20 - Information and Communication Technology

Structure of the Question Paper

Paper I - **Time: 02 hours**
50 multiple choice questions with 5 options. **All** questions should be answered.
Each question carries **02** marks. **Total 100 marks.**

Paper II - **Time: 03 hours**
This paper consists of **Two** parts as **A** and **B**.
Part A - **Four structured essay** type questions. **All** questions should be answered. 10 marks for each question - altogether 40 marks
Part B - **Six essay** type questions. **Four** questions should be answered. Each question carries 15 marks - altogether 60 marks.
Total marks for paper II = 100

Calculation of the final mark : Paper I = 100
Paper II = 100
Final mark = 200 ÷ 2 = <u>100</u>

Paper I

Important :

* **Answer all questions.**

* **Select the correct or the most appropriate answer. (A multiple choice answer sheet would be provided at the examination.)**

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1. The most significant digit (MSD) and the least significant digit (LSD) of the number 0.1780 are respectively.
   (1) 0 and 0   (2) 1and 8   (3) 1 and 0   (4) 8 and 1   (5) 0 and 1

2. Construction of modern computers is based on the concept of
   (1) Evolutionary Computing   (2) Intelligent and Emotional Computing
   (3) Artificail intelligence   (4) Von Neumann
   (5) Multi- Agent Software

3. Which of the following is based for the classification of computers as analog or digital?
   (1) Speed of the computer
   (2) Physical size of the computer
   (3) Technology used
   (4) Amount of data that can be obtained
   (5) Amount of information that can be obtained

4. Consider the following on computer processors
       A - Speeed
       B - Capacity
       C - Number of pins in the processor
   Which of them is/are **not** considerable when purchasing a computer?
   (1) A only   (2) B only   (3) C only   (4) A and B only (5)   B and C only

5. Which of the following network topologies is most appropriate for a local area network(LAN) that connects the computers by using only one hub ?
   (1) Bus   (2) Mesh   (3) Tree   (4) Star   (5) Ring

6. Which of the following communication media is most suitable to connect computers and accessories that are located in two buildings about 170 metres far from each other?

13. Consider the following statements about CSS:
- A - Controls the action of a web page
- B - Acronym for Cascade Style Sheet
- C - Acronym for Computer System Software
- D - Used to set the appearence of the web page

Which of the above statements are most accurate?

(1) A,D   (2) B,D   (3) A,B,C   (4) A,B,D   (5) B,C,D

14. Select the **incorrect** statement about BLOG
- (1) It has links to other BLOGs and consists of texts, pictures etc.
- (2) It is not used in business purposes.
- (3) It can be used to communicate the ideas between each other.
- (4) Free BLOG publishing tools are available in the web(www).
- (5) It is similar to personal diaries.

15. What can be used to store data temporarily at the user's computer when accessing web pages.

(1) CSSs.   (2) Frames   (3) Sessions   (4) Forms   (5) Cookies

16. After the preparation of performance reports of the last term test of grade 8, the teacher called over all the students and declared that Nimalka was the first of the class. When did Nimalka get the maximum value of this information?
- (1) When the name of Nimalka was declared at the school prize giving
- (2) When the teacher first stated to students that Nimalka was the first in the class.
- (3) When the parents knew that Nimalka was the first in the class.
- (4) When Nimalka's friends congratulated her.
- (5) When Nimalka's mother gave her a present.

17. Which of the following e-commerce transaction types does a person purchasing an airticket staying at home belong to?

(1) B 2 B   (2) B 2 C   (3) C 2 C   (4) C 2 G   (5) G 2 C

18. Consider the following types of memory :
- A - Read Only Memory
- B - Secondary Storage
- C - Register Memory
- D - Flash Memory
- E - Random Access Memory

Which pair of the above represents volatile memories?

(1) A,B   (2) A,C   (3) C,D   (4) C,E   (5) D,E

19. The Process State Diagram is shown below
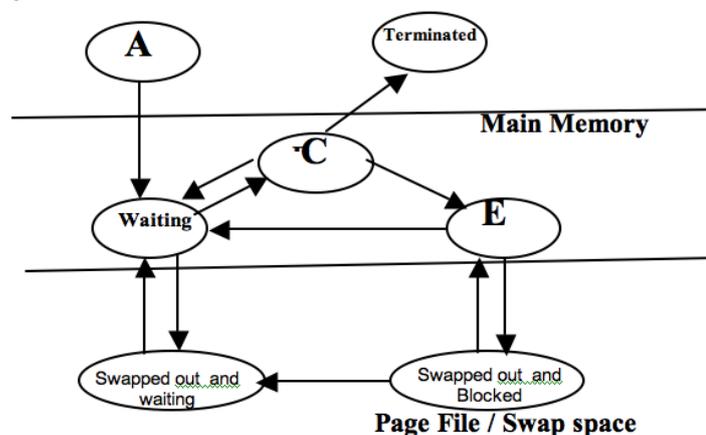
What are the Process States represented by A,C and E in the above diagram respectively?
(1) Running State, Created State and Blocked State
(2) Created State, Running State and Blocked State
(3) Blocked State, Running State and Created State
(4) Running State, Blocked State and Created State
(5) Created State, Blocked State and Running State

20. Which of the following is **not** a main activity of a Database Management System?
(1) Collection of data
(2) Preparation of the type, the model and the limits of data that are to be stored.
(3) Selecting specified data, updating data and preparation of reports.
(4) Allowing users to manage the database.
(5) Secure the data from unauthorized usage.

21. Consider the following statements about communication:
      A - Half duplex communication always takes place on both directions
      B - Public Switched Telephone Network (PSTN) uses the half duplex communication method
      C - Television communication uses the simplex communication method
Which of the above statements is/are correct?
(1) A only   (2) B only   (3) C only
(4) A and B only   (5) B and C only

22. The names of the Network Topologies shown in the following diagrams A, B, C, D respectively are
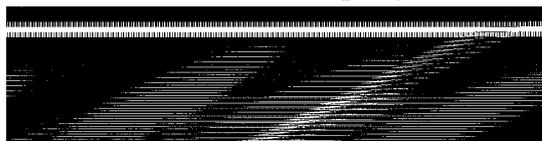
    A   B   C   D
(1) star, ring, bus and mesh   (2) star, ring, tree and mesh
(3) mesh, star, ring and bus   (4) bus, star, ring and mesh
(5) tree, ring, bus and mesh

23. Select the most accurate statement about the Domain Name Server.(DNS)
(1) It is a server which maps the Host Name on to the IP address.
(2) It is a server used to control a Distributed Database System.
(3) It is a server which uses a non-hierachical design model.
(4) It is a server which stores e-mail.
(5) It is a large scale server used in USA.

24. Consider the following IP addresses
    A - 137.10.23.4
    B - 192.10.23.4
    C - 200.10.23.4
    D - 222.10.23.4
    E - 224.10.23.4
What are the IP addresses of class C from those given above?
(1) A,B and C   (2) A, B and E   (3) A, D and C
(4) B, C and D   (5) B, D and E

25. Consider the following features about a Closed System:
    A - It obtains information by associating with different systems.
    B - It stands alone within a definite limited area.
    C - It considers the relationships between external variable as not important.
    D - It has opinions and objectives limited to the system.
    E - It is a permeable system.
    Which of the above could be the basic characteristics of a Closed System.
    (1) A, B, C   (2) A,B,E   (3) B,C,D   (4) B,C,E   (5) C,D,E

26. Consider the following features about a system:
    A - Being well organized
    B - Inter-relationships among sub-systems
    C - Having a definite objective
    D - Always having successful outputs
    Of the above, the basic characterstics that a system must have are
    (1) A,B   (2) B,C   (3) C,D   (4) A,B,C   (5) B,C,D

27. Consider the following statements about the of Kansei Systems methodology.
    A - Controls attributes abstractly or sensitively.
    B - It is connected with the trends of computer designing of the modern world.
    C - affects industrialization unfavourably.
    Which of the above is/are true?
    (1) A only   (2) B only   (3) C only   (4) A and B only   (5) B and C only

28. What is the standard expression used to insert a row into a table of an HTML web page?
    (1) \<tr\> line   (2) \<tr\> line \<tr/\>   (3) \<tr\> line \</tr\>
    (4) \<tr\> line \<tr\>   (5) \<tr line tr\>

29. Which of the following is **not** an example for E-commerce
    (1) Publishing the prices of the share market through Internet.
    (2) Buying and selling shares of the share market through brokering companies through Internet.
    (3) Import of goods by making payments through Internet using credit cards.
    (4) Computerizing the preparation of wages of an institution.
    (5) Purchasing books by making payments through Internet.

30. 275_{10} and 250_{10} are equivalent respectively to
    (1) 423_8 and FA_{16} (2) 423_8 and 371_8 (3) 213_{16} and FB_{16} (4) 113_{16} and 472_8 (5) 421_8 and FA_{16}

31. Student

SNo	Name	Address
1	Kamal	Negombo
2	Seetha	Colombo

    Consider the following statements in relation to the above table:
    A - There are three tuples in the table.
    B - Represents a student relation
    C - The primary key is denoted by SNo
    D - The Cardinality of the table is 3.
    Which of them is/are correct?
    (1) A only   (2) A and C only   (3) B and C only
    (4) B and D only   (5) D only

32. A part of an ER diagram is shown in the diagram below:
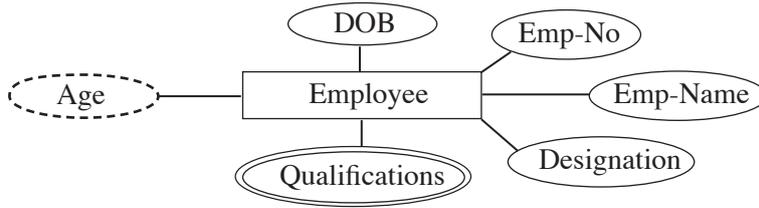
Which of the following characteristics is **not** represented by the chart?
(1) Entity   (2) Attribute   (3) Multi Attribute
(4) Relationship   (5) Derived Attribute

‡ The following programme is prepaired for the conversion of temperature from celsius scale to fahrenheit scale.
Answer the question number **33** and **34** based on it.

```
#program to convert Celsius Temperature to Fahrenheit
c=input ('Enter Temperature in Celsius:')
f=c*9/5.0+32
print "Fahrenheit %d" %f
```

33. Which of the following file names is having the most appropriate extension to save the python programme?
(1) Temperature Celsius into Fahrenheit.python
(2) Temperature Celsius into Fahrenheit.pyp
(3) cel_into_fah.pyc
(4) cel_into_fah.py
(5) temp_conv.pyc

34. The given programme is incorrect. In which of the following ways should it be corrected in order to obtain the expected output?
(1) Removing the line (#program to convert Celsius Temperature to Fahrenheit)
(2) Replacing the line c= input('Enter Temperature in Celsius:') with c-input('Enter Temperature in Celsius.')
(3) Replacing the line F=c*9/5.0+32 with c f=c*9.0/5.0+32
(4) Replacing the line print "Fahrenheit %d" %f with print "Fahrenheit %f" %f
(5) Replacing the line print "Fahrenheit %d" %f with print "Fahrenheit %f" f

35. Student

SNumber	Sname	SDOB	Sex	Address
72339043 V	Wijerathne	72.12.08	M	Mawanella

Mark

SNumber	SubjectCode	Marks
72339043 V	NB1	54
60376682 V	NB2	87
72339043 V	NB2	65

Which of the following statements is true in relation to the alove two tables?
(1) 'SNumber' is the primary key of 'Mark' relation' (table)
(2) 'SNumber' is a foreign key of the 'Mark' relation
(3) 'SNumber' and 'Subject Code' is a composite key of the 'Student' table.
(4) 'SubjectCode' is an alternate key of the 'Mark' table
(5) 'SubjectCode' is a candidate key of the 'Student' table.

36. Consider the following SQL statement :
    SELECT emp.deptno, ename,sal, hiredata
    FROM emp, dept
    WHERE emp.deptno=dept.deptno
    ORDER BY ename

    Which of the following conclusions is true regarding the above statement?
    (1) The output is only the attributes 'ename , sal, hiredata'.
    (2) Only the relationship 'dept' is used to obtain data.
    (3) The relationships both 'emp' and 'dept' are used to obtain data.
    (4) The attribute of the relationship 'dept' is represented by 'emp'. 'dept no'.
    (5) The final result has been sorted out according to the value of the 'dept no'.

37. The logic expression relevant to the output of the given truth table is
    (1) $A + B$
    (2) $A \cdot B$
    (3) $\overline{A + B}$
    (4) $A \oplus B$
    (5) $\overline{A \oplus B}$

38. Which of the following is the result you get when the Boolean expression $B.C(A+B\overline{A})$ is simplified?
    (1) $A\,B\,\overline{C}$ (2) $\overline{A}\,B\,C$ (3) $A\,B\,C$ (4) $\overline{A}\,\overline{B}\,C$ (5) $C\,\overline{A}$

40. While Amal purchased a software with proprietary licence, his friend Sahan copied down it to a CD.
    Consider the following statements :
        A - copying down the software by Sahan is illegal.
        B - Since Sahan received the software from his friend, it is not software piracy.
        C - Although Amal has purchased the software, he has no rights to give its copies to others.
    Which of the above statements are true?
    (1) A only   (2) B only   (3) C only
    (4) A and B only   (5) A and C only

41. The values has been assigned to the variables such as
    r=11; y=2.5; c=4
    Hence, what is the correct value of the phython statement
    $r\%3*c+10/y$
    (1) 6.2   (2) 8.0   (3) 12.0   (4) 24.0   (5) 40.0

42. What is the output of the phython programme given in the box.
    (1) 4
    (2) 6
    (3) 10
    (4) 14
    (5) 40

```
j=10
y=4
if j<y or j!=4:
   j-=y
   print j
else:
   y*=j
   Print y
```

‡ Question number **43** and **44** are based on the following flowchart:

43. The outputs of the flowchart are respectively,
    (1) 8, 11, 14, 17, 20, 23 and 26
    (2) 8, 11, 14, 17, 20 and 23
    (3) 8, 11, 22, 44 and 88
    (4) 11, 22, 44 and 88
    (5) 11, 22 and 44

44. What is the correct pseudo code relevant to the logic of the flowchart?

begin	begin	begin	begin	begin
r=5	r=5	r=5	r=5	r=5
s=3	s=3	s=3	s=3	s=3
r=r+s	if r<25	while r<25	do	do
s=r+3	r=r+s	r=r+s	r=r+s	r=r+3
display s	s=r+3	s=r+3	s=r+3	s=r+3
if r<25	display s	display s	display s	display s
end	else	end while	while r<25	while r<25
	end	end	end	end
(1)	(2)	(3)	(4)	(5)

45. Consider the follwing python statements :
   - A - s="It's correct"
   - B - x=y=z=2.5
   - C - x,y,z=1,2.3,'string'
   - D - #This is not correct
   - E - a=['string',123]
   - F - b=5
        while 4<=b>10:
        b+=1
   - G - for x in range(0,12,3):
        print x
   - H - a={'a':'b',4:40}
   - I - def fun1(a,b=4,l=[]):
        return b*a

   What is correct regarding the alove statements?
   (1) The statements A, B and C only are correct.
   (2) The statements A, C and F only are correct.
   (3) The statements D, E and F only are correct.
   (4) The statements G, H and I only are correct.
   (5) All the statements are correct.

46. A person who decided to extend his business, wishes to purchase an appropriate land for it. Accordingly he studies how far the environment, the people who live there and the indiviual needs are suitable for his business.
   With which stage of the waterfall model of the system designing does this study best fit?
   (1) Need identification   (2) Need analysis   (3) System designing
   (4) System development   (5) System testing

47. The best test that the user has to conduct at the stage of system acceptance is
   (1) White box Testing   (2) Black box Testing   (3) Unit Testing
   (4) Integrated Testing   (5) Code Testing

48. Consider the following statements related to the differences between Dynamic Random Access Memory (DRAM) and Static Random Access Memory(SRAM) :
   - A - The mostly availabe type of memory in modern computers is Dynamic Random Access Momory (DRAM)
   - B - While data in Dynamic Random Access Memory is frequenctly refreshed, no such an action is taken place for data in Static Random Access Memory
   - C - Data in Static Random Access Memory is low in density.

   Which of the above statements is/are true?
   (1) A only   (2) A and B only   (3) A and C only
   (4) B and C only   (5) All A, B, and C

49. Consider the following statements regarding Computer Language Translation :
   A - An interpreter is a computer language translator, and it converts the source code of each line into machine language.
   B - The compiler transforms a binary code into source bite code.
   C - The computer language translator named 'assembler' is used for transformation of 'mnemonic codes'.

   Which of the above is/ are true?
   (1) A only   (2) B only   (3) C only
   (4) A and B only   (5) A and C only

50. Consider the following python programme:

```
from date import date
class dtcheck:
    def_init_(self,y,m,d):
    self.now=date.today()
    self.dob=date(y,m,d)
    self.age=self.now - self.dob
    def printage(self):
    return "your age %d"%((self.age.days)/365)
```

   This shows a class module set to get age in years as the output when the date of birth is given.
   This module is saved as a python programme in the file name 'dcheck.' py'. What is the correct python module that can be used to construct an object from this class module and to get the output by giving the input?

   (1)

20 - Information and Communication Technology
Paper II

★ Answer **all** questions in **Part A**.
★ Answer only **four** questions from **Part B**.

Part A

1. (a) Explain the differences between data and information with examples.

    ....
    ....
    ....
    ....

    (b) Give **three** main advantages of processing data with computers compared to the manual system.

    ....
    ....
    ....
    ....

    (c) Explain the technological changes of the first, second, third and fourth generations of the computer evolution.

    ....
    ....
    ....
    ....
    ....

    (d) Explain the importance of the using the encoding systems such as ASCII, Unicode in processing data with computers.

    ....
    ....
    ....
    ....
    ....

    (e) Describe the function of the ALU (Arithmetic and Logic Unit) and CU (Control Unit) of a processor of a computer.

    ....
    ....
    ....
    ....
    ....

2.   Employee

EmployeeNo	EmpName	EmpAddress	EmpSalary
A001	Perera	Negombo	30,000
A002	Kamal	Kandy	45,000

(a) Build an SQL statement to create a table in a database so that it contains the attributes of
the above table.
....
....
....
....
....

(b) Insert Into 'Employee'('EmployeeNo', 'EmpName', 'EmpAddress', 'EmpSalary')
Values('A 003', 'Saman', 'Kandy', 20000)
What change will happen in the data base when this SQL statement is executed.
....
....
....
....

(c) ALTER TABLE 'EMPLOYEE' ADD 'Department' VARCHAR (20)
What change will happen in the table after this SQL statement is executed.
....
....
....
....

(d) SELECT EmployeeNO, EmpName, EmpSalary
FROM Employee
WHERE EmpSalary >=30000
Explain the result after this SQL statement is executed.
....
....

(e) What will be the end result, when the statement 'ORDER BY EmpSalary' is appended to
the end of the SQL statement in the (d) above.
....
....
....
....

3.   Following is a flow chart which is constructed to give an output of the average mark of ten students for the subject, Mathematics.
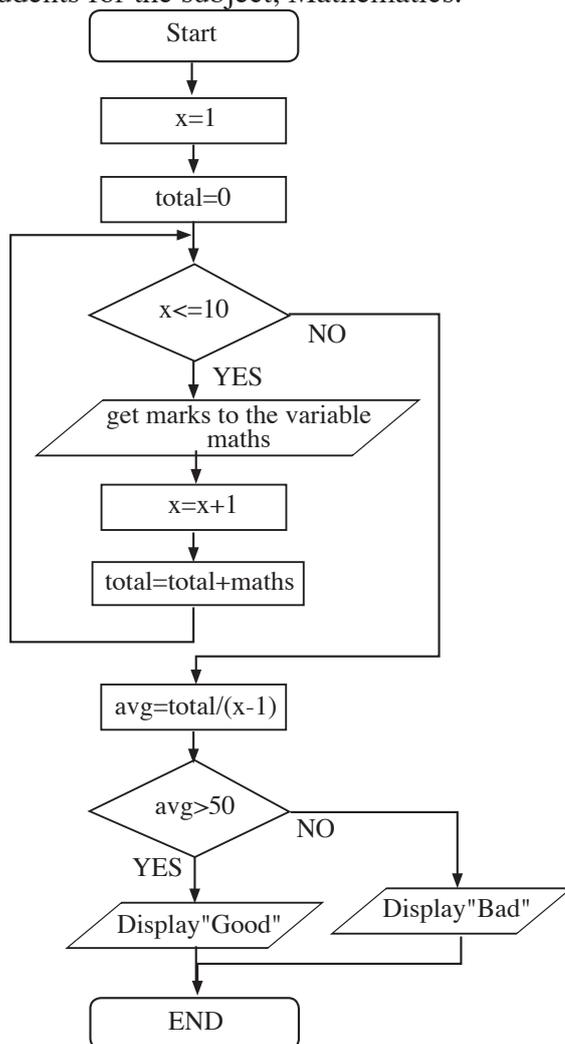
(a) Write the appropriate pseudo code for this flow chart.

....

....

....

(b) Name the control structures that can be observed in this flow chart.

....

....

(c) What is the output given by the following python code.

```
for letter in "python-programming":
    if letter=='-':
        break
    print letter
```

....

....

....

(d) Mention the output when 'continue' is used instead of 'break' in the python code given in (c) above.

....

....

....

4. ExpoBooks is a website which distributes & sells books. A page of this website is shown below.
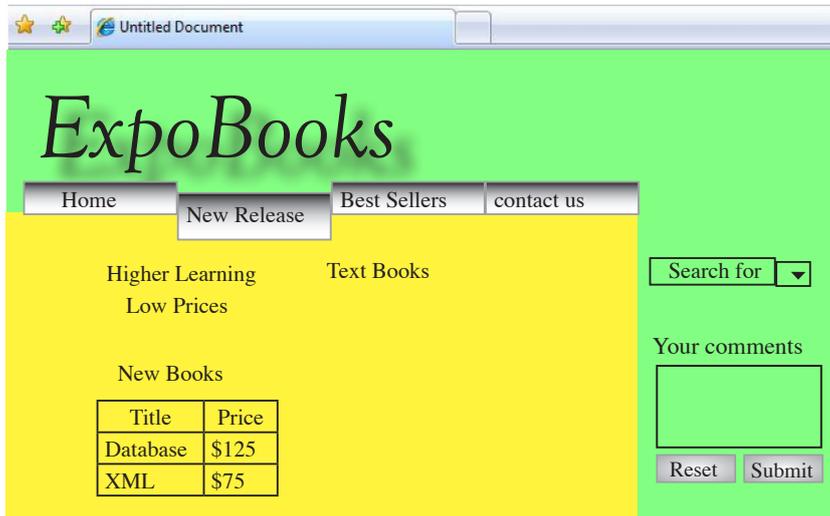
(a) (i) What is meant by a 'hyperlink'?

....

....

(ii) If 'Home' is a button in this web page, write the HTML code to navigate to the Homepage,that is index.html, when that button is clicked.
(Consider 'Home.jpg' as the image for the button 'Home')

....

....

(b) Assuming that the image 'Books.jpg', which is displayed the image associated to the heading 'Text Books' is in the 'images' subfolder and that subfolder is in the 'web' folder, write down the HTML code with the link and attributes to display the image.

....

....

(c) Complete the following HTML code which is used to display the table 'New Books' in the above web page.

```
<table border=1>
     <tr>
..............................
..............................
..............................
..............................
..............................
   ..............................
  </table>
```

(d) Write down the HTML code to prepare an ordered list which contains the names of two books in the table 'New Books'

....
....

(e) Show how the following xml document should be completed to display the names and prices of books as shown in the previous screen shot.
<?xml version="1.0"?>

....
....
....

(f) Mention **two** main services provided by a 'shopping cart' in a website.

....
....

(g) Write down **two** limitations of an electronic market when it is compared with a normal market.

....
....
....

* *

PART B

1. (a) Verify the following Boolean theorem using truth tables.
    A.(B+C) = A.B+A.C

   (b) A diagram of a logical circuit is given below. Answer the parts (i) ,(ii) and (iii) using it.
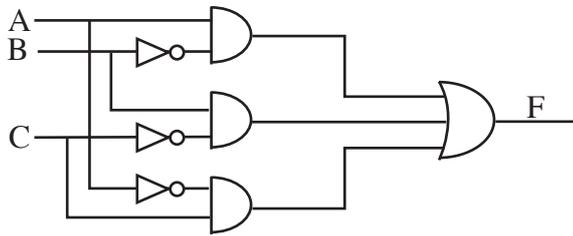
   (i) Write down the Boolean expression for the (output) F, in the given logical circuit using (input) A ,B, C.
   (ii) Convert the output F of the logical circurit, that is f(A,B,C) into the sum of product (SOP) Normal form.
   (iii) Convert the expression obtained in the (ii) above into the product of sum (POS) Normal form.

   (c) Solve the following Boolean expression by using "Karnaugh Map".
    $f(A, B, C, D) = \bar{A}BCD + \bar{A}BC\bar{D} + A\bar{B}C\bar{D} + A\bar{B}CD + \bar{A}\bar{B}CD + \bar{A}\bar{B}C\bar{D}$
    $+ A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}D + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}\bar{C}\bar{D}$

2. (a) (i) Give a comparative explanation by drawing a diagram of the hierarchy of computer memories, concerning the Size, Capacity, Access Speed and Prices of them.
     (ii) "When using application software, Random Access Memory(RAM) is the most important type of memory for the user". Give your opinion about this statement.
     (iii) Give the main characteristics and usage of following type of memories in brief.
       a. Read Only Memory
       b. Dynamic Random Access Memory
       c. Volatile Memory
       d. Flash Memory

   (b) (i) Write short notes about the following, with respect to 'processes'.
       a. Throughput
       b. Turnaround time
       c. Waiting time
       d. Response time

     (ii) Explain the main function of the following schedulers
       a. dispatcher
       b. Long-term scheduler

3. In a sports club, there are several sports for the members to participate. A coach is appointed for each sport separately. Details of the members, sports they have chosen and related coaches are stored in a flat file. Following are the details of two members extracted from it.

MemberID	MemberName	SportID	SportName	CoachID	CoachName
M123	Saman	S 12	Judo	C 02	Gamini
M123	Saman	S 14	Karate	C 09	Sarath
M125	Anura	S 12	Judo	C 02	Gamini
M125	Anura	S 13	Boxing	C 08	Nimal

   (a) Explain **two** main defects that can occur when storing data in a table as above.
   (b) A sports club has decided to store its data in a relational database. Design a suitable entity relationship model where many to many relationships are omitted.
   (c) Show the table structure with related key fields when the entities and relationships in the above ER diagram are transformed into 'Third Normal Form' tables.

4. (a) Name the layers of the 'Open System Interconnection Model – OSI'.
   (b) Explain the main functions of the Physical and Application layers.
   (c) Write down **three** protocols used in the 'Network Layer'
   (d) Write short notes about the following peripherals
        Repeaters
        Hubs
        Gateways
   (e) Explain the differences between 'Switches' and 'Hubs'
   (f) Show how you would develop a small computer network as a 'Tree Topology' by a diagram, assuming that you are provided with 7 computers and network cables.

5. (a) Mention the main purpose of the 'Compilers' and 'Interpreters' and compare the advantages and disadvantages of using them.
   (b) Identify the error free programmes out of the following python programmes.
       Show the output when the error free programmes are executed.

       Correct the programmes which contain errors.
       What are the outputs after the corrections have been made.
       (i) animals=['Dog','Rat','Cat']
            animals.sort()
            for animal in animals:
            print i,animal.strip(),len(animal)
                    i t=1
       (ii) def times(a):
             for i in range(1,12):
             print a,' x ', i,' = ',a*i
            times(5)

   (c) The mark obtained by the students for three subjects are recorded in the file 'input. text' as follows.
            Nimal, 20, 10, 30
            Saman, 40, 60, 45
            Mala, 22, 65, 75

Consider that the Total and the Average marks of each student should be obtained as follows.

1. Nimal 60   20.0
2. Saman 145   48.3
3. Mala   162   54.0

following is an incomplete python code which is written for this purpose.
Incomplete places of this code are marked by dotted lines.

```
def total(marks):
#compute the total
total=0
for mark in marks
_ _ _ _ _ _ _ _ _
return total
f=open("inpit.text")
line=f.readline()
i= _ _ _ _ _ _ _ _
while(line ='')
record=line.strip('\n').split(",")
aggregate=total_ _ _ _ _ _ _ _ _
print i,_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
i +=1
line = _ _ _ _ _ _ _ _ _
f.close()
```

Complete the above codes so that the required output can be obtained.

6. (a) A person intends to start an institution for processing and selling seafood. Give **two** system development methodologies he would expect to follow when he designs his system. Give the most appropriate methodology out of the above for his purpose with reasons.
    (b) Considering about the System Management,
        (i) Illustrate the states related to the System Management Level Triangle
        (ii) Explain how the above states can be applied in an office automation system.
        (iii) Explain **three** advantages and **three** disadvantages of an office automation system.

    (c) Compare the 'White Box Testing' with 'Black Box Testing', used in System Testing.
    (d) Give **four** major facts to be concerned when doing computer programming. Name **two** special facts among them and give reasons for them to be special.

* * *