_F				$R(B)$	Q
000	$R(A)$	Q	000	$R + S + C_{in}$	000	F	-	-
001	$R(A)$	$R(B)$	001	$S - R - C_{in}$	001	F	-	-
010	0	Q	010	$R - S - C_{in}$	010	$R(A)$	F	-
011	0	$R(B)$	011	$R \text{ or } S$	011	F	F	-
100	0	$R(A)$	100	$R \text{ and } S$	100	F	$2^{-1}F$	$2^{-1}Q$
101	D	$R(A)$	101	$\bar{R} \text{ and } S$	101	F	$2^{-1}F$	-
110	D	Q	110	$R \text{ xor } S$	110	F	2F	2Q
111	D	0	111	$R \text{ xnor } S$	111	F	2F	-

- 4.(a) Designing a pipeline circuit for a function involves first finding a suitable multistage sequential algorithm to compute the given function. The addition of two normalized floating point number x and y can be implemented by the following four stages sequences: compare exponents, align mantissa, and normalized the result. Design this four stages register level floating point adder pipeline.
- (b) List the advantages and disadvantages of designing a floating-point in the form of a k -stage pipeline. A floating-point pipeline has five stages S_1, S_2, S_3, S_4 and S_5 whose delays are 120, 90, 100, 85, and 110ns respectively. What is the pipelines maximum throughput in millions of floating-point operations per second (MFLOPS)?
- 5.(a) Design the simple processor composed of datapath unit (DP) and control unit (CU). Describe three types of control signals that implements an addition instruction of the form $ADD A, B$.
- (b) Procedure gcd shown in figure-5b is an HDL description to compute the greatest common divisor of two numbers. Construct a Moore-type state table defining the control unit of the gcd processor, an excitation table, and logic equation.
6. The state transition graph for DMA controller is shown in Fig-6.
(i) Write four input and five output signals of Moore-type machine. (ii) Construct a state table for DMA controller. (iii) Drive six state transition equations and output equations. (iv) Design all-NAND one-hot design for DMA controller.

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gcd(in: X,Y:out: Z);

register XR, YR, TEMPR;

XR := X; (Input the data)

YR := Y;

while XR>0 do begin

    if XR ≤ YR then begin (Swap XR and YR)

        TEMPR := YR;

        YR := XR;

        XR := TEMPR; end

        XR := XR-YR; (Subtract YR from XR)

    end

    Z := YR; (Output the result)

end gcd;
```

Fig:5b

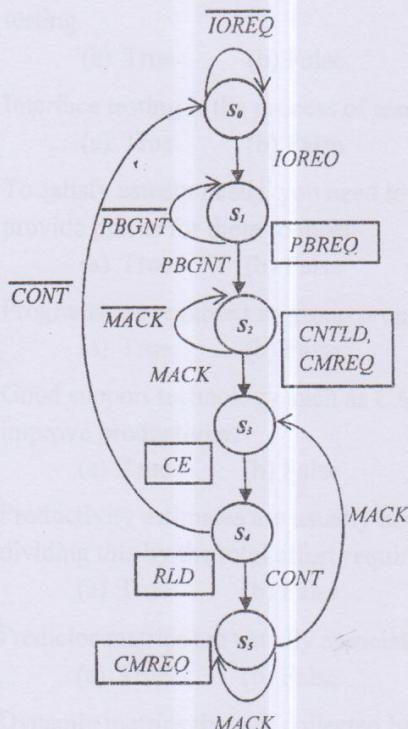


Fig:6

Department of Higher Education
University of Computer Studies
Fourth Year (B.C.Tech)
Mid-Term Examination
Linear Control System II (CT-405)
March, 2017
Zone IV

Answer all questions.

Time allowed: 3 hours

1. A tape recorder has a speed control system so that $H(s)=1$ with negative feedback and

$$G(s) = \frac{K}{s(s+2)(s^2+4s+5)}$$

(a) Sketch a root locus for K , and show that the dominant roots are $s = -0.35 \pm j0.08$ when $K=6.5$. (b) For the dominant roots of part(a) calculate the settling time and overshoot for a step input.

2 Sketch the root locus for a unity feedback system with $G(s) = \frac{K(s+1)}{s^2(s+9)}$

(a) Find the gain when all three roots are real and equal. (b) Find the roots when all the roots are equal as in part(a).

3 The tendon-operated robotic hand uses a pneumatic actuator. The actuator can be represented by

$$G(s) = \frac{2572}{(s+45.3)(s+341)}$$

Plot the frequency response of $G(j\omega)$. Show that the magnitude of $G(j\omega)$ is -15.6dB at $\omega=10$ and -30dB at $\omega=200$. Also show that the phase is -150° at $\omega=700$.

4 A system has a transfer function $G(s) = \frac{4(1+\frac{s}{3})}{s(1+2s)(1+\frac{s}{7}+\frac{s^2}{49})}$

Plot the Bode diagram for the frequency range of 0.1 to 10. Show that the phase margin is approximately 30° and that gain margin is approximately 16dB.

5 The single-loop feedback control system has: $G(s) = \frac{K}{s^2}$, $H(s)=1$. Determine the damping ratio, T_s , GM and PM for the uncompensated system. The lead compensation is added to get the following specifications:

(i) Settling time $\leq 4\text{sec}$

(ii) System damping constant ≥ 0.45

6 The total compensated loop transfer function from. Determine the GM and PM after compensating. Estimate the step response of the system by obtaining the settling time and damping ratio. Hint: Use Bode Diagram

6. The feedback control system has a loop transfer function: $GH(s) = \frac{K}{s(s+2)}$. It is desired to have a steady-state error for a ramp input equal to 5% of the magnitude of the ramp. Furthermore we desire that the phase margin of the system be at least 45° . Design a phase-lag compensator on the Bode diagram.

Answer

1. (a) D
 (i) $\frac{1}{s}$
 (ii) $\frac{1}{s^2}$
 (iii) $\frac{1}{s^3}$
 (iv) $\frac{1}{s^4}$
 (v) $\frac{1}{s^5}$
 (vi) $\frac{1}{s^6}$

- (b) Ex
 (i) $\frac{1}{s}$
 (ii) $\frac{1}{s^2}$

2. Write s
 (a) Typ
 (b) Mea
 (c) Rec
 (d) Gen

3. (a) Draw
 (b) Give
 (c) Deve

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- (c) Marry
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 (i) H
 (ii) V

Department of Higher Education
University of Computer Studies
Fourth Year (B.C.Tech)
Mid-Term Examination

Data and Computer Communications II (CT 406)

ZONE IV

(March, 2017)

Answer All Questions.

Time allowed: 3 hours

1. Define the followings: (2 marks each)

- | | |
|---------------|----------------------|
| (a) Bridge | (f) WFQ Queuing |
| (b) FIFO | (g) Gigabit Ethernet |
| (c) Mobile IP | (h) ALOHA |
| (d) ERP | (i) Tunnel |
| (e) AS | (j) FCS |

2. Answer ANY FOUR of the followings. (5 marks each)

- (a) How many different VLANs can IEEE 802.1 Q trunk supports?
- (b) Briefly explain the three types of IPv6 addresses.
- (c) The advantages of connectionless internetworking scheme.
- (d) OSPF protocol.
- (e) The characteristics of Autonomous System.
- (f) RSVP goals and characteristics.

3. (a) Write CSMA/CD rules and the operating of CSMA/CD explanation with figure.
(b) What is the subnet working? 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?

4. (a) Define flow label. What is the difference between the traffic class and flow label fields in the IPv6 header?

(b) What operations are performed by IGMP? Discuss about the IGMP message format.

5. (a) Discuss about Open Shortest Path First (OSPF) protocol.

(b) Describe the several key characteristics of Differentiated Services(DS). (10 marks each)