MASTER OF COMPUTER APPLICATIONS

(MCA)

MCA/ASSIGN/I/YEAR/2012

ASSIGNMENTS
Year, 2012-13

(1st Semester)

(MCS-011, MCS-012, MCS-013, MCS-014, MCS-015, MCSL-016, MCSL-017)

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
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Course Code	**:**	**MCS-011**
Course Title	**:**	**Problem Solving and Programming**
Assignment Number	**:**	**MCA(1)/011/Assign/12**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

There are five questions in this assignment, which carries 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. You may use illustrations and diagrams to enhance the explanations. **Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.**

Question 1: Write a program to print the following pattern:

a)
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

b)
```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

(20 Marks)

Question 2: Declare two arrays A and B, find
(i) A intersection B and (ii) A union B. **(10 Marks)**

Question 3: Write a program to ***crypt*** its input according to a specified transformation scheme. The transformation scheme will consist of two strings: a string of characters and then a string of replacement characters. The idea is that your program replaces every instance of the i^{th} character in the initial string with the (i+2) character (of English alphabets) in the replacement string. When no substitution is defined for a character, the program just passes it through to the output unchanged. Blank spaces and the other symbols remains the same. The program should inform the user of any errors in the transformation scheme. Your program should display the phrase before and after the substitutions have been made.

Example:
Original String: I know C programming.
String after the transformation: K mpqy E rtqitcookpi. **(20 Marks)**

Question 4: Write an interactive program called "DISTANCE CONVERTER" that accepts the distance in millimetres / feet / miles / yards / kilometres and displays its equivalent in metres. **(20 Marks)**

Question 5: Write an interactive program to generate progress reports for the students of class XII (Science group).
Assumptions can be made wherever necessary. **(10 Marks)**

Course Code	**:**	**MCS-012**
Course Title	**:**	**Computer Organisation and Assembly Language Programming**
Assignment Number	**:**	**MCA(1)/012/Assign/2012**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

There are four questions in this assignment, which carries 80 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Answer to each part of the question should be confined to about 300 words.

Question 1 (covers Block 1)

(a) Perform the following arithmetic operations using binary signed 2's complement notation for integers. You may assume that the maximum size of integers is of **12 bits** including the sign bit. (Please note that the numbers given here are in decimal notation) **(3 Marks)**

i) Add – 512 and 298
ii) Subtract 512 from – 64
ii) Add 1025 and 1023
Please indicate the overflow if it is occurs.

(b) Convert the hexadecimal number: AB CD EF into binary, octal and decimal equivalent. **(1 Mark)**

(c) Convert the following string into equivalent "UTF 8" code – "Copyright sign is © and you must check it prior to using copyrighted material". Are these codes same as that used in ASCII? **(2 Marks)**

(d) Design a logic circuit that takes a four digit binary input, counts the number of 1s in it, and produces it as the output. For example, if the input is 1101, then output will be 11 (as there are three ones in the input). Draw the truth table and use K-map to design the Boolean expressions for each of the output bits. Draw the resulting circuit diagram using AND – OR – NOT gates. **(5 Marks)**

(e) Design a two bit counter (a sequential circuit) that counts as 0, 2, 0, 2... and so on. You should show the state table, state diagram, the k-map for circuit design, logic diagram of the resultant design using D flip-flop. **(5 Marks)**

(f) Design a floating point representation of 16 bits closer to IEEE 754 format. The number should have a biased exponent of 5 bits. You may assume that the mantissa is in normalised form; the exponent bias of 15; and one bit is used for the sign bit in the mantissa. Represent the number $(24.125)_{10}$ using this format . **(4 Marks)**

Question 2 (covers Block 2)

(a) A RAM has a capacity of 32 K × 16. **(2 Marks)**
(i) How many data input and data output lines does this RAM need to have?
(ii) How many address lines will be needed for this RAM?

(b) Consider a RAM of 512 words with a word size of 32 bits. Assume that this memory have a cache memory of 8 Blocks with block size of 64 bits. For the given memory and Cache in the statements as above, draw a diagram to show the address mapping of RAM and Cache, if two way set associative memory to cache mapping scheme is used. **(4 Marks)**

(c) Explain which of the Input/output techniques that will be used for the following operations. Also explain the I/O techniques. **(4 Marks)**
(i) Reading data from a keyboard
(ii) Reading data from a file.

(d) Find the average disk access time that reads or writes a 1024 byte sector. Assume that the disk rotates at 18000 rpm; each track of the disk has 128 sectors and data transfer rate of the disk is 100 MB/second. (Please calculate data transfer time, assume a suitable seek time and calculate the average latency time). **(2 Marks)**

(e) What is the purpose of FAT in Windows? What construct do you use in Linux/Unix instead of FAT? Explain the differences between the two. **(2 Marks)**

(Word limit for the answer is 200 words ONLY)

(f) Define each of the following term. Explain the main purpose / use / advantage. (Word Limit for answer of each part is 50 words ONLY) **(6 Marks)**
(i) ZBR in the context of disks
(ii) SCSI
(iii) Colour Depth
(iv) Graphics Accelerators
(v) Monitor Resolution
(vi) Active matrix display

Question 3 (Covers Block 3)

(a) Assume that a new machine has been developed which has only 16 general purpose registers, but have a big high speed RAM. The machine uses stack for procedure calls. The machine is expected to handle all the object oriented languages. List four addressing modes that must be supported by such a machine. Give justification of the selection of each of the addressing modes. **(4 Marks)**

(b) Assume a hypothetical machine that has only PC, AC, MAR, IR, DR and Flag registers. (You may assume the roles of these registers same as that are defined in general for a von Neumann machine) The instructions of this machine can take two operands - one the operand of these must be a register operand. It has an instruction:
SUB AC, X; // it performs the operation AC ← AC – Content of location X. Write and explain the sequence of micro-operations that are required to fetch and execute the instruction. Make and state suitable assumptions, if any. **(5 Marks)**

(c) Assume that you have a machine as shown in section 3.2.2 of Block 3 having the micro-operations as given in Figure 10 on page 62 of Block 3. Consider that R1 and R2 both are 8 bit registers and contains 11110101 and 10101001 respectively. What will be the values of select inputs, carry-in input and result of operation if the following micro-operations are performed? (For each micro-operation you may assume the initial value of R1 and R2 as defined above) **(2 Marks)**

1) Decrement R1
2) R1 Exclusive OR R2
3) Subtract R1 from R2 with borrow
4) Shift Right R2

(d) Explain the functions performed by the Micro-programmed Control Unit with the help of diagram Control Units? Also explain the role of sequencing logic component of Control Unit. **(3 Marks)**

(e) What are the advantages of instruction pipeline? Explain with the help of a diagram for a 3 stage instruction pipeline having cycles IFD (Instruction Fetch and Decode), OF (Operand Fetch) and ES (Execute and store results). What can be the problems of such an instruction pipeline? **(3 Marks)**

(f) Assume that a RISC machine has 64 registers out of which 16 registers are reserved for the Global variables. Assuming that 8 of the registers are to be used for one function, explain how the remaining registers will be used as overlapped register windows. How will these registers be used for parameter passing for subroutine calls? Explain with the help of diagram. **(3 Marks)**

Question 4

(a) Write a program in 8086 assembly Language (with proper comments) to find if a given sub-string is prefix of a given string. For example, the sub-string "Assembly" is the prefix in the string "Assembly Language Programming." You may assume that the sub-string as well as the string is available in the memory. You may also assume that the end of the strings is the character '$'. Make suitable assumptions, if any. **(8 Marks)**

(b) Write a program in 8086 assembly language to convert a two digit packed BCD number into equivalent ASCII digits. Your program should print the two ASCII digits. You may assume that the BCD number is in the AL register. **(6 Marks)**

(c) Write a simple subroutine that receives one parameter value. The subroutine checks if the passed parameter value is 0 or otherwise. In case, the value is 0 then it prints FALSE, otherwise it prints TRUE. Make suitable assumptions, if any. **(6 Marks)**

Course Code	**:**	**MCS-013**
Course Title	**:**	**Discrete Mathematics**
Assignment Number	**:**	**MCA(1)/013/Assign/2012**
Assignment Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)**
		15th April, 2013 (For January 2013 Session)

There are eight questions in this assignment, which carries 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Question 1: **Marks (4 + 3 +4)**

a) Make truth table for followings:
   i) $\sim p \rightarrow (q \vee r) \wedge p \wedge \sim q$
   ii) $\sim p \rightarrow \sim r \vee q \wedge \sim p \vee r$

b) What are conditional connectives? Explain use of conditional connectives with an example.

c) Write down suitable mathematical statement that can be represented by the following symbolic properties.
   i) $(\exists x)(\forall y)(\forall z) P$
   ii) $\exists (x)(\exists y)(\forall z) P$

Question 2: **Marks (3 + 3+3)**

a) What is proof? Explain method of direct proof with the help of one example.

b) Show whether $\sqrt{11}$ is rational or irrational.

c) Prove that $A - (A - B) : A \cap B$

Question 3: **Marks (4 + 4+ 4)**

a) Set X has 10 members, how many members do P(X) has ? How many members of P(X) are proper subset of X ?

b) Establish the equivalence: $(P \rightarrow Q) \rightarrow (P \wedge Q) \equiv (\sim P + Q) \wedge (Q \rightarrow P)$

c) If p an q are statements, show whether the statement $[(\sim p \rightarrow q) \wedge (q)] \rightarrow (p \vee q)$ is a tautology or not.

Question 4: **Marks (4 + 3 +3)**

a) Make logic circuit for the following Boolean expressions:

i) $(x'.y + z) + (x+y+z)' + (x+y.z)$
ii) $(x'+y).(y'+ z).(y.z'+x')$

b) What is dual of a Boolean expression? Find dual of boolean expression of the output of the following logic circuit:

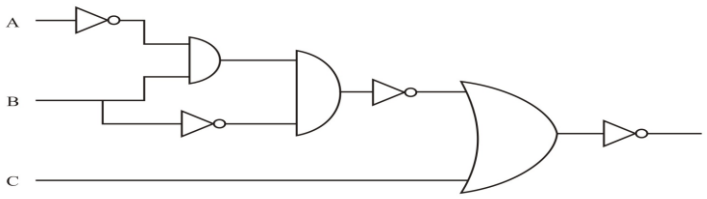

Fig: a

c) Set A,B and C are: A = {1, 2, 3, 4, 5,6,9,19,15}, B = { 1,2,5,22,33,99 } and C { 2, 5,11,19,15}. Find the followings

i. A - (A-B)
ii. $A \cup B \cup C$
iii. A\B

Question 5: **Marks (4+4 +2)**

a) Draw a Venn diagram to represent followings:

i) $(A \Delta B) \cup (C \cup B)$
ii) $(A \Delta B) \cap (B \Delta C)$

b) Give geometric representation for following

i) R x { 3}
ii) {-1, -1) x (3, -3)

c) Explain the concept of counterexample with the help of an example.

Question 6: **Marks (5+4)**

a) What is inclusion-exclusion principle? Explain inclusion-exclusion principle with an example.

b) Find inverse of the following functions

i) $f(x) = \frac{x^3 - 5}{x - 3}$ $\quad x \neq 3$

ii) $f(x) = \frac{x^3 - 7}{x^2 - 4}$ $\quad x \neq \pm 2$

Question 7: **Marks (3 + 3 + 3)**

a) Find how many 3 digit numbers are even? How many 3 digit numbers are composed of odd digits.

b) How many different 20 persons committees can be formed each containing at least 2 Professors and at least 3 Associate Professor from a set of 10 Professors and 42 Associate Professors.

c) Prove that for every positive integer n, $n^3 + n$ is even.

Question 8: **Marks (4 +4 +2)**

a) What is Demorgan's Law? Explain the use of Demorgen's law with an example?

b) How many ways are there to distribute 10 district object into 4 distinct boxes with
   i) At least two empty box.
   ii) No empty box.

c) In a fifty question true false examination a student must achieve twenty five correct answers to pass. If student answer randomly what is the probability that student will fail.

Course Code	**:**	**MCS-014**
Course Title	**:**	**Systems Analysis and Design**
Assignment Number	**:**	**MCA(1)/014/Assign/12**
Assignment Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

This assignment has four questions. Answer all questions. Each question is of 20 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Question 1: Develop SRS for Grade Card Generation System. Use IEEE format. Make necessary assumptions. **(20 marks)**

Question 2: How will you check the correctness of a DFD? What are Do's and Don'ts while drawing a DFD. Use examples or illustrations. **(20 marks)**

Question 3: Draw ERD for Grade Card Generation System. Make necessary assumptions. **(20 marks)**

Question 4: What are various functions of MIS? What are the benefits of it to the organization which implements MIS. **(20 marks)**

Course Code	**:**	**MCS-015**
Course Title	**:**	**Communication Skills**
Assignment Number	**:**	**MCA(1)/015/Assign/12**
Assignment Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

This assignment has seven questions. Answer all questions. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Question 1: Read the passage below and answer the questions that follow:

A tribal elder in southern India, a Bollywood star, a young villager. One uses an ingenious piece of bent wire, the second a high-powered rifle, and the last, a jaw trap. The first may make a meal of his catch, the second may carry home the antlers as trophy and the third may sell the skin and bones to a trader.

Hunting is perhaps one of the oldest ways in which humans have interacted with wildlife. Over time, as we honed this ancient skill, we systematically drove several animals to extinction. Mastodons, woolly mammoths and moas (giant, flightless birds that lived in New Zealand until the 15th century) were all given the final shove by human hunters unaided by guns or gunpowder. With modern weapons in hand, we did even better. Passenger pigeons, whose massive flocks once darkened American skies, were shot in thousands in the presumption that they could never become extinct. But they did.

Closer home, the wolf and tiger teeter on the brink. Their once vast ranges are now mere fragments but still, neither they nor their prey are safe from poison, snare or shotgun.

All of this takes place despite some of the most stringent wildlife protection laws in the world. Most hunting was outlawed in India in 1972. Overnight, an activity with complex social and cultural roots became illegal. In some places, the law combined with modern forms of recreation to draw people away from hunting, but has not been able to stop it completely. Despite the widespread availability of affordable farmed meat, hunting for the pot continues because of strong cultural preferences for wild meat.

Despite such strong social, economic and cultural roots, we still treat elimination of hunting entirely as a law-enforcement exercise. And this task is in the hands of ill-equipped, poorly-motivated and sometimes corrupt forest department personnel who don't always make the best guardians of the law.

Alongside enforcement, the law needs widespread public support which can come only if the socio-economic factors of hunting are addressed. Shooting suspected poachers at sight may have helped reduce hunting in Kaziranga but this strategy

might not work everywhere. In the Periyar Tiger Reserve, former poachers have been trained and inducted as wildlife guides, providing them an alternative livelihood. In Namdapha Tiger Reserve, addressing a traditional hunting community's needs in education, healthcare and livelihood has helped secure their support for the law. These are clear pointers to securing the future of our wildlife – by building context-specific solutions to make hunting implausible and unviable, rather than just illegal.

a) What is common between a tribal, a Bollywood star and a young villager according to the passage? **(2 marks)**
b) List four animals/birds that have become extinct due to human intervention. **(2 marks)**
c) Why is hunting prevalent in India despite strong legislation? **(3 marks)**
d) What were the measures taken in the three wildlife sanctuaries to stop hunting? **(3 marks)**
e) Give a suitable title to the passage. **(2 marks)**
f) Given below are the meanings of some words/phrases from the passage. Pick out those words/phrases from the text: **(8 marks)**

i A very clever device
ii Branched horns on the head of a deer
iii Developed and improved
iv Total destruction
v Ultimate push
vi A situation that is close to becoming disastrous
vii A trap for catching birds or small animals
viii Very strictly enforced law

Question 2: Fill in the blanks using the passive forms. One is done for you as an example. **(10 marks)**

Rohit Chauhan <u>was</u> just <u>sent</u> (send) to prison. Yesterday he (give)…….. a 6-month sentence for stealing a car. The conditions in the prison are terrible. Rohit (3 shock)……. by them. His cell (not paint)…… for years. The walls (cover) …….. in graffiti. He (wake up) …….. every morning at 6:30. He (allow) ……to leave his cell for only two hours a day. If he behaves himself, Rohit (let out) …… of prison after four months. But if he breaks any prison rules, he (keep in) …….. for over six months. He (plan) …….. to behave himself and come out in four months. He (spend) ……his time teaching illiterate convicts in the prison.

Question 3: You work for the HR department of your company and have been asked by the management to make a presentation on 'What motivates employees to work harder'. Use some of the points given below to write a presentation in about 200-250 words. Please keep to the format and semi-formal style of the presentation. **(20 marks)**

Great financial reward
A greater sense of 'team spirit' at work
Working with people who work hard
The chance of promotion
Getting more encouragement from your boss
Feeling that you, as an individual, are making a valuable contribution to your organization
Feeling that you are making a valuable contribution to society
Having a boss who works hard
Working for a successful company
Being given more responsibility
Having a more challenging job
Having a greater sense of belonging to the organization you work for
Being self-employed
A stronger sense of working for your country

Question 4: Write a letter of complaint to a TV company which has delivered a defective TV. In your letter mention: **(10 marks)**

- What the defect is
- What you want done by the company

Question 5: Write an essay in about 250-300 words on any one of the following: **(20 marks)**

i A job you would like to do
ii The impact of technology on work routines
iii A television programme that helped you learn about something
iv Time management is an important ingredient for success

Question 6: Mark the stress in the following words: **(10 marks)**

Manage	Management
Politics	Political
Organized	Organization
Consult	Consultant
Finance	Financial

Question 7: Write short notes on the following: **(10 marks)**

i Barriers to communication
ii The importance of body language in presentation

Course Code	**:**	**MCSL-016**
Course Title	**:**	**Internet Concepts and Web design (Lab Course)**
Assignment Number	**:**	**MCA(1)/L016/Assign/2012**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2012 (For July 2012 Session)** **30th April, 2013 (For January 2013 Session)**

This assignment has one question. Question carries 40 marks. Your Lab Record will carry 40 Marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Submit the screenshots also along with the coding and documentation.

Question 1: Answer the following questions:

(i) Create your own web page using HTML tags only. Your web page must include
   a. Your Photograph in the upper right corner
   b. Two tables showing your qualifications so far starting from 10^{th}. This table should provide a link to the School/ College/ University website that you have attended.
   c. A point wise list about your strengths
   d. Insert your career objective in a frame.
   e. Provide link to some Universities where you propose to do higher studies.

(ii) Create a Form asking feedback about your webpage. On submission of the form you should output a thank you message for submitting the form. Use JavaScript to check if any mandatory information is unfilled in the Form. Also the message should be displayed by the JavaScript.

(iii) Write a program using VB script that displays the multiplication of two matrices of size 2 * 2

(iv) Design a web page which displays a pulled down menu:

Introduction
Objectives
Video Show
References

Each of this menu option should link to a different page. All the pages should include the current date and time.

Course Code	**:**	**MCSL-017**
Course Title	**:**	**C and Assembly Language Programming**
Assignment Number	**:**	**MCA(1)/L017/Assign/2012**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2012 (For July 2012 Session)** **30th April, 2013 (For January 2013 Session)**

This assignment has two sections. Answer all questions in each section. Each Section is of 20 marks. Your Lab Records will carry 40 Marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the programme guide for the format of presentation.

Section 1: C Programming Lab

Question 1: Write an interactive program in C language to manage a Library information system. Maintain a library catalogue with the fields like Access number, Author's name. Title of the book, year of publication, publisher's name, price. Manage the users with different privileges and permissions like Teacher, Student and Staff. **(20 Marks)**

Note: You must execute the program and submit the program logic, sample input and output along with the necessary documentation for this question. Assumptions can be made wherever necessary.

Section 2: Assembly Language Programming Lab

Question 1: (a) Write a program in assembly language to calculate and display the product if first number is greater than second number else calculate and display the subtraction of first number and second number. **(5 Marks)**

(b) Develop and execute an assembly language program to find the Cube of a given number. **(5 Marks)**

(c) Write a program in assembly language for finding the second smallest number in an array of 10 elements. **(5 Marks)**

(d) Write an assembly language program to determine the number of characters/numbers in a string. **(5 Marks)**