Roll No. ______________

BSC (HONS) – 4th SEMESTER
SEQUENCE & SERIES - 09050401
END TERM THEORY EXAMINATION

Time: 03:00 Hrs **Max. Marks: 75**

Instructions:
1. Write Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaint(s) in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint in this regard will be entertained thereafter.
3. Attempt **5** Questions in all. **Q. No. 1** is compulsory. Students are required to attempt other **FOUR** questions selecting one from each unit. Marks are indicated against each question.
4. Draw diagram wherever required.

Q.1. Answer the following Questions. **(2X5=10)**

a) Define Adherent point and Limit point of a set with examples.

b) Show that every convergent sequence is bounded.

c) State and prove necessary condition for convergence.

d) Show that any superset of a nhbd of a point is also a nhbd of that point.

e) Show that the set $S = \{x : 0 < x < 1, x \in R\}$ ia open but not closed.

UNIT-I

Q.2.

a) If S and T be any two subsets of R. Then show the following. **(2x4=8)**

i. $(S \cap T)^o = S^o \cap T^o$

ii. $S^o \cup T^o \subset (S \cup T)^o$

b) The intersection of two nhbds of a point is also a nhbd of that point. **(7)**

OR

Q.3.

a) Prove the following. **(2x4=8)**

i. Show that an open interval is a nhbd of each of its points.

ii. Show that closed interval is a nhbd of each of its points except its end points.

b) Show that every infinite bounded set of real numbers has a limit point. **(7)**

UNIT-II

Q.4.

a) State and prove Cauchy's first theorem on limits. **(8)**

b) A sequence cannot converge more than one limit. **(7)**

OR

Q.5.

a) Discuss the convergence of a Geometric series. **(8)**

b) State and prove Cauchy Convergence Criteria. **(7)**

UNIT-III

Q.6.

a) Discuss the convergence of the series $\frac{1^2}{2^2}+\frac{1^2.3^2}{2^2.4^2}x+\frac{1^2.3^2.5^2}{2^2.4^2.6^2}x^2+..........$ (8)

b) Discuss the convergence of the series $1+a+\frac{a(a+1)}{1.2}+\frac{a(a+1)((a+2)}{1.2.3}+..........$ (7)

OR

Q.7.

a) Use Cauchy condensation test to discuss the convergence of the series
$\frac{(\log 2)^2}{2^2}+\frac{(\log 3)^2}{3^2}+\frac{(\log 4)^2}{4^2}+.........+\frac{(\log n)^2}{n^2}+.....$ (8)

b) Use Gauss test to discuss the convergence of the series $\frac{1^2}{2^2}+\frac{1^2.3^2}{2^2.4^2}+\frac{1^2.3^2.5^2}{2^2.4^2.6^2}+..........$ (7)

UNIT-IV

Q.8.

a) Define Alternating series. Write the Leibnitz test for convergence of alternating series. (8)

b) Examine the convergence of the series $\sum_{n=1}^{\infty}\frac{(-1)^{n+1}n}{n^2+1}$ (8)

OR

Q.9.

a) Show that the series $\frac{2}{1^2}-\frac{3}{2^2}+\frac{4}{3^2}-\frac{5}{4^2}........$ is conditionally convergent. (8)

b) Show that the sum of series $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+.....$ is $\log 2$. (8)

Roll No. ______________

B. Sc (Hons.) – MATHEMATICS – 4th SEMESTER
SPECIAL FUNCTION & INTEGRAL TRANSFORM - 09050402
END TERM THEORY EXAMINATION

Time: 03:00 Hrs **Max. Marks: 75**

Instructions:

1. Write Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaint(s) in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint in this regard will be entertained thereafter.
3. Attempt 5 Questions in all. **Q. No. 1** is compulsory. Students are required to attempt other **FOUR** questions selecting one from each unit. Marks are indicated against each question.
4. Draw diagram wherever required.

Q.1. Answer the following Questions. **(3X5=15)**

a) Define Laplace Transform of a function. Using the definition find out the Laplace Transform of f(t) = e^{at}.

b) Evaluate $L(te^{-t}\sin 2t)$.

c) Define Inverse Fourier sine and cosine transform.

d) Find out Fourier Transform of f(x) = $\begin{cases} 1-x^2, |x|\le 1 \\ 0 \quad ,|x|>1. \end{cases}$

e) Find the ordinary and singular point of the differential equation

$$2x^2\frac{d^2y}{dx^2}+3x\frac{dy}{dx}+(x^2-4)y=0.$$

UNIT-I

Q.2. a) Using Bessel's functions prove that $xJ'=nJ_n-xJ_{n+1}$. **(8)**

b) Find the Power series solution of the differential equation $(1-x^2)\frac{d^2y}{dx^2}-2x\frac{dy}{dx}+2y=0.$ **(7)**

OR

Q.3. a) **Prove that** $J_{5/2}(x)=\sqrt{\frac{2}{\pi x}}\left[\left(\frac{3-x^2}{x^2}\right)\sin x-\frac{3\cos x}{x}\right]$. **(8)**

b) Find the Power solution in generalized form about x = 0 for the differential equation

$$3x\frac{d^2y}{dx^2}+2\frac{dy}{dx}+y=0.$$ **(7)**

UNIT-II

Q.4. a) Prove that $P_n(1)=1$. **(8)**

b) Express the polynomial in terms of $f(x)=4x^3-2x^2-3x+8$. in terms of Legendre Polynomials. **(7)**

OR

Q.5. a) Prove that $\int_{-1}^{+1} P_m(x).P_n(x)dx = 0, n \neq m.$ (8)

b) Express $H(x) = x^4 + 2x^3 + 2x^2 - x - 3$ in term of Hermite's Polynomials. (7)

UNIT-III

Q.6. a) Express the function f(t) in terms of Unit step function and its Laplace Transform,

Where $f(t) = \begin{cases} 0, & 0 < t < 1 \\ t-1, & 1 < t < 2. \\ 1, & 2 < t. \end{cases}$ (8)

b) Evaluate $\int_0^{\infty} t^3 e^{-t} \sin t dt$ using Laplace Transform. (7)

OR

Q.7. a) Using Convolution theorem, evaluate $L^{-1}\left\{\frac{1}{(s+2)^2(s-2)}\right\}.$ (8)

b) Solve the differential equation $y'' - 4y' + 4y = 64\sin 2t, y(0) = 0, y'(0) = 1.$ (7)

UNIT-IV

Q.8. a) Find Fourier cosine transform of the function $f(x) = e^{-x^2}$. (8)

b) Find Forier Transform of $f(x)\begin{cases} 1, & |x| \leq 1 \\ 0, & |x| > 1. \end{cases}$ and hence evaluate $\int_0^{\infty} \frac{\sin s}{s} ds$. (7)

OR

Q.9. a) Find inverse Fourier transform of $f(s) = e^{-|s|y}$. (8)

b) Solve the differential equation: (7)

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x_2}, x > 0, t > 0, subject\ to\ the\ conditions$$

$i.\ u(0,1) = 0,$

$$ii.\ u(x,t) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x \geq 1. \end{cases}\ when\ t = 0,$$

$$iii.\ u(x,t)\ is\ bounded\ i.e.\ u \to \infty\ and\ \frac{\partial u}{\partial x} \to 0\ as\ x \to \infty.$$

************ETE MAY JUNE 2018****************

Roll No. ________________

B.Sc. (Hons.) MATHEMATICS – 4TH SEMESTER
PROGRAMMING IN 'C' AND NUMERICAL METHOD-09050403
END TERM THEORY EXAMINATION

Time: 3:00 Hrs **Max. Marks: 75**

Instructions:
1. Write Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaint(s) in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint in this regard will be entertained thereafter.
3. Attempt 5 Questions in all. **Q. No. 1** is compulsory. Students are required to attempt other **FOUR** questions selecting one from each unit. Marks are indicated against each question.
4. Draw diagram wherever required.

Q.1. Answer the following Questions.
- **a)** Generations of Computer (3)
- **b)** Switch statement (3)
- **c)** Functions (3)
- **d)** Arrays (3)
- **e)** Gauss –elimination method (3)

UNIT-I

Q.2. a) Differentiate between Algorithm and flow chart. Explain with example. (8)

b) Write a program to check whether a given number is odd or even (7)

OR

Q.3. a) What do you mean by Operators? Explain different types of operators available in C. (8)

b) Write a program for find the largest number among three numbers. (7)

UNIT-II

Q.4. a) Differentiate for, While and Do-while loop structures available in 'C'. (8)

b) Write a program to print factorial of a given number. (7)

OR

Q.5. a) What are Decision-making statements (switch, break, goto and continue)? (8)

b) Write a program to stimulate a simple calculator by using switch. (7)

UNIT-III

Q.6. a) What is the difference between call by value and call by reference? Explain with the help of example. (8)

b) What is the difference between structure and Union? How can we declare structure variables? (7)

OR

Q.7. a) Discuss order of Convergence of Secant method. (8)

b) Find a real root of $x^3-8x-5=0$ by using secant method. (7)

UNIT-IV

Q.8. a) What is Gaussian Elimination method? Solve the system of equation using Gaussian Elimination.

$2x+y-3z=-10$ (8)

b) What are the applications of system of linear equations and Gauss-Jordan elimination to Environmental science? (7)

OR

Q.9. a) Solve the following system of equation by using the Choleski method.

$4x-y-z=3$

$-x+4y-3z=-0.5$

$-x-3y+5z=0$ (8)

b) Solve the following system by Crout's method

$4x+y+z=4$

$X+4y-2z=4$

$3x+2y-4z=6$ (7)

Roll No. ________________

B. Sc (Hons) Mathematics 4th Semester
Hydrostatics - 09050404
END TERM THEORY EXAMINATION

Time: 03:00 Hrs **Max. Marks: 75**

Instructions:

1. Write Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaint(s) in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint in this regard will be entertained thereafter.
3. Attempt 5 Questions in all. Q. No. 1 is compulsory. Students are required to attempt other **FOUR** questions selecting one from each unit. Marks are indicated against each question.
4. Draw diagram wherever required.

Q.1. Answer all the followings: **(6X2.5= 15)**

a) Explain Thermal Capacity,Specific heat and internal energy.

b) Resultant pressure on a curved surface.

c) Define Metacentre.

d) Explain atmospheric pressure.

e) Explain surfaces of Equi-pressure.

f) Define lines of force.

UNIT-I

Q.2. a) Show that the pressure at any point inside the fluid is given by:

$dp = \rho[Xdx + Ydy + Zdz]$

Where X,Y, Z be the components of force per unit mass. Find the pressure when the temperature of the fluid varies. **(8)**

b) State and prove the necessary and sufficient conditions of equilibrium. **(7)**

Q.3. Prove that if the forces per unit mass at x,y,z parallel to the axes are y(a-z),x(a-z),xy
The surfaces of equal pressure are hyperbolic paraboloids and the curves of equal pressure and density are rectangular hyperbolas. **(15)**

UNIT-II

Q.4. An ellipse is completely immersed with its minor axis horizontal and at a depth h; find the position of centre of pressure. **(15)**

Q.5. Show that if a given plane area turns in its own plane about a fixed point, then the centre of pressure changes its position and describes a curve on the area. **(15)**

UNIT-III

Q.6. a) Find the curves of buoyancy and curves of floatation of a triangular lamina with one side outside the liquid. **(8)**

b) A cone of given weight and volume, floats with its axis vertical and vertex downwards, prove that the surface of the cone in contact with liquid is least when its vertical angle is $2\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$ **(7)**

Q.7. Show that the curves of buoyancy and floatation for an elliptic area are concentric and similar ellipses. **(15)**

UNIT-IV

Q.8. Show that a floating body is in stable or unstable equilibrium according as the metacentre is above or below the centre of gravity of the body. **(15)**

Q.9. a) Explain Boyle's law and Charles law of gas. Also explain Atmospheric pressure. **(8)**

b) Find the height of station by barometer when the temperature is supposed to be uniform. **(7)**

Roll No.................

B.SC. (HONS.) MATHEMATICS- 4th SEMESTER
ELEMENTARY INFERENCE - 09050405
END TERM THEORY EXAMINATION

Time: 03:00 Hrs. **Max. Marks: 75**

Instructions:
1. Write your Roll No. on question paper.
2. Candidates should ensure that they have been provided with the correct question paper. Complaints in this regards, if any should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. Attempt **FIVE** questions in **ALL**, **Q.1** is compulsory. Students are required to attempt **FOUR** questions selecting one question from each unit. Marks are indicated against each question.
4. Draw Diagram wherever required.

Q.1 (a) Distinguish between statistic and parameter. **[3]**

(b) Let T_1 and T_2 be two estimators with $V(T_1)=\frac{2}{5}\sigma^2$ and $V(T_2)=\frac{2}{3}\sigma^2$, which of the two estimators is more efficient? **[3]**

(c) State Neyman- Fisher factorization criterion for finding sufficient statistic. **[3]**

(d) Define F statistic. Write its two applications. **[3]**

(e) The mean and variance of a random sample of 64 observations were computed as 160 and 100 respectively. Find 95% confidence limits for population mean. **[3]**

UNIT-I

Q.2 (a) What do you understand by point estimation? What are the properties of a good estimator? Explain any two of them with examples. **[8]**

(b) Define consistent estimator of parameter θ. Let $X_1, X_2, \cdots, X_n$ be *iid* random variable with mean θ and finite variance σ^2, show that $T=\frac{2}{n(n+1)}\sum_{i=1}^{n} i X_i$ is a consistent estimator of θ. **[7]**

OR

Q.3 (a) Define sufficiency. If $X_1, \ldots, X_n$ are independent Bernoulli random variables with the same parameter p, show that the statistic $T=\frac{1}{n}\sum_i x_i$ is a sufficient estimator of p. **[8]**

(b) Let X_1, X_2, X_3 be a random sample of size 3 drawn from population with mean μ and variance $\sigma^2>0$. If the statistics $T_1=\frac{1}{n}\sum_{i=1}^{n} X_i$ and $T_2=\frac{1}{6}(X_1+2X_2+3X_3)$ are two unbiased estimators of the population mean μ, then which one is more efficient? **[7]**

UNIT-II

Q.4 (a) Explain the method of maximum likelihood for estimation (*m.l.e.*) of parameter. **[7]**

(b) Find the maximum likelihood estimate for the parameter θ of a Poisson distribution on the basis of a sample of size n. Also find its variance. **[8]**

OR

Q.5 **(a)** Define the following terms:

(i) Statistical Hypothesis (ii) Null and Alternative hypothesis

(iii) Critical region (iv) Level of significance **[8]**

(b) Let the *pdf* of a random variable X be

$$f(x;\theta)=\begin{cases}\frac{1}{\theta}, & 0<x<\theta\\ 0, & otherwise\end{cases}.$$

Let the hypothesis to be tested be $H_0:\theta=2$ against $H_1:\theta=3$ with critical region be $w=\{x:x>1\}$. On the basis of a single observation obtain Power function, Type-I error and Type-II error. **[7]**

UNIT-III

Q.6 **(a)** Discuss the procedure for testing the single mean in a large samples. **[7]**

(b) From a large lot of fresh coins, a random sample of size 50 is taken. The mean weight of coins in the sample is found to be 28.57 gm. Assuming that the population standard deviation of weight is 1.25 gm. Will it be reasonable to suppose that the mean is 28 gm? If not, obtain the 99% confidence limits to the mean weight of all coins in the lot. **[8]**

OR

Q.7 **(a)** The mean height of 50 male students who showed above average participation in college athletics was 68.2 inches with standard deviation of 2.5 inches, while 50 male students who showed no interest in such participation had a mean height of 67.5 inches with standard deviation of 2.8 inches. Test the hypothesis that male students who participate in college athletics are taller than other male students. **[7]**

(b) Before an increase in excise duty on tea, 400 persons out of a sample of 500 persons were found to be tea drinkers. After an increase in duty, 400 people were tea drinkers in a sample of 600 persons. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea after the increase in excise duty? Test at 5% and 1% significance level. **[8]**

UNIT-IV

Q.8 **(a)** A new diet and exercise program has been advertised as remarkable way to reduce blood glucose levels in diabetic patients. Ten randomly selected diabetic patients are put on the program, and the results after one month are given by the following table:

Before	268	225	252	192	307	228	246	298	231	185
After	106	186	223	110	203	101	211	176	194	203

Do the data provide sufficient evidence to support the claim that the new program reduces blood glucose level in diabetic patients? **[7]**

(b) A sample of 500 elementary school children in a certain school system were cross classified by nutritional status and academic performance. The results are given as follows:

Second criteria of classification Academic performance	First criteria of classification Nutritional Status	
	Poor	Good
Poor	105	15
Satisfactory	80	300

Can you say that there is a relationship between nutritional status and academic performance? [8]

OR

Q.9 A manufacturing company has purchased three new machines of different types and wishes to determine whether one of them is faster than the others in producing certain output. Five hourly production figures are observed at random from each machine and results are given below:

	Machine A	Machine B	Machine C
Observations	25	31	24
	30	39	30
	36	38	28
	38	42	25
	31	35	28

Use Analysis of Variance (ANOVA) technique to determine whether the machines are significantly different in their mean speeds at 5% significance level. **[15]**

Roll No. ____________

B.SC.(HONS.) MATHEMATICS – 4TH SEMESTER
DATA STRUCTURE USING 'C'-09050407
END TERM THEORY EXAMINATION

Time: 3:00 Hrs **Max. Marks: 75**

Instructions:

1. Write Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaint(s) in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint in this regard will be entertained thereafter.
3. Attempt 5 Questions in all. **Q. No. 1** is compulsory. Students are required to attempt other **FOUR** questions selecting one from each unit. Marks are indicated against each question.
4. Draw diagram wherever required.

Q.1. Answer the following Questions.

a) Priority Queue (3)

b) Circular list (3)

c) B-Tree (3)

d) Linear search (3)

e) Time Complexity (3)

UNIT-I

Q.2. What do you mean by data structure? Describe different type of Data Structure. (15)

OR

Q.3. What is Doubly Link List? Write an algorithm to Insert and delete an element from doubly link list. (15)

UNIT-II

Q.4. Define Array. Show memory representation of array with an example? How can we calculate the length of an Array? (15)

OR

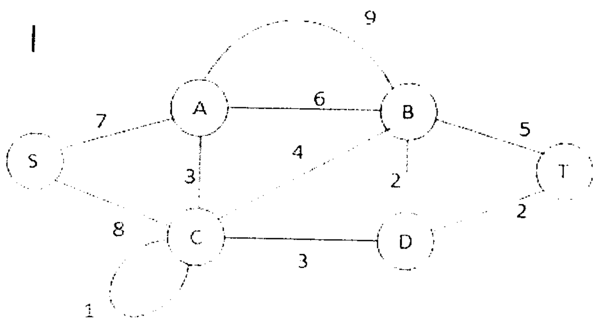
Q.5. Explain Binary Tree with its representation. Write an algorithm to delete an element from a binary search tree. (15)

UNIT-III

Q.6. What is Graph? How it can be stored in memory? Explain BFS and DFS with help of suitable example. (15)

OR

Q.7. What is spanning tree? Solve this by using Kruskal's algorithm: (15)



UNIT-IV

Q.8. Define sorting. Give its different applications in Computer Science. Define Internal and external sorting. (15)

OR

Q.9. Explain following sorting algorithms: (15)

a) Insertion sort

b) Merge sort

Roll No. ____________

B.Sc. (NM) – 4^{TH} SEMESTER
PROGRAMMING IN 'C' AND NUMERICAL METHOD -09010403
END TERM THEORY EXAMINATION

Time: 3:00 Hrs **Max. Marks: 40**

Instructions:
1. Write Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaint(s) in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint in this regard will be entertained thereafter.
3. Attempt 5 Questions in all. **Q. No. 1** is compulsory. Students are required to attempt other **FOUR** questions selecting at least one from each unit. Marks are indicated against each question.
4. Draw diagram wherever required.

Q.1. Answer the following Questions. (2X4=8)
- a) Algorithm
- b) Data Type
- c) I/O functions
- d) Operators

UNIT-I

Q.2. a) Explain the if-else statements. Show its execution with a flow chart. (4)
b) Write a program to check whether a given year is leap year or not. (4)

Q.3 a) Explain user defined function and library function. (4)
b) Write a program to calculate area of a square. (4)

UNIT-II

Q.4 a) What is array? How can we initialize one Dimensional and two Dimensional array. (4)
b) Write a program for finding the largest number in an Array. (4)

Q.5 a) Explain different kinds of loops available in 'C'. With example. (4)
b) Write a program for find the sum of n numbers. (4)

UNIT-III

Q.6 a) Write a program to check whether a given number is Palindrom or not. (4)
b) Using Gauss Jordan method solve the set of equations: (4)
$x+y+z=9$, $2x-3y+4z=13$, $3x+4y+5z=40$

Q.7 a) What is the difference between call by value and call by reference? Explain with the help of example. (4)
b) Explain Cholesky decomposition method and solve the following system of equation: (4)

$4x-y-z=3$
$-x+4y-3z=-0.5$
$-x-3y+5z=0$

*************ETE MAY/JUNE 2018***************