Department of Higher Education
University of Computer Studies, Hinthada
Fourth Year (B.C.Sc./B.C.Tech.)
Mid-Term Examination
English
March, 2018

Answer All questions **Time allowed: 3 Hours**

QUESTION I **(20 marks)**

Read the following passage and answer Questions 1-10.

A. Today in Britain, there are 124 state universities, but only one private university-the University of Buckingham. Before the 19th century, there were only six universities: Oxford, Cambridge, Aberdeen, Edinburgh, Glasgow and St Andrews. Universities were usually linked to the Church and were established between the 13th and 15th centuries. They often have good reputations, beautiful old buildings, traditions and usually offer a wide range of courses.

B. A number of universities were established in the 19th and early 20th centuries as a result of the industrial revolution and they began training highly skilled people for industry. These universities were generally established in major industrial centres such as Birmingham, Manchester, Newcastle and other big cities. Sometimes called modern or civic universities, these universities have the advantage of well-established libraries, academic specialities and accommodation that is close to campus.

C. A number of new universities were established in the 1960s when children born after World War 2 entered the higher education system. The government decided to expand higher education to educate these students. The advantage of these universities is that they are well planned and most of the living and teaching facilities are on campus.

D. Before 1992, higher education in the UK was split into polytechnics and universities. The polytechnics provided skilled people for the industries situated in their region – they focused on vocational and professional subjects. For many years, polytechnics didn't have the same influence as universities. However, by 1992, educational standards in polytechnics were as good as universities and many became universities. Many of these universities also offer diploma courses.

E. These universities are made of several smaller colleges which come together to form a single university under a senate committee. There are only seven of these institutions in the UK – London University, Oxford and Cambridge are examples. Specialist colleges offer a range of courses in one discipline – for example agriculture, music, design or medicine. Some of these colleges may only offer postgraduate programmes. These colleges are usually small, with a limited number of students.

F. Universities have different locations. The older universities often have teaching facilities and student accommodation situated close together. Students in these usually socialize in particular part of the city and there is a strong sense of community despite being in a large city. Some city campuses are situated on the outskirts of the city. These very often have the space to provide sports facilities and accommodation. They are also close enough to the city for students to enjoy city life. Some universities, notably Oxford and Cambridge, have a collegiate structure – that is, students are members of colleges within the university. These colleges are the centre of social life and academic life. Academic staff usually live at the college, and students and staff enjoy easy relationships.

Questions 1-6

Choose the correct headings for each paragraph from the list of headings below.

high	a	about	by	cooled	thickness	making
becomes	to	sides	it	rubbed	polished	coated
process	any	molten	than	since	continuously	

Glass, which has been made ---(1)--- the time of Mesopotamians and Egyptians, is little more ---(2)---a mixture of sand, soda ash, and lime. When heated to ---(3)--- 1500 degrees Celsius, this ---(4)--- a molten mass that hardens when slowly ---(5)---. The first successful method for ---(6)--- clear, flat glass involved spinning. This ---(7)--was very effective as the glass had not touched ---(8)--- surfaces between being soft and becoming hard, so ---(9)--- stayed perfectly unblemished, with a fire finish. However, the process took ---(10)--- long time and was labour intensive.

Nevertheless, demand for flat glass was very ---(11)--- and glassmakers across the world were making for a method of making it ---(12)---. The first continuous ribbon process involved squeezing ---(13)--- glass through two hot rollers, similar ---(14)--- an old mangle. This allowed glass of usually any ---(15)--- to be made non-stop, but the rollers would leave both ---(16)--- of the glass marked, and these would then need to be ground and ---(17)---. This part of the process ---(18)--- away around 20 per cent of the glass, and the machines were very expensive. The float process for making flat glass was invented---(19)--- Alistair Pilkington. This process allows the manufacturer of clear, tinted and ---(20)--- glass for buildings, and clear and tinted glass for vehicles.

QUESTION IV **(20 Marks)**

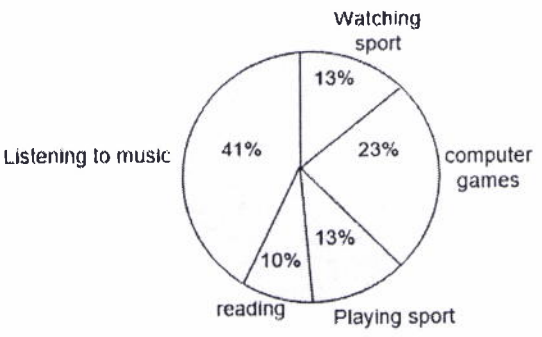
IV. (A). Answer the questions about yourself.

1. Are clothes important to you? (Why?)or(Why not?)
2. What kind of clothes do you usually wear?
3. Do you ever wear the traditional clothes of your country?
4. Do you like foreign fashion? (Why)or(Why not?)
5. Most people accept that being fashionable plays an important role in life-would you agree?

IV. (B).You should spend about 20 minutes on this writing task.

The pie chart below shows the behaviour of spending time for teenagers in the UK in 2010. Summarize the information by selecting and reporting the main features, and make comparisons where relevant. (Write at least **150** words.)

Favourite leisure activities for teenagers



QUESTION V **(20 Marks)**

V. Write an essay on the following topic:

"The internet will bring about a new freedom of information and it gives many advantages for our lives."

To what extent do you agree or disagree with the above statement? Write at least **250** words.

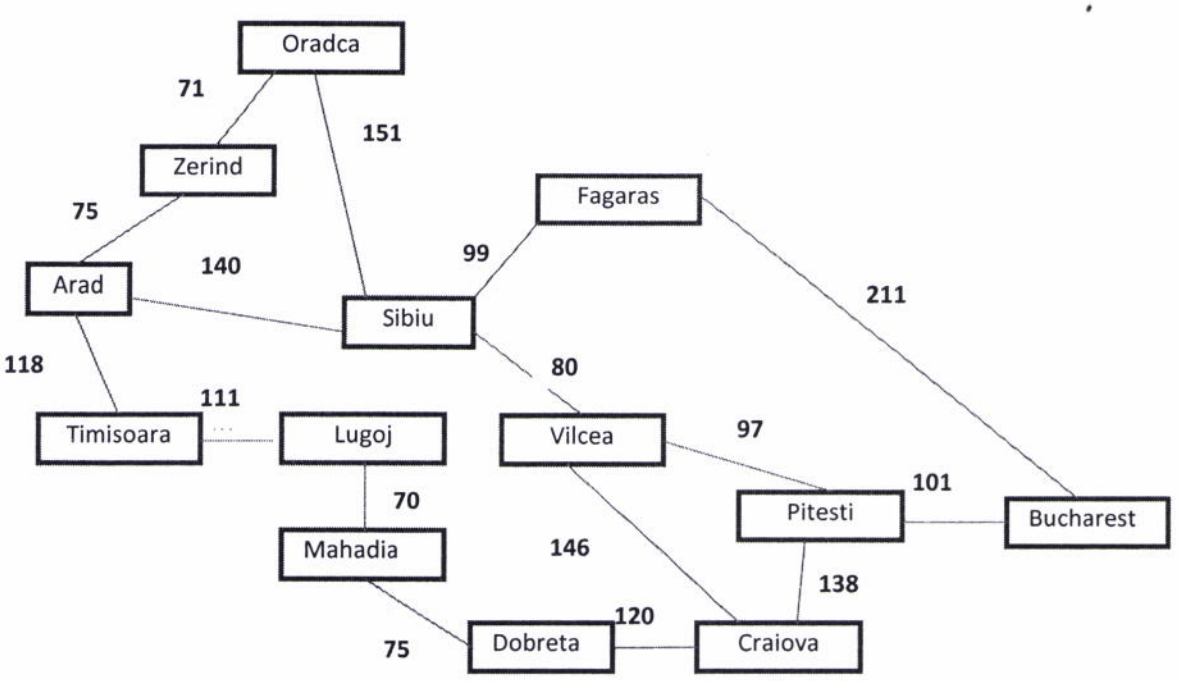
**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Fourth Year (B.C.Tech.)
Mid Term Examination
Artificial Intelligence (CT-401)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

1. Define the following terms. **(10 marks)**
   (a) Intelligence (c) Reflex agent
   (b) Autonomy (d) Branching factor (e) Search node
2. Answer **ANY FOUR** questions. **(16 marks)**
   (a) Differentiate between human and rationally for thinks or actions.
   (b) What ways are in measuring problem-solving performance? Explain them.
   (c) Briefly explain depth-first search.
   (d) Briefly explain uniform-cost search,
   (e) Describe the incremental formulation as a standard search problem for constraint satisfaction problem (CSP).
3. Write Short Notes on **ANY TWO** of the following: **(14 marks)**
   (a) Static vs dynamic
   (b) Discrete vs continuous
   (c) Simple reflex agents
4. (a) For each of the following agents types, develop a PEAS description of the task environment:
   (i) Robot soccer player
   (ii) President
   (b) Give the states, initial state, successor function, goal test and path cost for vacuum cleaner for two locations. **(15 marks)**
5. (a) Determine task environment of the following agent types:
   1. Tennis players 2. Taxi-driver 3. Researcher
5. (b) Give the states, initial state, successor function, goal test and path cost for 8-queens that are placed on chess board. **(15 marks)**

6. Consider the Romania map. **(15 marks)**



Arad	366	Mehadia	241
Bucharest	0	Oradca	380
Zerind	374	Fagaras	176
Sibiu	253	Timisoara	329
Lugoj	244	Vilcea	193
Pitesti	100	Dobreta	242
Craiova	160		

(a) Trace for **A*** search from Timisoara to Bucharest.

(b) Trace for **recursive best-first search** from Timisoara to Bucharest.

7. (a) The following map is the northern part of Myanmar. Consider for the coloring this map can be viewed as a constraint satisfaction problem (CSP) start from Ra.

(i) Draw a constraint graph.

(ii) Define domains.

(iii) Define the possible pair of neighboring region to have distinct colors.

(iv) Write down the possible solutions.

(v) Draw the search tree generated by simple backtracking for coloring map problem.

(vi) Define the progress of map-coloring search with forward checking that is concerned with previous answers.

7. (b) Consider the TWO+TWO = THREE for cryptarithmetic and draw the hypergraph.

(15 marks)

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Fourth Year (B.C.Sc./B.C.Tech.)
Mid-Term Examination
Mathematics of Computing IV (CST-402)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours.**

1. (a) Apply the Improved Euler method to the initial value problem $y' = xy^2$, $y(0) = 1$, $h = 0.1$. Do 5 steps. Solve the problem exactly. Compute the errors. Use 6D.

   (b) Solve the initial value problem $y' = xy$, $y(0) = 1$, $h = 0.2$ by the Classical Runge–Kutta method of fourth order. Do 4 steps. Solve the problem exactly. Compute the errors. Use 5D.

2. (a) Solve the initial value problem $y' = 3y - 12y^2$, $y(0) = 0.2$, $h = 0.1$ by Adams–Moulton method for y_4, y_5 and y_6 starting with 0.2109, 0.2198, 0.2269. Compute error.

   (b) Solve by the Euler's method for the system $y_1' = 2y_1 - 4y_2$, $y_2' = y_1 - 3y_2$, $y_1(0) = 3$, $y_2(0) = 0$, $h = 0.1$. Calculate the errors. Do 5 steps. Use 4D.

3. (a) Find maximum likelihood estimates for σ in the case of the normal distribution.

   (b) Find a 99% confidence interval for the mean of a normal population from the sample:
   Knoop hardness of diamond 9500, 9800, 9750, 9200, 9400, 9550. Find the length of confidence interval.

   (c) Find a 95% confidence interval for the *variance* of a normal population from the sample:
   Mean energy (keV) of delayed neutron group for uranium U^{235} fission: a sample of 100 values with mean 442.5 and variance 9.3.

4. (a) Assuming normality and known variance $\sigma^2 = 9$, test the hypothesis $\mu = 60.0$ against the alternative $\mu = 57.0$ using a sample of size 20 with mean $\bar{x} = 58.50$ and choosing $\alpha = 5\%$.

   (b) Graph the means of the following 10 samples (thickness of washers, coded values) on a control chart for means, assuming that the population is normal with mean 5 and standard deviation 1.55.

Time	8:00	8:30	9:00	9:30	10:00	10:30	11:00	11:30	12:00	12:30
Sample Values	3	3	5	7	7	4	5	6	5	5
	4	6	2	5	3	4	6	4	5	2
	8	6	5	4	6	3	4	6	6	5
	4	8	6	4	5	6	6	4	4	3

   (c) If 10 flips of a coin result in 4 heads and 6 tails, can we assert on the 5% level that the coin is fair?

5. (a) Are oil filters of type A better than type B filters if in 11 trials, A gave cleaner oil than B in 7 cases, B gave cleaner oil than A in 1 case, whereas in 3 of the trials the results for A and B were practically the same?

   (b) Find the regression line of y on x for the data $(x, y) = (0, 4), (2, 0), (4, 5), (6, 9), (8, 10)$, and graph the given data as points on the same axes. Show the details of your work.

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Fourth Year (B.C.Tech.)
Mid-Term Examination
Introduction to Microcontrollers (CT-403)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

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1. Define the followings: **(each 2 marks)**
   (a) Complex Instruction Set Computer (CISC)
   (b) Flash Memory
   (c) Polling process
   (d) Callee saving
   (e) Watchdog Timer
   (f) Pulse Width Modulation
   (g) Load / Store Architecture
   (h) BDM
   (i) Assembly language
   (j) UART

2. Answer **ANY FOUR** of the followings. **(each 5 marks)**
   (a) Draw a basic internal design of microcontroller.
   (b) What are the various types of memories used in microcontroller/microprocessor?
   (c) Write the operation of "*0x01f0+0x0220*" on an eight bits CPU.
   (d) List the types of semiconductor memory.
   (e) What is the difference between synchronous and asynchronous communication?
   (f) Why is the software debug chain of a JTAG debugger different from the hardware test chain?
   (g) Briefly explain about numeric display and multiplex display.

3.(a) Answer **ANY THREE** of the followings.
   (i) auto increment (ii) auto decrement
   (iii) indexed (iv) memory indirect
   (v) register indirect **(10 marks)**
   (b) Explain how the three registers control to the pins of the microcontroller. **(10 marks)**

4. (a) Draw a basic structure of UART module and explain its parameters. **(10 marks)**
   (b) Write the construction principles of Stepper Motor. **(10 marks)**

5. (a) How to use an ISS for debugging and describe its advantages? **(10 marks)**
   (b) How to calculate checksum over eight bytes in FLASH memory? **(10 marks)**

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Fourth Year (B.C.Tech.)
Mid-Term Examination
Computer Architecture and Organization (CT-404)
March, 2018

Answer All Questions. **Time Allowed : 3 hours**

1. (a) A 1-bit full adder 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. (i) Derive a pair of logic equations defining z_i and b_i. (ii) Design an n-bit subtracter whose operation is analogous to that of a ripple-carry adder. **(8 marks)**

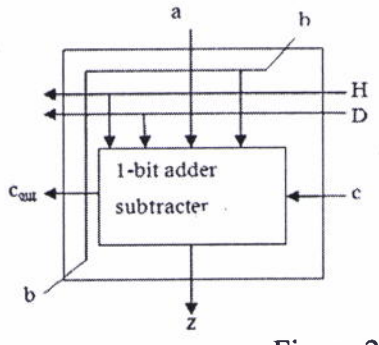
   (b) HDL description of Robertson multiplication algorithm for 8-bit two's-complement fraction is given in Figure 1. Illustration the actions required with its respective register, determine the product of multiplier X=10110011 and multiplicand Y=11010101. **(8 marks)**

```
2Cmultiplier    (in: INBUS; out: OUTBUS);
                register A[7:0], M[7:0],Q[7:0],COUNT[2:0],F;
                bus INBUS[7:0],OUTBUS[7:0];
BEGIN:          A :=0, COUNT :=0, F :=0,
INPUT:          M := INBUS;
                Q :=INBUS;
ADD:            A[7:0] := A[7:0] + M[7:0] × Q[0],
                F := (M[7] and Q[0] or F;
RSHIFT:         A[7] := F; A[6:0], Q :=A.Q[7:1], COUNT :=COUNT+1;
TEST:           if COUNT ≠ 7 then go to ADD;
SUBTRACT:       A[7:0] :=A[7:0] –M[7:0] × Q[0], Q[0] :=0;
OUTPUT:         OUTBUS :=Q;
                OUTBUS :=A;
end 2Cmultiplier;
```

Figure 1. Robertson multiplication algorithm

2. (a) Explain the basic characteristics of bit sliced and multicycle ALUs. **(8 marks)**

   (b) Suppose the Booth array multiplier of Figure 2. is given the signed integer operands X= 1010 and Y=1001. Determine the output signals generated by every M cell when the array computes X × Y. **(8 marks)**



H	D	Function
0	x	$z = a$
1	0	$c_{out}z = a$ plus b plus c
1	1	$c_{out}z = a$ minus b minus c

Figure 2. Array multiplier cell B for Booth algorithm

3. (a) Design the data path of the floating point add unit of the IBM System/360 Model 91 whose advanced design feature, including caches, and several type of instruction level parallelism, were very influential. **(8marks)**

   (b) Explain the major characteristics of a systolic array can be reduced from the matrix multiplier. **(8marks)**

4. (a) Suppose the adder-subtracter circuit of Figure 4.(a) has been designed for twos-complement numbers. It computes the sum Z=X+Y then control line SUB = 0 and the difference 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 word, 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)**

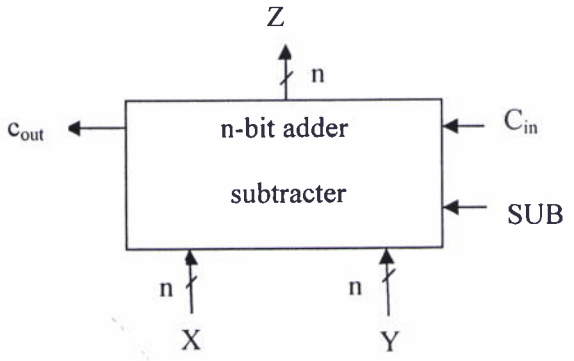


Figure 4.(a) the adder-subtracter circuit

(b) Suppose that floating-point addition consists of four main steps: exponent comparison, mantissa alignment, mantissa addition and result normalization. Design a register level adder pipeline based on these steps. **(8 marks)**

5. (a) To compute the greatest common divisor of two numbers, the HDL description of gcd processor is given in Figure 5. Write down the D flip-flop's characteristic equation $D_i^+(t+1) = D_i(t)$ defines the inputs D_1^+ and D_0^+ to the flip flop. Design the all-NAND classical design for the control unit of the *gcd* processor. **(9 marks)**

```
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;
```

Figure 5. HDL description of gcd process

(b) Design the block diagram of the multiplier's datapath unit DP for the two's-complement multiplier to show a set of control points, which represent abstractly the control signals and associated logic circuits needed to link CU and DP. **(9 marks)**

6. (a) A state transition graph is given in Figure 6. to represent the behavior of the DMA controller. Construct a condensed state table and obtain state transition equation and output equation for one-hot design for this DMA controller. **(18 marks)**

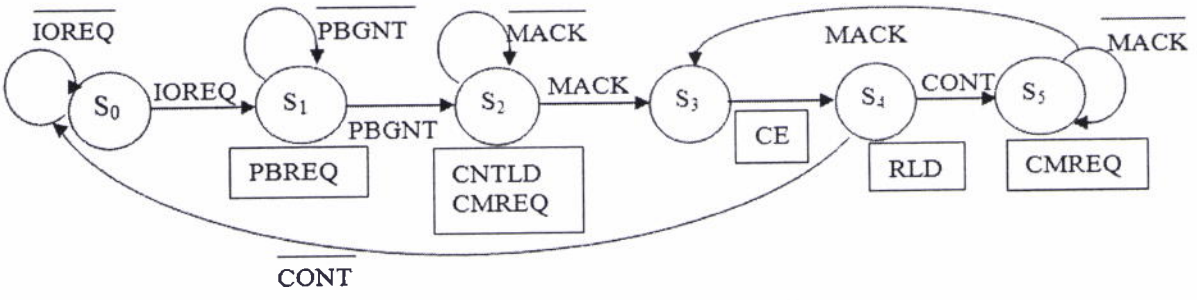


Figure 6. A state transition graph

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Department of Higher Education
University of Computer Studies, Hinthada
Fourth Year (B.C.Tech.)
Mid-Term Examination
Control Systems (CT-405)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

1. A device that consists of a ball rolling on the inside rim of a hoop. The hoop is free to rotate about its horizontal principal axis. The angular position of the hoop may be controlled via the torque T applied to the hoop from a torque motor attached to the hoop drive shaft. If negative feedback is used, the system characteristics equation is

$$1 + \frac{Ks(s+3)}{s^2+2s+2} = 0$$

(i) Sketch the root locus.
(ii) Find the gain when the roots are both equal.
(iii)Find these two equal roots.
(iv)Find the settling time of the system when the roots are equal. **(20 marks)**

2. (a) A control system for an automobile suspension tester has negative unity feedback and a process $L(s) = G_c(s)G(s) = \frac{K(s^2+4s+8)}{s^2(s+4)}$

We desire the dominant roots to have a ζ equal to 0.5. Using the root locus, show that K=7.35 is required and the dominant roots are s = -1.3 ± j2.2. **(12 marks)**

(b) A unity feedback system has the loop transfer function

$$L(s) = G_c(s)G(s) = \frac{K(s+12)}{s(s+6)}$$

(i) Determine the breakaway and entry points of the root locus and sketch the root locus for K> 0.
(ii)Determine the gain K when the two characteristics roots have a ζ of $1/\sqrt{2}$. **(8 marks)**

3. The arm is controlled by a unity feedback control with loop transfer function

$$L(s) = G_c(s)G(s) = \frac{K}{s\left(\frac{s}{5}+1\right)\left(\frac{s}{100}+1\right)}$$

(i) Draw the Bode diagram for K=200, and determine the frequency when 20log|L(jω)|is 0dB and phase angle L(jω) is -180°.
(ii)Determine the phase margin, the crossover frequency and the gain margin. **(20 marks)**

4. A unity feedback control system has a loop transfer function

$$L(s) = G_c(s)G(s) = \frac{K}{s(s+2)(s+50)}$$

Determine the phase margin, the crossover frequency and the gain margin when K=130. **(20 marks)**

5. A 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 step input to be approximately 5% and the phase margin of the system is approximately 40°. Design a phase-lead compensator on the **Bode diagram.** **(20 marks)**

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Fourth Year (B.C.Tech.)
Mid-Term Examination
Data and Computer Communications II (CT-406)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

1. Define the following terms: **(20 marks)**
   (a) CSMA
   (b) VLAN identifier
   (c) IS
   (d) Router
   (e) BGP
   (f) IRP
   (g) Care-of Address
   (h) Fragmentation
   (i) Best Effort Service
   (j) SLA

2. Answer **ANY FOUR** of the followings: **(20 marks)**
   (a) Full-Duplex operation in Ethernet
   (b) Multilane Distribution
   (c) Typical reasons for fragmentation in IP packet
   (d) Differences among unicast, anycast and multicast addresses in IPv6
   (e) Three subtypes of Membership Query Message in IGMP
   (f) Three functional procedures of BGP
   (g) Two categories of Internet traffic

3. (a) Which persistence algorithm is used in CSMA/CD LAN? Illustrate the operation of the CSMA/CD and Describe the IEEE 802.3 Ethernet frame format.
   (b) (i) Given a network address of 128.168.0.0 and a subnet mask of 255.255.248.0, how many subnets are created? How many hosts are there per subnet?
   (ii) Given a company with four individual departments and each department having 2000 computers or networked devices, what mask could be applied to the company network to provide the subnetting necessary to divide up the network equally? **(20 marks)**

4. (a) Briefly explain the five main design issues involved in operation of an IP-controlled Internet.
   (b) Internet routing protocols employ one of three approaches to gathering and using routing information: distance-vector routing, link-state routing, and path-vector routing. Explain briefly the two approaches of routing that are used in interior routing protocols. **(20 marks)**

5. (a) Discuss the three basic capabilities (processes) used by Mobile IP. Which protocols are used in each of the process to support the operation of the Mobile IP?

   (b) Describe the several key characteristics of Differentiated Services (DS). Explain the five main functions of DS traffic conditioning. **(20 marks)**

**********END**********