F.Y.B.Sc.(Comp.Science)

June 2016

**Con. 281-16.** **LH-4656**

Foundation Course -I

Time: 3 Hrs. Max. Marks: 100

**N.B.** (i) All the questions are compulsory.

(ii) Figures to the right indicate full marks.

Q.1. Discuss the multi-lingual, multi-religious and multi-cultural nature of Indian society. 15

OR

Write a short note on each of the following:

(a) The problems of declining sex ratio in India

(b) Type of mental retardation

(c) Demographic composition of India

Q.2. Describe the salient features of Indian constitution. 15

OR

Write a short note on each of the following:

(a) Portrayal of women in media

(b) Linguism in India

(c) State any five fundamental duties of Indian citizen

Q.3. What is 'social problem'? Discuss various social problems in India. 20

OR

Write a note on each of the following:

(a) Local self-government in India

(b) Causes and measures to prevent AIDS



**[TURN OVER**

Q.4. Explain the concept of 'globalization' and its impact on various sectors. 15

OR

Write a note on each of the following:

(a) Universal Declaration of Human Rights, 1948

(b) Rights to Liberty

(c) Four premises of political democracy

Q.5. Discuss the structure and function of eco-system. 15

OR

Write a short note on each of the following:

(a) Agents of socialization

(b) Forms of environmental degradation

(c) Roles of prejudices and stereotypes in the development of an individual

Q.6. Critically examine the issue of farmers' suicide in India. 20

OR

Write a note on each of the following:

(a) Maslow's Theory of Self Actualization

(b) Conflict management mechanism

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F.Y.B.Sc (Comp. Science) June 2016

**Con. 261-16.** **LH-4031**

Mathematics - (Paper - I)

Duration : 3 hours Total Marks : 100

N.B: 1. All questions are compulsory.
2. Figures to right indicate full marks.

Q.1. Solve any **two**. (10)

a. State and prove Lagrange's mean value theorem of differentiability.

b. Check the continuity of f(x) at x = 0.

$$f(x) = \begin{cases} 2x - 3 & \text{if } x \leq 0. \\ x + 1 & \text{if } x > 0. \end{cases}$$

c. Show that $f_x(x, 0) = f_y(0, y)$, for the function ,

$$f(x, y) = \begin{cases} \frac{xy(x^2 - y^2)}{x^2 + y^2} & \text{if } x^2 + y^2 \neq 0 \\ 0 & \text{otherwise.} \end{cases}$$

Q.2. Solve any **three**. (15)

a. Draw graph of ceiling function by defining it.

b. Show that $\lim_{x \to 1} f(x)$ does not exist at x = 1.

$$f(x) = \begin{cases} 3 - x & \text{if } x \leq 1. \\ 2x + 1 & \text{if } x > 1. \end{cases}$$

c. Show that $\lim_{x \to 0} \frac{1}{x}$ does not exist.

d. Discuss continuity of function f(x) on IR where $f(x) = x^3 + 2x^2 - x + 2$.

Q.3. Solve any **three**. (15)

a. Show that differentiable functions are continuous. Is converse true? Justify.

b. Show that $f(x) = |x|$, is not differentiable at x = 0.

c. Find tangent and normal to the curve $x^2 + xy - 2y^2 = 12$ at the point (2,3).

d. Find derivative of $y = \sin^{-1}x$ if $-1 \leq x \leq 1$ and $\frac{-\pi}{2} \leq x \leq \frac{\pi}{2}$

Q.4. Solve any **three**. (15)

a. Verify Rolle's mean value theorem for $f(x) = x^2$ in the interval [-1, 1]

b. Find asymptotes of $y = \frac{x^2}{\sqrt{x^2 - 4}}$

c. Expand the function f(x) = tanx in ascending power of $(x - \frac{\pi}{4})$

d. Find c using Cauchy's mean value theorem for f(x) = sin x and g(x) = cos x on $[0, \frac{\pi}{2}]$.

Q.5. Solve any **three**. (15)

a. Find vector perpendicular to the plane containing the points A(-1,-1,0), B(2,2,-1) and C(-3, 1,2),

b. Define spherical coordinates. Further, give relation between Cartesian coordinates, polar coordinates and spherical coordinates.

c. Find area of triangle with vertices P(1, 2, 0), Q(-1, 1, 1) and R(2, 2, 4).

d. Find unit vector in direction of $\bar{v} = (3, 4, -2)$. Also, find the magnitude of $\bar{v}$ and the unit vector.

Q.6. Solve any **three**. (15)

a. Define continuity of the function of two variables. Examine the continuity of f(x,y) at (1,2).

$$f(x, y) = \begin{cases} \frac{x^2 - 4y^2}{x-2y} & \text{if } x \neq 2y \\ 3 & \text{otherwise.} \end{cases}$$

b. Discuss the continuity of $f(x,y, z) = 3x - y^2 + e^z$ at (1,1,0)

c. Using polar coordinates, show that $\lim_{(x,y)\to(0,0)} \frac{x^3 - xy^2}{x^2+y^2}$.

d. Evaluate the limit. $\lim_{(x,y)\to(1,1)} \frac{(x+y)(x^3+y^2-4x)}{(x+2y)}$.

Q.7. Solve any **three**. (15)

a. Find the linearization of $f(x,y) = x^2 + 2x + y^2 + xy$ at (-1,-1)

b. If $z = \cos(x^2y^2)$ then find $(\frac{\partial z}{\partial x})^2 + (\frac{\partial z}{\partial y})^2$.

c. If $u = \log(x^2 + y^2)$ then show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$

d. Find $\frac{\partial f}{\partial x}$ if $f(x, y) = \frac{xy}{\sqrt{x^2+y^2}}$.

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F.Y.B.Sc (Comp. Science)

Con. 262-16. Mathematics -(Paper-II) LH-4590

June 2016

(3 Hours)

**1>ALL QUESTIONS ARE COMPULSORY** **Total Marks: 100**

**2>FIGURES TO THE RIGHT INDICATE FULL MARKS TO THE SUBQUESTIONS**

**3>FROM QUESTION 2 TO 7, SUBQUESTION (a) IS COMPULSORY AND ATTEMPT ANY TWO FROM (b)(c)&(d)**

Q.1>Attempt any one:

(a)Using Principle of Inclusion and Exclusion find the number of Primes not exceeding 100. (10)

(b) In Z, relation R defined by xRy iff x-y is divisible by 7.Prove that R is an equivalence relation and find the Corresponding Equivalence Classes. (10)

Q.2>(a)For a, b ∈ N, Prove that gcd(a,b)*lcm(a,b)=a*b. [*=multiplication] (7)

(b)State Pascal's rule and write Pascal's Triangle for n=5. (4)

(c)find lcm and gcd of 1705 and 625. (4)

(d)Prove that if a/b & b/c then a/c. (4)

Q.3>(a)A & B are two finite sets. If A ⊆ B & f from A to B is a surjective map then Prove that A=B. (7)

(b)Show that the mapping f(x)=3x+5 from Real numbers to itself is Bijective & find its inverse. (4)

(c)Check whether the Operation a*b=$a^2 + b^2$ Associative & Commutative on N. (4)

(d)Prove that for any two sets A & B, A⊆B iff A∩B=A. (4)

Q.4>(a)State & Prove Chinese Remainder Theorem. (7)

(b)Show that 41 divides $2^{20}$-1. (4)

(c) Solve the Equation 17x≡9 (mod 276) (4)

(d)If a,b,c,d are integers & n is fixed positive integer then if a≡b (mod n) & c≡d (mod n) then a+c ≡ b+d (mod n). (4)

Q.5>(a) Prove that any Equivalence relation on set A produces partition of A. (7)

(b)How many different letters words can be formed by using the letters of "TIYYSIOSOPI". (4)

(c)In how ways a student can answer 7 questions out of 10 if (4)

(i)there are no restrictions?

(ii)he must answer first two questions?

(d)Write all derangements on S={1,2,3} . (4)

Q.6>(a)find the number of positive integers between 1 to 100 which are not divisible by 2,3 or 5. (7)

(b)find the total number of integer solutions to $x_1+x_2+x_3+x_4=32$. (4)

(c)If x=(1 2 3 4)(5 6 7) factor $x^{-1}$ into disjoint cycles. (4)

(d)Compute S(5,2). (4)

Q.7>(a)Prove that every complex number has n nth roots. (7)

(b)Using De Moivre's Theorem, find $x^{10}$ if x=1-i (4)

(c)find gcd of $f(x)=x^4-x^2+x-1$ and $g(x)=x^3-x^2+x-1$ in Q[x] (4)

(d)find all solutions of $x^3+8=0$. (4)

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Con. 263-16. T.Y.B.Sc (Comp. Science) LH-4885 June 2016

Physics - (Paper - I)

**2 Hours** **Total Marks: 60**

**N.B** 1] All question are compulsory and carry equal marks.
2] Figures to the right indicate full marks.
3] Use of scientific non-programmable calculator is all allowed.

**Q1.A] Attempt any One.** **(7)**

1] Define Young's modulus, bulk modulus and modulus of rigidity. Show that $Y=2\eta\ (1+\sigma)$, where $\eta$=modulus of ridigity and $\sigma$ is poisson's ratio.

2] Derive the poisseullis equation for the steady flow of a liquid.

**B] Attempt any One.** **(3)**

1] Two wires of same material are subjected to the same tension. Compare the extensions produced in the length of the first wire is double that of the other, and its radius is half that of the other.

2] A wooden block of mass M kg is placed on an inclined plane at an angle $\theta$, the angle is adjusted such that the block moves downward with constant speed. Find the angle in the terms of co-efficient of friction.

**Q2 A] Attempt any ONE.** **(7)**

1] Derive Mayer's relation, relating two specific heats of a perfect gas.

2] Derive an expression for the work done by a perfect gas in an isothermal change.

**B] Attempt any ONE.** **(3)**

1] State and explain zeroth law of thermodynamics.

2] A perfect gas has volume of $4m^3$ and initial pressure of 1atm undergoes isothermal expansion to a volume four times its initial. What is the amount of work done by the gas?

**Q3 A] Attempt any One** **(7)**

1] What are ultrasonics? Explain Kundt's tube method to defect them. How ultrasonics are used in sonar?

2] What is progressive wave ? Explain propagation of a progressive wave along positive X-axis. Deduce its differential from.

**B] Attempt any ONE.** **(3)**

1] Calculate the reverberation time, if a hall of volume $5500m^3$ has sound absorbing surface of $750m^2$ and average absorption coefficient 0.504.

[TURNOVER

2] Find the wavelength of audible acoustic waves for the following values for air medium. $\gamma$=1.4, R= 8.3 J/ mole K, M=0.029 Kg/mole and temperature 27°C.

**Q4 A] Attempt any ONE.** **(7)**

1] Deduce the equation of the resultant motion when two perpendicular simple harmonic wave motion of same period superimpose on each other.

2] Show that a system of N particles obeys conservation law of linear momentum.

**B] Attempt any ONE.** **(3)**

1] A rocket has an exhaust velocity of 2500 m/s. At what rate must it burn fuel to develop its thrust of $10^4$ N ?

2] Draw Lissajous figures for two perpendicular SHMS of the same frequency when $\delta = 0$, $\delta = \frac{\pi}{4}$ and $\delta = \pi/2$.

**Q5 A] Attempt any ONE.** **(7)**

1] What is spherical aberration ? Derive necessary expression to minimise it.

2] Give the necessary theory of Newton's rings to show that the radius of the $n^{th}$ dark ring is proportional to the square root of natural number.

**B] Attempt any ONE.** **(3)**

1] Two thin lenses of focal length 20cm and 25cm are place coaxially parallel to each other and are at a distance 8cm apart. Find equivalent focal length and position of principal points.

2] An oil film of thickness $0.15 \times 10^{-3}$cm is observed at an angle 45° to the normal. If the wave length of light absent in the reflected light is $5 \times 10^{-7}$m, what is the R.I. of a liquid?

**Q6 A] Attempt any ONE.** **(7)**

1] With the help of a neat diagram explain construction and working of a helium neon laser.

2] What is numerical aperture of an optical fibre? Derive necessary expression for it.

**B] Attempt any ONE.** **(3)**

1] Draw a diagram to show
   a. Graded-index optical fibre.
   b. Propagation of light through it.

2] Explain any two properties of Laser.

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Con. 264-16. F.Y.B.Sc (Comp. Science) LH-4391 June 2016

Physics - (Paper-II)

( 2 hours) Total marks : 60

NOTE: 1. All questions are compulsory and carry equal marks.
2. Figures to the right indicate full marks.
3. use of scientific calculator is allowed.

**Q. 1) A) Attempt any one of the following.** [7]

1. A source of EMF E is connected to a series L-R circuit. Obtain an expression for the growth of current at any instant time t.
2. Explain following AC circuits with their phasor diagram and necessary formula i) AC circuit with inductor alone and ii) AC circuit with capacitor alone.

**B) Attempt any ONE of the following.** [3]

1. What value of C resonates with 200 micro henry inductance at 1500KHz?
2. A sine wave has peak value 200 V What is its rms and average value?

**Q. 2) A) Attempt any ONE of the following.** [7]

1. State Bohr's postulates of hydrogen atom and explain atomic spectra.
2. How X-rays can be diffracted? Why X-rays cannot be diffracted by ordinary grating?

**B) Attempt any ONE of the following.** [3]

1. The accelerating voltage of X-Ray tube is 10KV. Determine the minimum wavelength of x-ray produced.
2. What is the radius and energy of electron in $4^{th}$ orbit of hydrogen atom.?

**Q. 3) A) Attempt any ONE of the following.** [7]

1. Explain with the circuit diagram and input –output waveforms the working of bridge wave rectifier.
2. State and explain De-Morgan's laws.

**B) Attempt any ONE of the following.** [3]

1. Prepare the truth table for logic expression; $Y = A \cdot \bar{B} + B \cdot \bar{A}$
2. In CB mode the current gain is 0.99 If the collector current is 5 mA, calculate the base current.

**Q. 4) A) Attempt any One of the following.** [7]

1. Explain the working Wein's bridge.
2. Explain the construction and working of MCG

**B) Attempt any ONE of the following.** [3]

1. In a De-Sauty's bridge find the capacitance of unknown if $R_2 = R_1 = 1.5K$ , $C_2 = 0.33\ \mu F$.

2. Distinguish between B.G. and dead beat galvanometer.

**Q. 5) A) Attempt any ONE of the following.** [7]

1. State the laws of radioactive disintegration and obtain the exponential relation governing the radio-active decay..

2. Write a note on i) NMR and ii) Radio metric dating.

**B) Attempt any ONE of the following.** [3]

1. Write the following radioactive chemical equations:- ( i) Positive β decay ii) Negative β decay
2. The mass of radioactive substance reduces to 0.7 of its initial value in 8 days. What is its half life ?

**Q. 6) A) Attempt any ONE of the following.** [7]

1. Write a note on Pair production and annihilation.
2. Show that de-Broglie wave length associated with the electron can be varied according to potential?

**B) Attempt any ONE of the following.** [3]

1. A photon has a wavelength of 7000 AU. Calculate its energy.
2. A 150 eV electron has a wavelength of 1 $A^0$ What is the wavelength of 0.06 KeV electron?

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Con. 282-16. F.Y.B.Sc.(Comp. Science) LH-4247 June 2016

Computer Science (Paper-I)

(2 Hours) [Total Mks:60]

N:B: (1) All questions are compulsory.
(2) Figures to the right indicate marks.
(3) Mixing of sub – questions is not allowed.

**Q.1 Attempt the following (any Two)** (10)

(i) Represent the following decimal numbers in their equivalent Binary and Octal form:
(i) 54 (ii) 68

(ii) Explain with a diagram the layers and views of a computer system.

(iii) Perform the following binary subtraction using 1's & 2's complement separately.
**(i)** (11011 - 00111) **(ii)** (111101 – 001011)

**Q.2 Attempt the following (any Two)** (10)

(i) Write a short note on JK Flip Flop.

(ii) Draw the logic diagram and truth table for:
**(i)** EX-OR Gate **(ii)** NAND Gate

(iii) Give the Circuit diagram and truth table of a Multiplexer.

**Q.3 Attempt the following (any Two)** (10)

(i) Write a short note on cache memory.

(ii) Discuss the function of CPU.

(iii) Explain different types of ROM's with its purposes.

**Q.4 Attempt the following (any Two)** (10)

(i) Explain I/O module in detail.

(ii) Explain magnetic tape with neat and labelled diagram.

(iii) Short note on Direct Mapping.

**Q.5 Attempt the following (any Two)** (10)

(i) Write a short note on Paging Technique.

(ii) What are the services provided by an Operating System?

(iii) Explain Multiprocessing. What is Time Shared Bus?

**Q.6. Attempt the following (any Two)** (10)

(i) State the features of 8085 microprocessor.

(ii) Draw neat diagram of 8086 microprocessor.

(iii) Write an 8085 program to add two 8-bit numbers.

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**Con. 283-16.** Computer Science -(Paper-II) **LH-4963**

(2 Hours) (Paper -II)

**[Total Marks: 60]**

N.B: (1) **All** questions are **compulsory.**
(2) **Figures** to the **right** indicate **full** marks.
(3) Answers to **both** the sections to be written in **same** answer book.

## SECTION-I

**Q1 Attempt any two :**

a) What are the different types of algorithm? 05

b) Explain Best, Worst and Average case complexity with respect to bubble sort algorithm. 05

c) Write an algorithm to find the sum and average of 5 numbers. 05

**Q2 Attempt any two :**

a) List and explain relational operators in C. 05

b) Explain explicit type casting. 05

c) Write a C program to generate Fibonacci series. 05

**Q3 Attempt any two :**

a) State the rules to declare an identifier. 05

b) Why there is need of array data structure in C? 05

c) Write a program for addition of two numbers using structures. 05

## SECTION-II

**Q4 Attempt any two :**

a) Explain the need for functions. Write a function that takes an integer number as argument and returns its factorial. 05

b) What is meant by recursion? Explain with suitable example. 05

c) Write a note on Algorithmic efficiency. 05

**Q5 Attempt any two :**

a) Explain how pointer variables are assigned and accessed. 05

b) Explain following functions 05
(i) malloc( ) (ii) free( ) (iii) calloc( ) (iv) realloc( )

c) Explain with an example, the syntax of opening and closing a file in C. 05

**Q6 Attempt any two :**

a) Write a program to create a link list which allows user to append and display numbers in the list. 05

b) Define a Stack and state its basic operations? 05

c) Explain the concept of (with respect to queues) 05
i. FIFO ii. Overflow iii. Underflow.