CS-60

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-60 : FOUNDATION COURSE IN MATHEMATICS IN COMPUTING

Time : 3 hours *Maximum Marks : 75*

Note : *Question no. 1 is **compulsory**. Attempt any **three** questions from Q. no. 2 to 5. Calculators are not allowed.*

1. (a) If f and g are functions defined on [a, b] such that f+g is continuous on [a, b], then must f and g be continuous ? Give reasons for your answer. *2*

(b) Check whether the function $f(x) = x^2$, $\forall x \in \mathbf{R}$, is periodic or not. *2*

(c) If $y = e^{m \sin^{-1} x}$, then prove that

$(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (m^2 + n^2)y_n = 0$ *4*

(d) Taking four sub-divisions of the interval [1, 3], find the approximate value of

$$\int_1^3 x^2\,dx$$

using Simpson's Rule. 3

(e) Find the condition for the line $y = mx + c$ to be a tangent to the hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

4

(f) Evaluate

$$\int \frac{x^2 - 1}{x^4 + x^2 + 1}\,dx$$

5

(g) Prove that

$\cos 4\theta = \cos^4\theta - 6\cos^2\theta\sin^2\theta + \sin^4\theta$ 3

(h) Prove that $2^n > 1 + n\sqrt{2^{n-1}}$ $\forall\ n > 2$. 4

(i) Find the projection of the line segment AB on the line CD, where we have A(— 2, 3, 0), B(1, — 3, 1), C(0, 0, 1), D(3, 1, 5). 3

2. (a) Use the Mean Value Theorem, to prove that $|\sin(a - b)\cos(a + b)| \leq |a - b|$, where $a, b \in \mathbf{R}$. 4

(b) The plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ meets the axes at A, B and C. Find the equation of the cone whose vertex is the origin and whose guiding curve is the circle ABC. 5

(c) In a single Venn diagram show the sets A^c, $A \cup B$ and C, where

$A = \{x \mid x \text{ is a multiple of } 3, |x| < 20, x \in \mathbf{Z}\}$

$B = \{x \in \mathbf{N} \mid x \text{ is a factor of } 27\}$

$C = \{-\frac{1}{2}, 0, 1\}$ 3

(d) Find $\lim_{x \to \infty} \left[\sqrt{4x^2 - 3x + 5} - \sqrt{4x^2 + 4x - 5}\right]$ 3

3. (a) Show that

$$\int_0^{\pi/4} \ln(1 + \tan\theta)\, d\theta = \frac{\pi}{8} \ln 2.$$ 5

(b) Find the area enclosed by the cardioid

$r = a(1 + \cos\theta)$ 4

(c) Obtain the resolvent cubic, corresponding to Descartes' method, of the biquadratic equation

$x^4 - 8x^3 - 6x - 2 = 0.$ 6

4. (a) Use Tchebychev's inequality to prove that

$$\sqrt{1} + \sqrt{2} + \sqrt{3} + \ldots + \sqrt{n} \leq n\sqrt{\frac{n+1}{2}}, \forall\, n \geq 1$$ 3

(b) Differentiate

$$(\sin x)^x + x^{\sin x}$$

with respect to x. 5

(c) Find the standard equation of the conicoid

$$x^2 + y^2 + z^2 - 2x - 2y - 2z - 1 = 0$$

by shifting the origin to the centre of the conicoid. 4

(d) Find all the asymptotes of the curve $x^2y = 2 + y$. 3

5. (a) Find the angle of intersection of the curves $y^2 = 3x$ and $4y^2 - x^2 = 36$. 4

(b) Find the equation of the sphere through the circle

$$x^2 + y^2 + z^2 - 4x + 2y - 6z - 22 = 0,$$
$$x + 3y - 2z = 1$$

and passing through the point (1, 1, — 1). 3

(c) Reduce the equation $3x^2 - 10xy + 3y^2 + 14x - 2y + 3 = 0$ to standard form. Hence identify the conic it represents. Also trace the original conic, and its reduced form. 8

CS-62

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-62 : 'C' PROGRAMMING AND DATA STRUCTURE

Time : 2 hours *Maximum Marks : 60*

Note : *Question no. 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest. All algorithms should be written nearer to 'C' language.*

1. (a) Write a C function to convert the adjacency matrix of a graph to its adjacency list. Illustrate this C function, using an example. *7*

(b) Explain the concept of representation of a graph. Write an algorithm for graph traversal using Breadth First Search, with a suitable example. Also, determine its space and time complexity. *10*

(c) Write an algorithm for the implementation of insertion sort. Compute the time complexity of insertion sort in accordance to worst, best and average case. Sort the following sequence of numbers by applying insertion sort : *10*

7, 4, 1, 3, 0, 2, 8, 5

(d) How is a circular queue better than a linear queue ? Explain this with an example. *3*

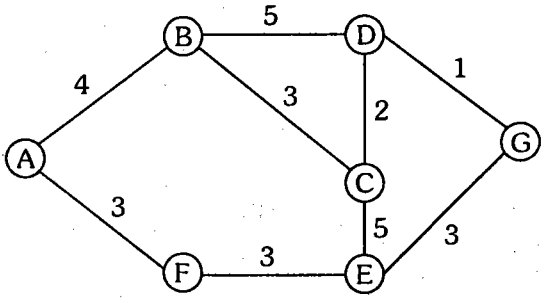
2. (a) Define an AVL Tree. Construct a Height Balanced Tree for the following list of elements : *7*

3, 5, 11, 9, 4, 2, 15, 7, 2, 6, 10

(b) Write a recursive function to generate the fibonacci series. *3*

3. (a) Explain any three advantages of a singly linked list over arrays. *3*

(b) Consider the graph :



Construct a minimum cost spanning tree for the graph above. Also give the cost of this tree. *7*

4. Suppose there is a singly linked list of integers. The linked list is implemented by pointers in 'C'. Write 'C' functions for the following : *10*

   (i) Delete a node in the list, given a pointer to that node.

   (ii) Reverse the list.

5. Explain the following with an example each : *10*

   (i) Dynamic Memory Allocation

   (ii) Sparse Array

   (iii) Pre-order Traversal

   (iv) Indexed Sequential File Organization

   (v) Macros

CS-63

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-63 : INTRODUCTION TO SYSTEM SOFTWARE

Time : 2 hours *Maximum Marks : 60*

Note : *Question no. 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) Write an algorithm and draw a corresponding flow chart to check whether a given number is an Avogadro number or not.
(Note : e.g. $153 = 1^3 + 5^3 + 3^3$ is an Avogadro number.) 7

(b) What are the limitations of a one-pass assembler ? Explain the additional tasks that are performed in two-pass assemblers over one-pass assemblers. 7

(c) Write a shell program to find the Greatest Common Divisor (GCD) for any two given numbers. 7

(d) Explain why segmentation is required in memory management. How is address mapping implemented in a Segmented System ? Give any two advantages of segmentation over a paging scheme. 9

2. (a) Explain the functions of LEX s/w tool. *4*

(b) What is 4GL ? Give any two examples for 4GL. Mention the merits and demerits of usage of 4GLs in applications development. *6*

3. (a) Generate the parse tree for the expression : *5*

$$P = a * b + c/d + e$$

for the grammar rules given below :

List $\rightarrow$ list + digit

List $\rightarrow$ list * digit

List $\rightarrow$ list / digit

List $\rightarrow$ digit

digit $\rightarrow$ 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

(b) Give the UNIX commands for the following : *5*

(i) Print the first five lines of any file.

(ii) Find the number of users logged-on to the system.

(iii) Print lines not common to any two given files.

(iv) To sort the numbers in descending order in a data file.

(v) To copy file1 with another name file2 in the same directory.

4. (a) What is offline communication and online communication in UNIX ? Give at least two commands to carry out each of these communications in UNIX. 6

(b) Explain the hardware support for the Mutual Exclusion Problem, using semaphores. 4

5. (a) What is a scheduler ? Explain any two types of schedulers. 6

(b) Write at least four characteristics of an interactive text editor, with the help of an example editor. 4

CS-64

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-64 : INTRODUCTION TO COMPUTER ORGANISATION

Time : 3 hours *Maximum Marks : 75*

Note : *Question number 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) Simplify the following boolean function in Product of Sums form : 5

$F(A, B, C, D) = \Sigma(0, 1, 3, 5, 7, 9, 11, 14, 15)$

(b) Design a combinational circuit that takes a 4-bit binary number as input and generates an output 0 for combinations 0000 to 0110 and combinations 1110 to 1111. For all other combinations, output is 1. 5

(c) What are the factors for deciding the length of the Instruction ? Also, give factors for deciding the length of addressing bits. 5

(d) Write the syntax, and explain the function of the following 8086 assembly language instructions : 6

(i) AAA

(ii) XLAT

(iii) LEA

(iv) IDIV

(e) Write an instruction sequence for evaluating

$$A * B - D / E$$

using zero and one-address instructions. 4

(f) What is arbitration ? Describe the method of Daisy Chaining. Also, give one advantage and one disadvantage of Polling and Independent requesting over this method. 5

2. (a) An 8-bit register R1 contains 10110110. What should the value of the register R2 be so that the most significant 4-bits of R1 are :

(i) selectively set

(ii) selectively complemented

(iii) selectively cleared

(iv) masked.

Show the operations above using R1 and R2. 6

(b) What is the need of master-slave flip-flop ? With the help of a logic diagram, explain the working of the master-slave flip-flop. 5

(c) Why does DMA have priority over the CPU when both request a memory transfer ? 4

3. (a) Draw the logic diagram of a 4-bit ripple counter. How is it different from synchronous counters ? 5

(b) What are the problems encountered while writing in systems with cache memories ? Also, give the suggested techniques for writing in systems with cache memories. 5

(c) Write a program in 8086 assembly language to find the minimum and maximum of 10 given values stored in an array in the memory. 5

4. (a) What is RAID ? Explain briefly the RAID level 3 and level 5. 5

(b) What is the purpose of Wilkes control unit ? Describe this with the help of a diagram. 5

(c) What is Interrupt driven Input/Output ? Is it better than programmed I/O ? Justify your answer. 5

5. (a) Explain the following terms with the help of an example or diagram : 10

(i) Interrupt vector table

(ii) Peripheral processors and co-processors

(iii) PLA

(iv) Horizontal and Vertical Microinstructions

(b) List five addressing modes used in an 8086 microprocessor. Explain any two in the context of an 8086 microprocessor, with the help of an example each. 5

CS-66

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-66 : MULTIMEDIA

Time : 2 hours *Maximum Marks : 60*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Define the term Multimedia. List four softwares used in multimedia industry. 4

(b) Explain the role of a logic flow chart for multimedia application, with an example. 4

(c) How is multimedia used in business communication ? Explain this with an example. 4

(d) What are Annotations ? Explain the role of annotations in the applications of hypertext, using an example. 4

(e) What is video conferencing ? List two differences between video conferencing and document conferencing. 4

(f) Explain the use of the Everest Authoring System. Also list four features of this system. *4*

(g) Describe the Hardware requirement for a multimedia system, with a suitable diagram. *6*

2. Briefly explain four features of Digital Video. Also explain why it is increasingly used in current applications. Explain two differences in the functions of Digital Video and a CD-ROM. *10*

3. (a) What is Macromedia Director ? How is it used to develop multimedia ? *5*

(b) Explain the following multimedia file formats : *5*

AVI, BMP, JPEG, MPEG and Wav.

4. (a) What is a hypertext ? Explain this with a diagram. Also describe three major elements of hypertext. *6*

(b) Explain the use of communication technology for multimedia services, with an example. *4*

5. (a) Explain the process of collaborative learning using multimedia, with an example. *5*

(b) Explain the production process of multimedia applications, with an example. *5*

CS-68

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-68 : COMPUTER NETWORKS

Time : 3 hours *Maximum Marks : 75*

Note : *Question number 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) How are dual-ring systems used to maintain a link when a station fails ? Explain this with the help of a diagram. 5

(b) Why is a twisted pair not used for LAN connectivity ? 2

(c) For n devices in a network, what is the number of cable links required for a mesh, ring and star topology, respectively. 3

(d) Explain the factors which will determine the length of the sliding window. 5

(e) What are three similarities and three differences between OSI and TCP reference models ? 6

(f) Explain the connection establishment and multiplexing in the transport layer protocol. 6

(g) Explain any three QoS parameters of a transport layer protocol. 3

2. (a) If a size of a window is 3 bits, how many packets can be sent using Go Back N without getting an acknowledgement ? Explain your answer. 2

(b) How does a store-and-forward system affect the delivery of data traffic ? Explain this. 3

(c) UDP is a connectionless protocol. Why does it exist ? Explain this. 4

(d) Explain the three differences between CSMA/CD and token ring protocol. 6

3. (a) Differentiate between Hubs, Switches and Bridges. 6

(b) A system has n-layer protocol hierarchy. Applications generate a message of length M bytes. At each layer, an h-byte header is added. What fraction of the network bandwidth is filled with headers, and why ? 4

(c) What are the two popular approaches to packet switching ? Explain any one of these approaches with the help of a diagram. 5

4. (a) The physical service is a non-confirmed service. If some data bits are lost during transmission over the interconnecting media, which layer detects their loss and takes recovery action ? Explain this. *3*

(b) Explain Source Routing Bridges, and write the pseudocode for Source Routing Bridges. How are they different from Spanning Tree Bridges ? *8*

(c) Draw, and explain, the structure of an ATM cell. *4*

5. (a) What is the difference between IDN and ISDN ? Explain the basic services of ISDN. Describe five applications of ISDN. *9*

(b) Explain the following : *6*

(i) Half-Duplex transmission

(ii) Collision

(iii) TELNET

(iv) Quality of Service (QoS)

(v) Remote Procedure Call (RPC)

(vi) Piggybacking

CS-69

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-69 : TCP/IP PROGRAMMING

Time : 3 hours *Maximum Marks : 75*

Note : *Question no. 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) Explain how data transmission occurs from one computer to another. Explain the main activities to be conducted at the TCP levels and IP levels in sending packets to the destination computer. *8*

(b) Identify the address classes of the following IP addresses : *4*

(i) 196 . 202 . 101 . 102

(ii) 216 . 111 . 52 . 12

(iii) 2 . 212 . 011 . 200

(iv) 150 . 156 . 10 . 10

(c) How does TCP handle time out and retransmission ? Explain the need for multiplexing at the transport layer. 7

(d) How many networks can each IP address class A, B and C have ? Also, find the number of hosts per network in each given address class. 6

(e) Write any three differences between the OSI reference model and the TCP/IP model. 3

(f) Explain the meaning of the following IP addresses : 2

(i)

Network id	1111 1111

(ii)

000 00	Host id

2. (a) Design UDP Client and Server algorithms, where the client should prompt a user to type a line of text and send it to the server. The server should listen to the clients concurrently and print the text with the client's name on the screen. 10

(b) How does FTP work ? Explain the connection establishment procedure between a client and a server. 5

3. (a) Explain the concepts of IP subnet addressing and subnet masking, with the help of an example for each. 8

(b) Explain any three fields in the ethernet frame format. Also explain how the ethernet frame format is related to the IP and TCP header. 7

4. (a) Explain the importance of the following IP header fields in network communication : *10*

(i) Time To Live

(ii) Fragment Offset

(iii) Type of Service

(iv) Header Checksum

(v) Padding

(b) How does name resolution take place in DNS ? Explain this with the help of a suitable example. *5*

5. (a) How does TCP handle the flow control problem ? Also, write any four advantages of TCP over UDP. *7*

(b) Define the following terms : *8*

(i) Sliding Window

(ii) Multicasting

(iii) Congestion

(iv) Gateway

CS-70

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-70 : INTRODUCTION TO SOFTWARE ENGINEERING

Time : 3 hours *Maximum Marks : 75*

Note : *Question no. 1 is* ***compulsory*** *and carries 30 marks. Answer any* ***three*** *questions from the rest.*

1. (a) Explain the importance of problem identification in software development. Explain how a data flow diagram represents work flow in a typical Library Management System. *8*

(b) What is the concept of project outsourcing ? Give two examples each, with justification, of where outsourcing is recommended and where outsourcing is not recommended. *7*

(c) Explain the term 'quality of software'. Consider any software for Desk Top Publishing. Give three factors which can affect the quality of this software. Justify your answer. *7*

(d) Explain the concept of object oriented programming. List four important features each of Oracle and Ingres. 8

2. (a) What are the possible S/W team structures ? In which of these is communication horizontal ? Use examples of such teams to explain your answer. 6

(b) What is software upgradation ? What are the processes to be followed for upgradation ? Explain four problems that could be encountered by not following the proper methdology for upgradation. 9

3. (a) Describe briefly four major functions of a Systems Analyst. Also describe four important attributes that a Systems Analyst must have. 8

(b) Describe four problems encountered in applications development. 4

(c) How does minimization of intellectual distance make software maintenance easy ? Which design approach is developed using this concept ? 3

4. (a) What is project scheduling ? Describe at least three functions associated with project scheduling. Explain four options available to a project manager when a project is behind schedule. 8

(b) Prepare an SRS document for an airline reservation system. Explain how design reviews can uncover deficiencies in this. 7

5. (a) How is 'risk management' performed in a software project ? List any six risks of a s/w project, and the corresponding risk management techniques. *8*

(b) What are the considerations of evaluating a CASE tool ? Also list five benefits of using CASE tools. *7*

CS-71

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-71 : COMPUTER ORIENTED NUMERICAL TECHNIQUES

Time : 3 hours *Maximum Marks : 75*

Note : *Question number 1 is **compulsory**. Attempt any **three** questions from Q 2 to Q 5. Calculators are **not** to be used. Unless otherwise mentioned, calculations should be done upto 3 decimal places.*

1. (a) The equation $9x^3 + 3x^2 - 5x + 1 = 0$ has a double root near 0·3. Obtain one approximation to the root using the Newton-Raphson method, upto three decimal places. *4*

(b) Find the relative error in the computation of $x - y$, where $x = 0{\cdot}572133869$, $y = 0{\cdot}572021437$ with five decimal digit accuracy. *3*

(c) If $f(x) = \frac{1}{x}$, find the third divided difference $f[x_0, x_1, x_2]$. *3*

(d) Using the Newton's backward difference formula, obtain an approximation to f(4·5) from the data of values. 4

x	1	2	3	4	5
f(x)	8	21	46	89	156

(e) Evaluate $\int_0^1 xe^{-x^2}\,dx$ using the Simpson's rule with n = 4 sub-intervals. Compare the result with the exact solution.

(Given : $e^{-1/16} = 0{\cdot}9394$, $e^{-1/4} = 0{\cdot}7788$, $e^{-9/16} = 0{\cdot}5698$, $e^{-1} = 0{\cdot}3679$) 4

(f) Obtain the truncation error of the Heun's method for the solution of the initial value problem $y' = f(t, y)$, $y(t_0) = y_0$. 7

(g) Explain what 'instability of an algorithm' is. Support your explanation with appropriate examples. 5

2. (a) Derive the regula-falsi method for finding a simple root of the equation f(x) = 0. 6

(b) State the Lipschitz condition. Further, check whether the IVP

$y' = 1 + y^2$, $y(0) = 1$

can be solved using this condition. 4

(c) From the following data, approximate f(2·5) using Newton's difference formula : 5

x	2	3	4	5
f(x)	0·693	1·098	1·386	1·609

3. (a) For $f(x) = x^2 - 3x + 1 = 0$, find the smallest positive root by the fixed point iteration method, using three iterations. Find the minimum number of iterations required so that the error in the approximation is $\leq 5 \times 10^{-1}$. *9*

(b) Solve the following system of equations by Gauss elimination with partial pivoting. *6*

$$x_1 + x_2 + 2x_3 = 1$$
$$4x_1 + 2x_2 + x_3 = 2{\cdot}5$$
$$2x_1 + 3x_2 + 4x_3 = 1$$

4. (a) If $f''(x_0)$ is approximated by

$$f''(x_0) = \frac{1}{12h^2}\,[-f(x_0 - 2h) + 16f(x_0 - h) + cf(x_0) + 16f(x_0 + h) - f(x_0 + 2h)],$$

find the value of c. *5*

(b) Solve the initial value problem

$$y' = \frac{2y - x}{2y + x},\ y(0) = 1$$

using Euler's method in $[0, 0{\cdot}3]$ with $h = 0{\cdot}1$. *5*

(c) Find the interpolation polynomial that fits the data $f(0) = 1$, $f(2) = 25$, $f(3) = 82$, $f(4) = 193$. Hence, find an approximation to $f(1)$. *5*

5. (a) Use the Runge – Kutta method of order 4 to evaluate $y(1\cdot1)$ for the IVP $\frac{dy}{dx} = x^2 + y^2$, $y(1) = 0$. *6*

(b) Which of the following statements is true ? Give reasons for your answer. *6*

(i) $2\cdot145$ is the floating point representation of $21\cdot45$.

(ii) The round-off of $4\cdot50936$ to 4 significant digits is $4\cdot5094$.

(iii) Numbers in 3-digit decimal arithmetic with rounding satisfy the distributive property of multiplication over addition.

(c) Using inverse interpolation, find the value of x for $y = 1$, given the following data : *3*

x	1	3	4
y	— 3	0	3

CS-72

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-72 : C++ AND OBJECT ORIENTED PROGRAMMING

Time : 2 hours *Maximum Marks : 60*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Explain the concepts of encapsulation and information hiding in an object oriented paradigm, with the help of an example in C++. 5

(b) Explain 'dynamic binding', with the help of an example. Give its advantages and disadvantages. 5

(c) Differentiate between function and operator overloading. Also give one example of each. 5

(d) What are public and private inheritance ? Why do we need different access specifiers ? 5

(e) Explain the utility of the friend function, using an appropriate example. 5

(f) Write a String class in C++ which should include the member function to calculate the length of the string. 5

2. (a) If a base class and derived class each include a member function with the same name, which member function will be called by an object of a derived class, and why ? 3

(b) Write a program to read and display information about employees and managers. Employee is a class that contains employee_no, name and address. Manager class contains all the information of the employee class and the list of employees working under the manager. 7

3. (a) Define a class template. What are its advantages ? 4

(b) Write a template function for exchanging (swapping) the values between two variables. Use this function in main( ) for int, double and char type of variables. 6

4. (a) What is an interaction diagram ? Explain the steps involved in drawing such a diagram, with the help of example. 5

(b) Explain the concept of virtual functions. Give three examples of the use of such functions. 5

5. Explain the following with the help of an example each : *10*

(i) Static data member

(ii) Object Oriented Programming

(iii) File streams in C++

(iv) Exception handling

CS-73

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-73 : THEORY OF COMPUTER SCIENCE

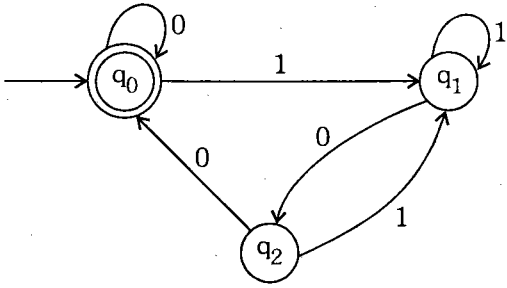
Time : 3 hours *Maximum Marks : 75*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) What is a linear bounded automaton (LBA) ? What is the class of languages it can accept ? 4

(b) Languages L_1 and L_2 are both recursive. Is their intersection also recursive ? Justify your answer. 5

(c) Find a regular expression for the following finite automata. 5



(d) What is Ld, the diagonal language ? Is it decidable ? Give reasons. 5

(e) Differentiate between Moore and Mealy machines. 3

(f) Describe the little-oh and little-omega growth rate functions. 4

(g) Show that the predecessor function

$$\text{Pred}(x) = \begin{cases} 0 & \text{if } x = 0 \\ x - 1 & \text{if } x \geq 1 \end{cases}$$

is primitive recursive. 4

2. (a) Combine CFG and BNF to define the syntax of an assignment statement. 6

(b) When is a problem NP-complete ? Give an example of an NP-hard problem which is not NP-complete. Justify your example. 5

(c) State and prove the pumping lemma for context free languages. 4

3. (a) Design a pda (push down automaton) for the following context free grammar. 5

$S \rightarrow aAA$

$A \rightarrow aS \mid bS \mid a.$

(b) Is the language $L = \{a^i b^j \mid i \neq j\}$ regular ? Justify your answer. 6

(c) Describe two ways in which a pda can accept a context free language. 4

4. (a) Design a Turing Machine which accepts the language

$$L = \{a^n b^n \mid n \geq 1\}$$ 6

(b) What is the halting problem in the context of Turing Machines ? Prove that this problem is undecidable. 5

(c) Describe the working of a multi-tape Turing Machine. 4

5. (a) Prove that the following decision problem is undecidable :

Given a Turing Machine T, is L(T) non-empty ? 6

(b) Prove that the regular languages are closed with respect to concatenation. 2

(c) Prove that the independent-set problem is NP-complete by reducing the vertex cover problem to it. 7

CS-74

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-74 : INTRODUCTION TO INTERNET PROGRAMMING

Time : 3 hours *Maximum Marks : 75*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Differentiate between nested and inner classes. Explain this through appropriate examples of each. 8

(b) "We can have void as return type for the constructor of a class." Is this true or false ? Give reasons for your answer. 2

(c) Answer the following questions in brief : 5

(i) finalize( ) is always followed by which access specifier ?

(ii) Which special class is a superclass of all other classes in Java ?

(iii) join( ) method belongs to which class ?

(iv) Which operator is used for unsigned right shift ?

(v) How many bits does short data type contain ?

(d) Super( ) must be the first statement executed inside the subclass constructor. Why ? Explain uses of the keyword 'super', with an example. 4

(e) What is the role of a default exception handler in Java ? Differentiate between '*throw*' and '*throws*'. 4

(f) Write an applet that reads two floating point numbers, and displays their sum. 7

2. (a) Differentiate between the following, using examples : 9

(i) Transient and Volatile keywords

(ii) == and equals( )

(iii) abstract class and interface

(b) What is a package in Java ? Also write steps to create a package in Java. 3

(c) Assume that a class A extends a class B, which further extends class C. Also all the three classes implement the method test( ). How can a method in class A invoke the test( ) method defined in class C (without creating a new instance of class C) ? Explain. 3

3. (a) What are threads ? What are the two ways in which threads can be created in Java ? Explain each one through an appropriate program. 6

(b) Give the output of the following program code, and an explanation of its functioning : 4

```
public Class Test {
    public static void main (string args[ ]) {
        int i,j=1;
        i=(j>1)?2:1;
        switch (i) {
case 0 : System.out.println("0"); break;
case 1 : System.out.println("1");
case 2 : System.out.println("2");
case 3 : System.out.println("3"); break;
        }
    }
}
```

(c) Write a program that reads the data from one file and writes into another file. 5

4. (a) Explain the following terms in AWT package : 4

(i) Frame

(ii) Panel

(iii) Component

(iv) Container

(b) Explain the StringBuffer length and capacity methods, using an example. 4

(c) Differentiate between method overloading and method overriding. Explain dynamic method dispatch in this context. 5

(d) Explain the Event Delegation Model. 2

5. (a) Explain static methods and static variables. What are the restrictions on static methods ? 5

(b) Write a program in Java to print the following pattern for a given integer n. 6

```
        1
      1 2 1
    1 2 3 2 1
  1 2 3 4 3 2 1
  .....
```

n = number of lines.

(c) What are applets in Java ? Explain the 'applet skeleton', using an example. 4

CS-75

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-75 : INTRANET ADMINISTRATION

Time : 2 hours *Maximum Marks : 60*

Note : *Question no. 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) Give any two differences between Intranet and Internet. Also, list any three advantages of intranet. 5

(b) Differentiate between internal and external security threats in an intranet. 5

(c) Explain the purpose of the following : 6

(i) Kerberos v5

(ii) Windows NT LAN Manager (NTLM)

(iii) Secure Socket Layer/Transport Layer Security

(d) Differentiate between intranet authoring and management tools. Give one example of each type of tool also. 5

(e) What is the difference between local and domain account types ? Write the steps for creating these accounts. 6

(f) What is a Virtual Private Network (VPN) ? Give one advantage and disadvantage of VPN. 3

2. (a) Explain the public key infrastructure solution, with the help of an example. 5

(b) What is Agora ? Explain any two of its properties that make it useful for E-commerce. 5

3. (a) Give any two uses of intranet authoring tools. Also list any three features of these tools. 5

(b) What is a distributed database ? Give two benefits of using a distributed database for an organisation. Give two differences between a distributed database and a file server model. 5

4. (a) What is the importance of an Internet Information Server ? Give any two differences between an internet information server and a personal web server. 4

(b) What are the different classes of IP addresses ? Explain each class, with an example. 6

5. (a) What are the different firewall technologies ? Explain the working of the packet filter firewall technology. 5

(b) What are the uses of the following commands in an Intranet/Internet ? Write their complete syntax also. 5

(i) Unlink in HTTP

(ii) TOP msg n in POP

CS-601

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-601 : DIFFERENTIAL AND INTEGRAL CALCULUS WITH APPLICATIONS

Time : 2 hours *Maximum Marks : 60*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions out of the remaining questions.*

1. (a) Which of the following statements are true and which are false ? Give reasons for your answers. *10*

(i) $\frac{d}{dx}\left[\int_{5}^{4x^4} \tan^{-1}(\sec 2t)\, dt\right] = \tan 8x^4 - \tan 10$

(ii) $f(x) = \frac{1+x^3}{1-x}$ is an odd function of x.

(iii) The tangent to the curve $x^2 + y^2 + 3xy + x = 0$ at $(1, -2)$ is parallel to the x-axis.

(iv) $\int_0^{\pi/2} \sin^4 x \, dx = \frac{3\pi}{16}$.

(v) $f(x) = (x + 2)^4$ increases on $[-5, -4]$.

(b) Find $\frac{dy}{dx}$, if $y = \sec^4 x$. 3

(c) Find U(P, f), if $f(x) = 2x^3$ and $P = \{0, 1, 2, 3, 4\}$ is a partition of $[0, 4]$. 3

(d) Find all the symmetries of the curve $y = x^2 + 2$. 4

(e) Is $f(x) = \begin{cases} x + 1, & x \leq 0 \\ 1 - x, & x > 0 \end{cases}$

continuous on $[-2, 2]$? Give reasons. 3

(f) Match the functions with their derivatives : 3

	f(x)		f'(x)
1.	sinh x	1.	$-\operatorname{cosech}^2 x$
2.	cosh x	2.	$-\operatorname{sech} x \tanh x$
3.	tanh x	3.	sinh x
4.	coth x	4.	$-\operatorname{cosech} x \coth x$
5.	sech x	5.	$\operatorname{sech}^2 x$
6.	cosech x	6.	cosh x

(g) Find $\lim_{x \to 0} \frac{\sin 3x}{\sin 5x}$. 2

(h) Find the maximum possible domain of the function f, defined by

$$f(x) = \sqrt{\frac{x}{x^2 - 1}}.$$ 2

2. (a) Check whether the following function is monotonic. 2

(b) Find the rate of change of the volume of a sphere w.r.t. the radius, when the radius is 3 cm. 4

(c) Prove that $\int_{-a}^{a} f(x)\,dx = 0$ if f is an odd function of x. 4

3. (a) Evaluate $\int \frac{x+1}{x^2+2x+7}\,dx$. 4

(b) Find the value of sin 61°, rounded off to two decimal places. (Take $\pi = 3{\cdot}142$). 6

4. (a) Differentiate $(\cos x)^x + (\sin x)^{\ln x}$ with respect to x. 4

(b) Show that

$$\int_0^{\pi/2} \cos^n x\,dx = \begin{cases} \frac{2}{3}, \frac{4}{5}, \ldots \frac{n-1}{n}, & \text{if n is odd, } n \geq 3 \\ \frac{1}{2}, \frac{3}{4}, \ldots \frac{n-1}{n} \cdot \frac{\pi}{2}, & \text{if n is even, } n \geq 2 \end{cases}$$

6

5. (a) Find the area of the region bounded by one arch of the cycloid

$x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$

and its base. 5

(b) Find the extrema of the following functions (if any) : 5

(i) $y = x + \frac{2}{x}, \quad x > 0$

(ii) $y = 2 \cos x + 8, x \in \mathbf{R}$

CS-610

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-610 : FOUNDATION COURSE IN ENGLISH FOR COMPUTING

Time : 2 hours *Maximum Marks : 50*

Note : *Attempt **all** the questions.*

1. Read the passage and answer the questions that follow :

Computers are used in many seemingly different ways in modern life, to the point that they are frequently misnamed "electronic brains". However, all these different applications use the same basic principles, and all must be first analyzed as problems by a person before the computer can be used. For example, a computer may be used to perform routine work of a repetitive nature, such as maintaining the bank accounts of all of the customers of a bank.

Previously this job was done by manual labour. Bookkeepers were instructed about the rules to be followed for a typical account and then they applied them to each account. Now the computer can do this, but the rules must first be established by a person. This is an example of the use of a computer to save human drudgery in processing repetitive information.

Computers are also used to control systems in environments where it is not feasible for humans to act, as, for example, in unmanned space flight. A computer may be organized to respond in predetermined ways to measurements made by on-board instruments such as radar and to signals sent from ground stations. It may also compute the position and the velocity of the spacecraft in order to find out where the craft is heading in relation to the desired destination. Using the information available, the computer can send signals to the spacecraft control systems to keep the craft on the desired course and to perform the planned manoeuvres. However, again notice that all of the operations had to be planned ahead of time by people. A person had to think out the response to each combination of circumstances and to organize the computer to produce

those responses. Thus a person might have decided that the braking rockets should be fired with a thrust proportional to the velocity and the inverse of the distance to the target. When the computer is properly prepared, it can control the braking rockets, but the decision about how they are fired is made by a person when he writes the program.

The third major area of computer application is to assist people in solving problems that are beyond human capabilities. For example, a computer can be used to perform long sequences of computations that could never be performed by people because of human proneness to error and slow speed. Such situations commonly arise in mathematics or engineering when computations can only be performed sequentially; that is, when the results of one calculation must be known before the next can be performed. Manual calculation of the stresses in a modern airplane wing, for example, would be out of the question. Although the designer of the plane makes the basic decisions about the style of the wing and how the stresses are to be analyzed, the computer makes it possible to perform the analysis in a practical length of time.

(i) Why does the writer think that the computer has been wrongly named as 'electronic brains' ? 2

(ii) List the three major areas of computer application. 3

(iii) In what ways has the computer saved man from drudgery/manual labour ? 2

(iv) Find out words from the passage which mean the same as the following : 3

(1) Work in which you use your physical strength rather than your mind

(2) An action planned beforehand

(3) Things happening in a fixed order

2. (a) Change the voice of the following sentences : 2

(i) The cheque issued by you has been refused by the bank.

(ii) Heat turns milk sour.

(b) Fill in the blanks in the following sentences with the correct form of the tense of the verb given in brackets : 3

(i) Water _____ (boil) at 100° C.

(ii) Have you _____ (see) my book ?

(iii) You _____ (drive) very fast.

3. Do as directed :

(a) Correct the following sentences : 3

(i) I am understanding the lesson now.

(ii) All qualities and kinds of material is available in this Mall.

(iii) The house was shook by the explosion.

(b) I am right. (Use a tag question) 1

(c) He is _____ able student but not _____ ablest. (Use proper article) 1

(d) Abstinence _____ smoking will do you good. (Use correct preposition) 1

(e) Use these words in your own sentences to bring out their different meanings : 2

desert; dessert

(f) He built a house. He built it at a great cost. (Combine the two sentences into one) 1

(g) "The earth is round," said the teacher. (Change into indirect speech) 1

4. Write a composition in about 300 words on any ***one*** of the following. The topic sentence is given to you. Develop it keeping in mind unity, order and coherence. 15

(i) How computers have changed your life.

(ii) Distance education helps education reach all the corners and all the sections of people.

(iii) Only the rich people have benefited from an open and liberalized economy.

5. Read the passage and summarise it in about 150 words. *10*

Once again the Supreme Court seems to have done the job that the Parliament and the executive has long dithered over. In demanding that the central and state governments speed up the process of making the registration of marriages compulsory for all communities, the SC has understood the urgency of this simple procedure that can help check the gross violation of women's rights in the country. Proof of marriage may not be a panacea, but it can go a long way towards controlling persistent social diseases like child marriage, bigamy and trafficking of women. It is actually baffling as to why the Centre has repeatedly rejected the NHRC's proposal for such a rule — in 1994, 1996 and 2000 — and allowed the situation to drift unchecked.

A large number of marriages in India take place in violation of existing provisions of the law. Despite the Child Marriage Restraint Act, which penalises under-age marriage, social sanction for this Act persists, mainly in states like Rajasthan and UP, and ceremonies are performed openly and in large numbers. In the case of bigamy and trafficking, it often gets difficult for the complainant wife to prove her marital status in the absence of a proof of marriage. And this lacuna is also widely misused to deny marriage and thus, escape from paying maintenance or to prevent women from inheriting

their husband's property. Gender parity is still a distant goal in this country. But steps like registering marriages will go some way in empowering women and helping them assert their rights.

In the case of marriage registration, unlike others where the spectre of the uniform civil code hangs ominously, the government has no cause to be worried about objections from the minority communities. In any case, the personal laws of the Christian and Parsi communities make registration of marriage mandatory while under Muslim law, the terms of marriage are recorded in the *nikahnamma*, a contract, which is handed over to the couple. What is really needed is to insert a provision in the Hindu Marriage Act to make registration mandatory. Four state governments — Maharashtra, Gujarat, Karnataka and Himachal Pradesh — have already gone ahead with this legislation. It is now up to the Centre to make this a uniform rule.

CS-611

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-611 : COMPUTER FUNDAMENTALS AND PC SOFTWARE

Time : 2 hours *Maximum Marks : 60*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Explain the steps involved, for each of the following in MS-Word : 6

(i) Changing Document Margins

(ii) Mirror Margins

(iii) Setting Page Margins

(b) What is Circuit Switching ? How is it different from Message Switching ? 4

(c) Explain five resources used to manage windows and user-defined objects. 10

(d) Explain access modes and access time with reference to memory. Also write the three types of access modes. 5

(e) What is Boot Infector ? Explain how it affects the system file. Also, explain how it can be prevented. 5

2. (a) What is Multimedia ? Explain three multimedia tools available with Windows-95. 5

(b) What is a dial-up network ? Explain how it is different from cable network. 5

3. (a) What is parallel processing ? Also explain the categories of Flynn's classification. 5

(b) What are the steps for recording a macro in MS-Word ? How does one run a recorded macro ? 5

4. (a) What is Network security ? Explain two measures that can be adopted for Network security. 5

(b) What is a magnetic disk ? Define 'optical disk'. List three advantages of an erasable optical disk over a magnetic disk. 5

5. (a) What is MailMerge ? Explain its advantages using an example. 5

(b) What is data communication ? Explain two differences between Synchronous and Asynchronous transmission. 5

CS-612

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CS-612 : PC SOFTWARE SKILLS

Time : 2 hours *Maximum Marks : 60*

Note : *Question no. 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) John is an honest milkman supplying milk in two houses. One day the two ladies asked for two litres of milk each. One lady was carrying a five litre pan and the other a four litre pan. John had only two forty-litre cans, each full of milk. How would he measure exactly two litres of milk for each lady ? 9

(b) What is an Address Book, and why is it required ? How are new addresses added to the Address Book ? 4

(c) What are Cell References ? Explain three ways of giving cell references, with examples of each implemented and explained through formulae. 5

(d) Differentiate between splitting of windows and freezing of window panes. 2

(e) State and prove Jung's theorem. 5

(f) How can names be given to a range of cells ? What are the rules for defining range names ? List two valid and two invalid range names. 5

2. (a) What is a Domain Name System (DNS) ? Explain the terms username, host, domain and subdomain in the context of an Internet Address. 5

(b) Differentiate between a Worksheet and a Workbook. Give three ways to restrict access to your workbook. 5

3. (a) What is the utility of viewing a worksheet in multiple windows ? Explain four ways of arranging the windows on the screen. 5

(b) Explain two ways to share information with people having common interest, on the Internet. 5

4. (a) How can data in a database be filtered ? Explain Autofilters and Advanced filters. 5

(b) What is a template ? Also explain why it is called a Special Workbook. 2

(c) State Goldbach's conjecture. Why is it called a conjecture, and not a theorem ? 3

5. (a) Explain the following terms, with examples : *6*

(i) Mailing Lists and Mail Reflectors

(ii) Telnet

(iii) Autotemplates

(b) Show that for all positive integers n, $2^{2n-1} + 1$ is divisible by 3. *4*

CC-09

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CC-09 : INTERNET AWARENESS

Time : 2 hours *Maximum Marks : 75*

Note : *Question number 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) Suppose you are browsing any University website. Give ten general features/options you would find on its first/home page. *10*

(b) Write the step-by-step procedure to participate in an "On-line poll" offered by some website and to view the results of the poll instantaneously. *10*

(c) Explain the following : *10*

(i) WWW

(ii) HTML

(iii) Hypermedia

(iv) Remote login

(v) FTP

2. Write a step-by-step procedure to prepare notes on some topic by browsing several websites using a search engine. Also, mention how to download the images. 15

3. (a) List the steps involved in attaching a file along with an e-mail message. 5

(b) What is TCP/IP ? Explain the different components of an IP address. 5

(c) Who governs the Internet, and how is it funded ? 3

(d) Give two examples each of a geographic and a non-geographic domain. 2

4. With the help of diagrams, explain briefly any three methods of connecting to the Internet. 15

5. List any three URLs for each of the following : 15

(i) Search engines

(ii) E-mail providers

(iii) Free chat providers

(iv) Software providers

(v) News providers

CC-11

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CC-11 : VISUAL BASIC

Time : 2 hours *Maximum Marks : 75*

Note : *Question number 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest.*

1. (a) Explain the usage of the following, with an example for each : 5

(i) PRINT command

(ii) DEBUG window

(b) Write an event procedure that accepts a string as input and displays all words which consist of at least one vowel in them. 10

(c) Explain each of the following functions with an example : 10

(i) Lcase$

(ii) PV

(iii) Ccur

(iv) Pmt

(v) Ltrim$

(d) Write the file extensions for the following VB files : 5

(i) Project file

(ii) Resource file

(iii) Class module file

(iv) Form module file

(v) Standard module file

2. (a) Explain at least 10 tools of a tool box along with their usage on the form. 10

(b) Write an event procedure to find the sum and average of a list of 10 numbers given as input. 5

3. (a) Write an event procedure for a command button to calculate the factorial of x, where x is a positive integer. Design a sample layout for the application, which includes a splash screen. 9

(b) Write a step-by-step process to create a control array. 6

4. (a) Define the term **database**. Design a Visual Basic Application to automate the library of an educational institution. Give the details of database tables, forms, controls and menu design. Make assumptions, wherever necessary. 7

(b) Explain the DBList, DBCombo and DBGrid controls. Will these controls permit several records to be displayed or to be manipulated at a time ? Give reasons for your answer. 8

5. (a) Explain the process of creating an OLE object at design time. *9*

(b) Write an event procedure for the addition of two matrices. Design a user interface for this application. *6*

CC-16

BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

June, 2006

CC-16 : INTRODUCTION TO C++

Time : 2 hours *Maximum Marks : 75*

Note : *Question number 1 is* ***compulsory****. Answer any* ***three*** *questions from the rest. Use C++ wherever necessary.*

1. (a) There is an automobile showroom named ABC. It sells cars of different brands. The showroom closes at 9 PM and opens at 11 AM every day. At the end of the day, they calculate the number of cars sold under each brand, number of cars of each model sold of the same brand and the discounts given to customers. Accordingly, they will place orders with the manufacturing companies so that the same can be delivered to the customers.

Design appropriate classes for the Car Sales Management System, including constructors, destructors and member functions. Write a main( ) function to display the information required to be sent to manufacturing companies. Make assumptions, wherever necessary. *15*

(b) Explain the use of "::" operator in C++ programs, with an example. 5

(c) Explain the advantages of a pure virtual function, with the help of an example. 5

(d) Does C++ support procedural programming ? Justify your answer. 3

(e) Give two differences between C and C++. 2

2. (a) Write a constructor that initializes a single dimensional array with a string that indicates your name. 6

(b) Write a program in C++ that accepts two strings S_1 and S_2 as input and prints the one among them which is longer. Define appropriate classes. Make necessary assumptions. Don't use any standard library function to find the length of the strings. 9

3. (a) Write the syntax of **break** and **continue** statements. Also write **the** difference between them. 5

(b) Define the term **Inline function**. Write an example program that uses an inline function. 5

(c) List five major features of object oriented programming. 5

4. (a) Explain any two ways of deriving a class from a given class. Give an example of each. 10

(b) Write the syntax of any two functions of an "iostream.h" library. 5

5. (a) Write a function template that accepts a set of elements as input and prints them in the same order they were received during input. 5

(b) Write a program in C++ for the multiplication of two matrices. 10

PPC

PREPARATORY PROGRAMME IN COMPUTING (BCA/MCA)

Term-End Examination

June, 2006

PREPARATORY PROGRAMME IN COMPUTING

Time : 3 hours *Max. Marks : 100*

Note : *Attempt any **five** questions. No calculators are allowed.*

1. (a) Simplify :

(i) $2(3a + 2b) - (a - 7b)$

(ii) $(3x^2)(4x^3y) - 3x^4y(x - y)$

What is the degree of the polynomial in (ii) ? 4

(b) (i) Write the decimal form of 3/7.

(ii) If $x = 0{\cdot}545454...$, write x as a ratio of two positive integers. 4

(c) The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 1 : 3. Find the ratio of their curved surface areas. 4

(d) A father's age is four times that of his daughter. Twenty years hence the father's age will be double his daughter's age. Find their ages. 4

(e) Evaluate the following : 4

(i) $\lim\limits_{x \to 2} \dfrac{x^3 - 8}{x - 2}$

(ii) $\int \left(e^{-\sqrt{2}x} + 5x\right) dx$

2. (a) If $U = \{a, b, c, d, e, f, g, h, i, j\}$,
$X = \{a, c, d, e, f\}$,
$Y = \{a, f, h, j\}$,
$Z = \{b, c, d, g, i, j\}$, find

(i) $X' \cap Z$ (ii) $(X \cap Z)'$. Check whether they are equal. 4

(b) Which of the following are true and which are false ? Give reasons. 4

(i) Z is closed under multiplication.

(ii) R has two identities for multiplication : 1 and — 1.

(c) Write the sample space when you toss 4 coins. Also find the probability of getting exactly 3 heads. 4

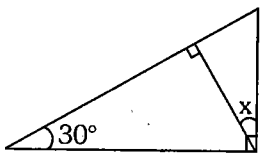
(d) Give one example each of a linear equation which

(i) has no intersection with $2x + 5y = 2000$.

(ii) is equivalent to $500x = y$.

(iii) intersects $300x - 0{\cdot}5y = 75$ in only one point, and find the point of intersection. 4

(e) (i) Find the angle marked x in the following figure :



(ii) Find the vertical angle of an isosceles triangle, if one of its base angles is 25°. 4

3. (a) The following table gives the distribution of the students in a college :

Year / Medium	First year	Second year	Third year	Total
English	210	160		515
Hindi	115		96	
Total		266		

(i) Fill in the blanks in the table.

(ii) What is the probability that a student picked at random is in the third year ?

(iii) What is the probability that a Hindi medium student is not in the 1st year ? 8

(b) (i) Write 625 as a power of 5.

(ii) Find $(3^4)^{-2} \times (5^2)^{-4}$. 4

(c) A room is 21 metres long and 16 metres wide. How many tiles measuring 75 cm × 75 cm would be required for its floor ? 5

(d) Find x, y, z if

$$\begin{pmatrix} 2x & -1 & -4 \\ z & x & 0 \end{pmatrix} + \begin{pmatrix} 1 & 2y & z \\ 4 & 2 & 3 \end{pmatrix} = \begin{pmatrix} 1 & 1 & -2 \\ 6 & 2 & y+z \end{pmatrix}.$$ 3

4. (a) Solve : $x - \sqrt{1-x} = -5$ 4

(b) Prove :

(i) $\sin^2 A + \sin^2 A \tan^2 A = \tan^2 A$

(ii) $\cos^2 A - \sin^2 A = 2\cos^2 A - 1$ 4

(c) Find the values of x for which the derivative of the function $f(x) = x^3 - 3x^2 + 4$ becomes zero. 4

(d) (i) Write the sequence defined by the recurrence relation : $a_0 = 1$, $a_1 = 3$, $a_n = 2a_{n-1} - a_{n-2}$, $n \geq 2$.

(ii) Find the sum of the first 20 terms of the A.P. 1, 6, 11, 16, ... 4

(e) The number of diagonals of a polygon with n sides is $\frac{n(n-3)}{2}$. Draw a pentagon and a hexagon, and verify the formula. 4

5. (a) Find the standard deviation of the following data : 6

Class	Frequency
60 – 70	3
70 – 80	10
80 – 90	4
90 – 100	3

(b) (i) Find the x and y intercepts of the line $3x - y + 17 = 0$.

(ii) Find the radius of the circle $x^2 + y^2 - 16x - 12y = 21$. 4

(c) Find the value of x for which $\begin{vmatrix} 1 & x & -2 \\ 3 & 2 & -1 \\ x & 4 & 6 \end{vmatrix} = 0$. 4

(d) Write the expansion of $(x^2 - 2y)^5$. 4

(e) Give an example, with justification, of the use of Mathematics in Social Sciences. 2

6. (a) One female captain and one male vice-captain is to be chosen out of the 11 players consisting of 6 girls and 5 boys in a team. In how many different ways can this be done ? 4

(b) Fill in the blanks in the following table :

(i)

Angle	Degree	Radian
A	135°	
B		$\frac{17\pi^c}{36}$

(ii) Also write the value of $\sin 60° + \cos 90°$. 4

(c) Graph the inequality $2x + y - 4 \geq 0$. 4

(d) Draw the graph of $f(x) = |x| - 1$. 4

(e) Find the median and mode of the following data : 4

x_i	9	10	12	13	14	15	16	17	18	19	20
f_i	1	2	1	3	6	2	1	7	2	6	4