END TERM EXAMINATION

FIRST SEMESTER [BCA] NOVEMBER-DECEMBER 2017

Paper Code: BCA-101	Subject: Mathematics-I
Time: 3 Hours	Maximum Marks: 75

**Note: Attempt any five questions including Q.no.1 which is compulsory.
Select one question from each unit.**

Q1   (a) Solve the following system of equations by Cramer's rule:
$2y - 3z = 0, \quad x + 3y = -4, \quad 3x + 4y = 3.$ **(5)**

(b) Solve: $\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0.$ **(5)**

(c) Find the maximum and minimum values of $f(x) = x + \sin 2x$ in $[0, 2\pi]$. **(5)**

(d) Evaluate $\int \dfrac{\sqrt{\tan x}}{\sin x \cos x} dx.$ **(5)**

(e) Show that $\lim\limits_{x \to 0} \dfrac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1}$ does not exist.   **(5)**

Unit-I

Q2   (a) Find eigen values and eigen vectors of $A = \begin{bmatrix} 2 & 0 & 4 \\ 0 & 6 & 0 \\ 4 & 0 & 2 \end{bmatrix}.$ **(6.5)**

(b) Find whether or not the following set of vectors are linearly dependent or independent.
$X_1 = (1, 1, 0), \quad X_2 = (1, 0, 1), \quad X_3 = (0, 1, 1).$ **(6)**

Q3   (a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence find A^{-1}.   **(6.5)**

(b) Find the rank of matrix $\begin{bmatrix} 1 & 1 & 2 & 3 \\ 3 & 4 & 7 & 10 \\ 5 & 7 & 11 & 17 \\ 6 & 8 & 13 & 16 \end{bmatrix}.$ **(6)**

Unit-II

Q4   (a) Discuss the continuity of the function $f(x) = \begin{cases} -x, & x \le 0 \\ x, & 0 < x \le 1 \\ 2-x & 1 < x \le 2 \\ 1 & x > 2 \end{cases}$

at each point $x = 0, 1, 2$.   **(6.5)**

(b) $\lim\limits_{x \to 0} \left(\dfrac{\cos mx - \cos nx}{x^2} \right).$ **(6)**

P.T.O.

P1/2

Q5   (a) Let $f(x) = \begin{cases} 1, & x \le 3 \\ ax + b, & 3 < x < 5 \\ 7, & 5 \le x \end{cases}$. Find the values of a and b so that $f(x)$ is

      continuous.   **(6.5)**

      (b) Evaluate: (i) $\lim\limits_{x \to \infty} \dfrac{x}{\sqrt{4x^2+1}}$ (ii) $\lim\limits_{x \to 0} \dfrac{x^3 \cot x}{1 - \cos x}$.   **(6)**

Unit-III

Q6   (a) Verify the hypothesis and conclusion of Lagrange's mean value

      theorem for the function $f(x) = \dfrac{1}{4x-1}, 1 \le x \le 4$.   **(6.5)**

      (b) Expand $\log \sin x$ in powers of (x-2) by Taylor's series.   **(6)**

Q7   (a) If $y = \left[x + \sqrt{1+x^2}\right]^m$, show that

      $(1 + x^2) y_{n+2} + (2n + 1) xy_{n+1} + (n^2 - m^2) y_n = 0$. Also find $y_n(0)$. **(6.5)**

      (b) Find asymptotes of the curve

      $x^3 + 2x^2y - xy^2 - 2y^3 + x^2 - y^2 - 2x - 3y = 0$.   **(6)**

Unit-IV

Q8   (a) Evaluate: (i) $\int \dfrac{x \tan^{-1} x}{(1+x^2)^{3/2}} \, dx$ (ii) $\int e^x \left(\dfrac{1-\sin x}{1-\cos x}\right) \, dx$.   **(6)**

      (b) Show that $\beta\,(p, q) = \int_0^1 \dfrac{x^{p-1} + x^{q-1}}{(1+x)^{p+q}} \, dx$.   **(6.5)**

Q9   (a) If $I_{m,n} = \int \cos^m x \sin nx \, dx$, prove that

      $(m + n) I_{m,n} = -\cos^m x \cos nx + m I_{m-1,n-1}$.

      Hence evaluate $\int_0^{\pi/2} \cos^5 x \sin 3x \, dx$.   **(7.5)**

      (b) Evaluate $\int_0^1 x^{3/2} (1 - x)^{3/2} \, dx$.   **(5)**

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P2/2

END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER 2017

Paper Code: BCA-103	Subject: Technical Communication
Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each unit.

Q1   Write short notes on **any five** of the following: (5x5=25)
      (a) Formal and informal communication
      (b) Difference between Letter and Memorandum
      (c) Good news and bad news letters
      (d) Merits and demerits of written communication
      (e) Executive summary
      (f) Paralinguistic aspects of communication
      (g) Significance of soft-skills

Unit-I

Q2   Explain the essential features of effective business communication. **(12.5)**

Q3   Distinguish between verbal and non-verbal communication. Illustrate your answer.   **(12.5)**

Unit-II

Q4   You are the Chairman of HCL Electrical Ltd., Gurugram. Write a letter to the Manager Corporate Sales asking him to take appropriate measures to augment the sales. Imagine the relevant details.   **(12.5)**

Q5   What do you mean by report writing? Distinguish between Letter Style Report and Schematic Report giving examples.   **(12.5)**

Unit-III

Q6   Bring out separately the guidelines for the interviewer and the interviewee.   **(12.5)**

Q7   What do you mean by project presentation? Write the do's and don'ts of an effective presentation.   **(12.5)**

Unit-IV

Q8   What are the essentials of improving interpersonal skills? Explain. **(12.5)**

Q9   Write an essay on the topic "Education should Develop Skills and Values."   **(12.5)**

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END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER 2017

Paper Code: BCA-105	Subject: Introduction to Programming Language using C
Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each unit.

Q1 (a) What are the keywords in C? Give examples.   (2.5x10=25)
    (b) Explain various bitwise operators available in C.
    (c) What is the function of break and continue statement in C?
    (d) Briefly explain the concept of recursion.
    (e) What are macros in C?
    (f) Differentiate between function declaration and function definition.
    (g) Name functions of standard library ctype.h.
    (h) What are nested control statements? Give examples.
    (i) What is the need of pre-processor directives in C?
    (j) Differentiate between post increment and pre-increment operator with example.

Unit-I

Q2 (a) Explain loop statements in C.   (6.5)
    (b) What are different types of operators in C? Briefly explain.   (6)

Q3 (a) What is an array? Write a program to print average of all elements of an array.   (6.5)
    (b) Differentiate between while and do-while loop constructs with example. (6)

Unit-II

Q4 (a) With the help of a program, explain the concept of call by value and call by reference.   (6.5)
    (b) Define the following terms: (6)
        (i) Static Variables
        (ii) Pointers
        (iii) Dynamic Memory Allocation

Q5 (a) Explain the concept of recursion by writing a program to find factorial of any given number.   (6.5)
    (b) How array of pointer are passed as arguments in a function. Give example.(6)

Unit-III

Q6 (a) Explain the concept and need of structures in C. How is union different from structure?   (6.5)
    (b) What is file handling? What are various functions used in file handling? Briefly explain.   (6)

Q7 What is file pointer? Write a program in C to create a file, write string data into it and count number of characters in that file.   (12.5)

Unit-IV

Q8 (a) What is array of strings? Describe various string manipulation functions with example.   (6.5)
    (b) What are standard libraries in C? Give examples of functions in libraries stdio.h, math.h and string.h.   (6)

Q9 Write a program to first compare and then concatenate two strings entered by user.   (12.5)

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END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER 2017

Paper Code: BCA-107	Subject: Introduction to Computers and IT
Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each unit.

Q1   (a) Define architecture of computer system.   **(5x5=25)**
       (b) Differentiate between Low Level and High Level Language.
       (c) Define Operating System. Name two open source OS.
       (d) Differentiate between LAN and WAN.
       (e) Define Telnet.

Unit-I

Q2   (a) Discuss classification of computers.   **(6)**
       (b) Explain functionality of magnetic Hard disk.   **(6.5)**

Q3   (a) Explain Serial Access memory.   **(6)**
       (b) Differentiate between Magnetic Tape Drive and Magnetic Hard Disk. **(6.5)**

Unit-II

Q4   (a) Differentiate between Assembler, Compiler and Interpreter.   **(6.5)**
       (b) Explain role of linker.   **(6)**

Q5   (a) Explain the procedure of mail merge in MS-WORD.   **(6)**
       (b) What is the importance of Algorithm and Flow Chart in computer program?   **(6.5)**

Unit-III

Q6   (a) Convert the following: **(6.5)**
         $(1 1 0 1 1)_2 = (?)_8$
         $(2 B C A)_H = (?)_2$
         $(3 4 5)_8 = (?)_H$
         $(8 7 9)_{10} = (?)_H$
         $(0 1 0 1 1 0 0 0 1)_2 = (?)_H$
       (b) Explain the role of ASCII code is computer system.   **(6)**

Q7   (a) Convert the following: **(6.5)**
         (i) $(11.01)_2 = (?)_{10}$
         (ii) $(5 4 A A)_H = (?)_8$
         (iii) $(7 0 7)_8 = (?)_2$
         (iv) $(49.54)_{10} = (?)_2$
       (b) Explain EBCDIC code functionality in computer system.   **(6)**

Unit-IV

Q8   (a) Discuss various data transmission media.   **(6)**
       (b) Differentiate between Digital and Analog Transmission.   **(6.5)**

Q9   (a) Explain Client-Server architecture.   **(6.5)**
       (b) Discuss Network topologies.   **(6)**

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END TERM EXAMINATION

First Semester [BCA] December 2017

Paper Code: BCA-109	Subject: Physics

(From 2011 Batch Onwards)

Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit. Scientific symbols have their usual meanings. Scientific calculator is allowed.

1. Attempt all the parts: **(2.5x10=25)**
   (a) State Newton's laws of motion and mention their implications.
   (b) Mention laws of *limiting friction* and explain how they can be verified experimentally.
   (c) Write down the laws of resistances connected in series and parallel.
   (d) What is a Gaussian surface? Mention the one widely used Gaussian surfaces and how it is produced.
   (e) Explain how a light emitting diode works.
   (f) State work-energy theorem.
   (g) Define *equipotential surface* and *equipotential lines*. Schematically show equipotential lines for a point charge and an electric dipole.
   (h) Four charges of q, -2q, 3q and 2q are placed at the corners of a square of side 1 m. Calculate the electric potential at the centre of the square (Given: $q = 2 \times 10^{-8}$ C).
   (i) Write down the postulates of Bohr's atomic model.
   (j) State Lemi's theorem. Give one application of the theorem.

Unit-I

2. (a) Explain the concept of banking of roads. Obtain an expression for the maximum speed a car can safely move on a curved road banked at an angle θ. What is the ideal, or critical speed (the speed for which no friction is required between the car's tires and the surface) for a car moving on a curved road of radius 50 m at a banking angle of 15^0? **(9)**
   (b) A car of mass 2000 kg travels around a flat circular race track of radius r = 85 m. The car starts at rest and its speed increases at the constant rate of 0.6 m/s. What is the speed of the car at the point when its centripetal and tangential accelerations are equal?   **(3.5)**

3. (a) Out of three basic Newton's law of motion, which one is the most fundamental one and why? Discuss with the help of suitable example.**(8)**
   (b) Discuss various types of friction & their possible causes. Mention some of the advantages of friction.   **(4.5)**

Unit-II

4. (a) Differentiate between *elastic* and *inelastic collisions* and obtain an expression for the velocities after collision and the energy lost in inelastic collision between two bodies.   **(9)**
   (b) A body of mass 50 g moving with speed of 10 m/s undergoes an elastic collision with another body of mass 150 g at rest. Find the kinetic energies of the two bodies after head-on elastic collision.   **(3.5)**

5. (a) Define conservative force and prove that gravitational force is a conservative force. Give one example of non-conservative force.   **(8)**
   (b) Discuss conservation of energy in an inelastic collision.   **(4.5)**

P.T.O.

Unit-III

Q6 (a) Derive an expression for *electric field strength* at a point due to an *electric dipole.* (8)

(b) A parallel plate capacitor has a capacitance of 112 pF, a plate area of 96.5 cm² and a mica dielectric (k_e = 5.4). At a 55 V potential difference, calculate: (4.5)
(i) the electric field strength in the mica.
(ii) the magnitude of the free charge on the plates
(iii)the magnitude of the induced surface charge

Q7 (a) What is *Wheatstone bridge*? Explain it using a schematic diagram. Why are Wheatstone Bridge circuits very important in measuring resistance accurately? (6)
(b) A 12 V battery charges four capacitors are shown in Figure below.(6.5)
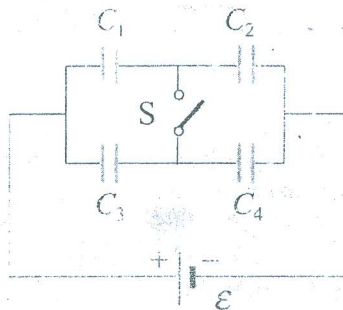
If C_1 = 1 μF, C_2 = 2 μF, C_3 μF, and C_4 = 4 μF.
(i) What is the equivalent capacitance of the group C_1 and C_2 if switch S is open?
(ii) What is the charge on each of the four capacitors if switch S is open?
(iii)What is the charge on each of the four capacitors if switch S is closed?

Unit-IV

Q8 (a) Differentiate between *metal, semiconductor* and *insulator.* Draw schematic energy level diagrams. (6)
(b) Explain the principle of operation of p-n junction diode using energy level diagrams. Draw the current-voltage characteristics of junction diode. (6.5)

Q9 (a) Explain the principle of operation of p-n-p transistor using schematic diagrams. (6)
(b) Distinguish between *intrinsic* and *extrinsic* semiconductors. Schematically show the positions of Fermi levels in an intrinsic semiconductor, an n-type and a p-type semiconductor. (6.5)

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P2/2