REAL ANALYSIS

1. Course Description

Programme: B.Sc | **Max. Hours : 60**

Course Code: U26/MAT/DSC/201 | **Hours per week : 04**

Course Type: DSC- II | **Max. Marks : 100**

No. of credits: 4

2. Course Objectives

1. To offer a thorough introduction to the fundamental ideas of Real Analysis and explain their relevance to current Mathematical progress.
2. To demonstrate the applicability of Real Analysis in analyzing and solving domain-specific challenges within Computer Science, Engineering, Physics, Economics, and various other disciplines.

3. Course Outcomes

After the successful completion of the course, the student will be able to:

CO 1: Recall and explain the concepts of open sets, closed sets, and the convergence and divergence of sequences. (L I)

CO 2: Explain the concepts of convergence of series using various tests, including the limits and continuity of functions. (L II)

CO 3: Analyze the differentiability of real functions using Rolle's Theorem and the Mean Value Theorem. (L IV)

CO 4: Explain the conditions and algebra of integrability for real functions using the Fundamental Theorem of Calculus. (L II)

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4. **Course Content**

Module – I **15 Hours**

Real Numbers:
Field Structure and Order Structure, Bounded and Unbounded Sets, Completeness in the Set of Real Numbers, Absolute value of a Real Number

Sections: 2, 3, 4, 5 of Chapter 1, Pg. No: 9 to 26

Open Sets, Closed Sets and Countable Sets:
Limit Points of a Set, Closed Sets- Countable and Uncountable Sets.

Sections: 2, 3, 4 of Chapter 2, Pg. No: 31 to 43.

Real Sequences:
Sequences, Limit Points of a Sequence, Convergent Sequences, Non-Convergent Sequences (Definitions), Cauchy 's General Principle of Convergence, Algebra of Sequences, Some Important Theorems, Monotonic Sequences.

Sections: 1, 2, 4, 5, 6, 7, 8, 9 of Chapter 3, Pg. No: 44 to 50, 52 to 98.

Module -II

15 Hours

Infinite Series:
Positive Term Series, Comparison Tests for Positive Term Series, Cauchy's Root Test, D'Alembert's Ratio Test, Logarithmic Test, Integral Test, Alternating Series (Leibnitz Test). **Sections: 2, 3, 4, 5, 7, 8, 10.1, 10.2 of Chapter 4, Pg. No:103 to 116, 119 to 124, 130 to 136.**

Functions of a Single Variable (I):
Limits, Continuous Functions, Functions Continuous on Closed Intervals.

Sec 1, 2, 3 of Chapter 5, Pg. No: 145 to 171

Module-III **15 Hours**

Functions of a Single Variable (II):
The Derivative, Increasing and Decreasing Functions, Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Higher order derivatives.

Sections: 1, 3, 5, 6, 7, 8 of Chapter 6, Pg No: 177 to 180, 184 to 186, 188 to 208.

Module-IV **15 Hours**

Riemann Integral:
Definition and Existence of the Integral, Refinement of Partitions, Darboux's Theorem, Conditions of Integrability, Integrability of the Sum and Difference of Integrable Functions, The Integral as a Limit of Sums, Some Integrable Functions, Integration and Differentiation, The Fundamental Theorem of Calculus.

Sections: 1, 2, 3, 4, 5, 6, 7, 8, 9 of Chapter 9, Pg. No: 263 to 287, 291-300.

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5. Reference Books:

1. S.C Malik and Savita Arora, Mathematical Analysis, Seventh Edition, New Age International Publishers.
2. Kenneth A Ross - Elementary Analysis: The theory of Calculus, Springer, Second Edition, 2013.
3. William F. Trench- Introduction to Real Analysis, Prentice Hall/ Pearson Education, First Edition, 2003.
4. Lee Larson - Introduction to Real Analysis I, University of Louisville (course notes), 2014.
5. Shanti Narayan & P. K Mittal – A course of Mathematical Analysis, S Chand & Company Ltd., Revised (29th Edition), 2005.
6. Brian S. Thomson, Judith B. Brucker & Andrew M. Bruckner – Elementary Real Analysis, Prentice Hall, First Edition 2001; Second Edition 2008.

6. Syllabus Focus

a) Relevance to Local, Regional, National and Global Development Needs

Local/Regional/National /Global Development Needs	Relevance
National	Understanding the integrability of real functions and the Fundamental Theorem of Calculus equips students with essential mathematical skills used in scientific research, engineering analysis, and data modelling, which are important for technological and scientific development.
Global	Real analysis is a versatile and fundamental branch of mathematics with applications spanning a wide range of disciplines. Its rigorous methods and concepts provide a solid framework for understanding and solving real-world problems in various scientific, engineering, and economic fields.

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a) **Components on Skill Development/Entrepreneurship Development/Employability.**

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module I, II, III & IV	Fundamentals of Real Analysis using Mathematical Software
Employability	Module I, II, III & IV	Real analysis helps in understanding optimization, modelling, and stability of economic systems used in financial analysis and forecasting.

7. **Pedagogy**

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	Presentations, Interactive Classroom games/Quiz
2.	Experiential Learning	Field Trips
3.	Problem Solving	Assignments, Research Projects

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8. Course Assessment Plan

a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination

b) CO	Continuous Internal Assessments CIA - 40%	End Semester Examination- 60%
CO1	CIA-1 - Written Exam	Written Exam
CO2	CIA-I(Written Exam)	
CO3	CIA-II (Skill Tests)	
CO4	CIA-II (Assignments)	

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c) Model Question Paper- End Semester Exam Theory

MODEL QUESTION PAPER
THEORY

Course Code: U26/MAT/DSC/201 **Max. Marks: 60**
No. Of Credits: 4 **Max. Time: 2 Hrs**

Note: This question paper consists of Section A and B. The answer to Section A & B must be written in the answer book given.

SECTION – A (Long Essay Type)

I. Answer ALL questions: **Marks: 4 x 10 =40M**

1. (a) Prove that every bounded sequence with a unique limit point is convergent.

   (b)Show that $\lim_{n \to \infty} \frac{3 + 2\sqrt{n}}{\sqrt{n}} = 2$.

OR

2. State and Prove Cauchy 's General Principle of Convergence.

3. (a) State and prove D' Alembert's Ratio Test.

   (b) Test for the convergence of the series (a)$\sum_{n=0}^{\infty} \frac{1}{2n^2 + 1}$.

OR

4. (a) State and prove Cauchy's Root Test.

   (b) If a function f is continuous on a closed interval [a, b] then f attains its bounds at least once in [a, b].

5. (a) State and prove Rolle's Theorem,

   (b) Expand $f(x) = e^x$ using Maclaurin's theorem.

OR

6. (a) Prove Taylor's Theorem with Lagrange's form of remainder.

   (b) Show that using Cauchy's Mean Value theorem $\frac{\sin\alpha - \sin\beta}{\cos\beta - \cos\alpha} = \cot\theta$,where $0 < \alpha < \theta < \beta < \pi/2$.

7. (a) Prove that a necessary and sufficient condition for the integrability of a bounded function f is that for every $\in > 0$ there corresponds $\delta > 0$ such that for every partition P of [a, b] with norm P $< \delta$ is $U(P, f) - L(P, f) < \in$.

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(b) Show that a constant function is integrable and $\int_a^b k\,dx = k\,(b-a)$.

OR

8. (a) State and prove the Fundamental Theorem of Calculus.

(b)Show that $\int_1^2 (3x + 1)\,dx = \frac{11}{2}$.

SECTION –B (Short Essay Type)

II. Answer any FOUR of the following questions: **Marks: 4 x 5=20M**

9. Show that the sequence $S_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \ldots\ldots\ldots + \frac{1}{n+n}$ is convergent.

10. Show that the series $1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \ldots\ldots\ldots$ is convergent.

11. Discuss the kind of discontinuity for the function f defined as

$$f(x) = \begin{cases} \frac{x-|x|}{x} & when\ x \neq 0 \\ 2 & when\ x = 0 \end{cases}.$$

12. Determine whether the function f defined on R by $f(x) = \begin{cases} x & if\ 0 \leq x \leq 1 \\ 1 & if\ x \geq 1 \end{cases}$

is differentiable.

13. Examine the validity of the hypothesis and conclusion of Lagrange's Mean Value Theorem for $f(x) = |x|$ on $[-1, 1]$.

14. Prove that every continuous function is integrable.

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Question Paper format – Bloom's Taxonomy Level

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Question Paper format – Bloom's Taxonomy Level

SECTION A - INTERNAL CHOICE				**4Q X 10 M = 40 M**
Question Number	**Module Covered**	**Question**	**CO**	**BTL (Bloom's Taxonomy Level)**
1	Module I	(a) Prove that every bounded sequence with a unique limit point is convergent (b) Show that $\lim_{n\to\infty} \frac{3+2\sqrt{n}}{\sqrt{n}} = 2$	CO 1	Level I
2	Module I	State and Prove Cauchy 's General Principle of Convergence.	CO 1	Level I
3	Module II	(a) State and prove D' Alembert's Ratio Test. (b) Test for the convergence of the series (a)$\sum_{n=0}^{\infty} \frac{1}{2n^2+1}$	CO 2	Level II
4	Module II	(a) State and prove Cauchy's Root Test. (b) If a function f is continuous on a closed interval [a, b]. then f attains its bounds at least once in [a, b].	CO 2	Level II
5	Module III	(a) State and prove Rolle's Theorem. (b) Expand $f(x) = e^x$ using Maclaurin's theorem	CO 3	Level IV
6	Module III	(a) Prove Taylor's Theorem with Lagrange's form of remainder. (b) Show that using Cauchy's Mean Value theorem $\frac{sin\alpha - sin\beta}{cos\beta - cos\alpha} = cot\theta$, where $0 < \alpha < \theta < \beta < \pi/2$.	CO 3	Level IV
7	Module IV	(a) Prove that a necessary and sufficient condition for the integrability of a bounded function f is that for every $\in > 0$ there corresponds $\delta > 0$ such that for very parttion P of [a, b] with norm P $< \delta$ is $U(P,f) - L(P,f) < \in$. (b) Show that a constant function is integrable and $\int_a^b k\,dx = k\,(b-a)$.	CO 4	Level II
8	Module IV	(a) State and prove Fundamental theorem of Calculus. (b) Show that $\int_1^2 (3x+1)\,dx = \frac{11}{2}$.	CO 4	Level II

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SECTION B - ANSWER ANY 4 OUT OF 6 **(To compulsorily have ONE question from each module)**				**4Q X 5 M = 20 M**
9	Module I	Show that the sequence $S_n = \frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \ldots\ldots\ldots + \frac{1}{n+n}$ is convergent	CO 1	Level I
10	Module I	Show that the series $1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \ldots\ldots\ldots$ is convergent.	CO 1	Level I
11	Module II	Discuss the kind of discontinuity for the function f defined as $f(x) = \begin{cases} \frac{x - \lvert x \rvert}{x} & when\ x \neq 0 \\ 2 & when\ x = 0 \end{cases}$	CO 2	Level II
12	Module II	Determine whether the function f defined on R by $f(x) = \begin{cases} x & if\ 0 \leq x \leq 1 \\ 1 & if\ x \geq 1 \end{cases}$ is differentiable	CO 2	Level II
13	Module III	Examine the validity of the hypothesis and conclusion of Lagrange's Mean value theorem for $f(x) = \lvert x \rvert$ on $[-1, 1]$	CO 3	Level IV
14	Module IV	Prove that every continuous function is integrable.	CO 4	Level II

c. Question Paper Blueprint

Modules	**Hours Allotted in the Syllabus**	**CO Addressed**	**Section A (No. of Questions)**	**Total Marks**	**Section B (No. of Questions)**	**Total Marks**
1	15	CO-1	2	4x10=40	6 (By taking at least one question from each Module)	4x5=20
2	15	CO-2	2			
3	15	CO-3	2			
4	15	CO-4	2			

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9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions (hrs.)
1	1, 2	Remember	15
2	2, 7	Understand	15
3	1, 2	Analyze	15
4	1, 2	Discuss	15

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REAL ANALYSIS

Practical Syllabus

1. Course Description

Programme: B.SC.
Course Code: U26/MAT/DSC/201/P
Course Type: DSC 2
No. of credits: 1

Max. Hours: 30
Hours per week: 02
Max. Marks : 50

2. Course Objectives:

1. Test the convergence or divergence of a given sequence/series.
2. Analyze the behaviour of functions with regard to continuity, differentiability and integrability.

3. Course Outcomes

After the successful completion of the course, the student will be able to:

CO1: Test the convergence or divergence of a given sequence.
CO2: Understand the convergence or divergence of a given series.
CO3: Analyze the behaviour of functions with regard to derivability.
CO4: Discuss the Riemann integrability of real functions.

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PRACTICAL SESSIONS

1. Limit of Sequences
2. Cauchy Sequences and Monotone Sequences
3. Infinite Series
4. Integral Tests and Alternating Series
5. Continuous functions
6. Derivatives
7. The Mean Value Theorems
8. Higher Order Derivatives.
9. Riemann Integrals-I
10. Riemann Integrals-II

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6.Model Question Paper – End Semester Exam Practical

REAL ANALYSIS

Programme : B.Sc.
Course Code :U26/MAT/DSC/201/P
Type of Course: DSC-II **Max. Marks: 50**
No. of credits : 1

I. Answer any SIX of the Following **6x5=30M**

1. Using the definition of limit show that $\lim_{n\to\infty} \frac{2n-3}{n+1} = 2$.

OR

2. Show that the sequence $\{S_n\}$, where $S_{n=1+}\frac{1}{2}+\frac{1}{3}+\ldots..+\frac{1}{n}$ cannot converge.
3. Test for convergence of the series $\frac{1.2}{3^2.4^2} + \frac{3.4}{5^2.6^2} + \frac{5.6}{7^2.8^2} + \cdots$.

OR

4. Show that the following series is convergent:
$1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}\ldots..$
5. Investigate the continuity at the indicated point $f(x) = \begin{cases} \frac{x^3-8}{x^2-4} & when\ x \neq 2 \\ 3 & when\ x = 2 \end{cases}$ at x=2.

OR

6. Discuss the derivability of the function $f(x) = \begin{cases} 1 & when\ 0 \leq x \leq 1 \\ x & when\ x > 1 \end{cases}$ at x=1.
7. Examine the validity of the hypothesis and the conclusion of Rolle's theorem for $f(x) = (x-a)^m(x-b)^n$ where m and n are positive integers on [a, b].

OR

8. Use Taylor's theorem to show that $\cos x \geq 1-\frac{x^2}{2}$, for all real x.
9. Show that a constant function k is integrable and $\int_a^b k\,dx = k\,(b-a)$.

OR

10. Compute $\int_{-1}^{1}|x|\,dx$.

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SEMESTER - II

MACRO ECONOMIC ANALYSIS

1. Course Description

Programme: BSc — Max. Hours:60

Course Code: U26/ECM/DSC/201 — Hours per week: 4

Course Type: DSC — Max. Marks:100

No. of credits: 4

2. Course Objectives

1. To provide knowledge on various macroeconomic concepts
2. To learn the theories of Consumption, Investment

3. Course Outcomes

On completion of the course the student will be able to:

CO1: Demonstrate knowledge in macroeconomic concepts (Understand)

CO2: Analyse the economic theories (Analyse)

CO3: Illustrate the working of IS and LM(Understand)

CO4: Examine the effects of inflation and deflation (Analyse)

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4. Course Content

MODULE I: Introduction to Classical and Keynesian Theories of output Income and Employment **15 hours**

1. Macro Economics –meaning, definition and scope of macro economics
2. Say's law of markets, Pigou's wage flexibility
3. Keynesian theory – of income output and employment
4. Effective demand- aggregate demand and aggregate supply
5. Keynesian tools and underdeveloped countries

MODULE II: Consumption and Investment Functions **15 Hours**

1. Consumption function-attributes, factors affecting and determinants of level of consumption in the short run
2. Keynes psychological law of consumption function.
3. Permanent, Relative and Life Cycle Hypothesis of consumption function
4. Investment function, types and factors affecting level of investment marginal efficiency of capital (MEC), marginal efficiency of investment (MEI).
5. Green investment and sustainable capital

MODULE III: Equilibrium in the IS -LM Model **15 Hours**

1. Product market equilibrium IS curve
2. Money Market Equilibrium -LM curve
3. Two market equilibrium- product and money market.
4. Introduction of government in IS-LM Model

MODULE IV: Inflation & Business Cycles **15 Hours**

1. Inflation, Deflation and Stagflation: concept
2. Inflation - causes, effects and measures
3. Inflation and unemployment- Philips curve
4. Role of big data in predicting inflation
5. Business Cycles – phases and measures

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5. References

1. Branson, W. H. (2006). *Macroeconomics: Theory and policy*. AITBS Publishers.
2. Dornbusch, R., Fischer, S., & Startz, R. (2004). *Macroeconomics*. Tata McGraw-Hill.
3. Chopra, P. N. (2011). *Macro-economic theory*. Kalyani Publications.
4. Froyen, R. T. (2005). *Macroeconomics: Theories and policies*. Pearson Education.
5. Jhingan, M. L. (2014). *Macro economic theory*. Vrinda Publications.
6. Rangarajan, C. (1979). *Principles of macroeconomics*. Tata McGraw-Hill Education.
7. Froyen, R. T. (2012). *Macro economic theory*. Prentice Hall.
8. Shapiro, E. (1996). *Macroeconomic analysis*. Galgotia Publications.
9. Seth, M. L. (1995). *Macroeconomics*. Lakshmi Narain Agarwal.
10. Surrey, M. J. (1976). *Macroeconomic themes*. Oxford University Press.
11. Vashi, M. C. (2009). *Macroeconomic theory*. Vikas Publishing House.

6. Syllabus Focus

a) Relevance to Local , Regional , National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
National	The course will enable students to know the trends economy

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
EMP	Module I	Case Study
SD	Module 4	Presentation

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Seminar Presentation	Participative Learning
2.	Case studies	Problem Solving
3.	Group Discussion	Participative Learning

8. Course Assessment Plan

a) Weight age of Marks in Continuous Internal Assessments and End Semester Examination

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CO1	CIA-1	End Semester examination
CO2	CIA-1	
CO3	CIA-2 Presentation	
CO4	CIA-2 Assignment	

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b) Model Question Paper- End Semester Exam

MACRO ECONOMIC ANALYSIS

SECTION A - INTERNAL CHOICE			**4 Q X 10 M = 40 M**	
Question Number	**Question**	**Question**	**CO**	**BTL(Blooms Taxonomy Level)**
1	**Module 1**	Explain Keynesian theory of income and employment	CO 1	BL 2
2	**Module 1**	Illustrate how Keynesian tools are used in underdeveloped countries	CO 1	BL 2
3	**Module 2**	Examine Keynes psychology law of Consumption	CO 2	BL 4
4	**Module 2**	Analyze Relative Income Hypothesis theory	CO 2	BL 4
5	**Module 3**	Explain the IS and LM model	CO 3	BL 2
6	**Module 3**	Analyze the role of Government in IS and LM	CO 3	BL 2
7	**Module 4**	Evaluate the effects and remedial measures of Inflation	CO 4	BL 2
8	**Module 4**	Explain Philips curve and its relationship with employment	CO 4	BL 2
SECTION B - ANSWER ANY 4 OUT OF 6			**5 x 4= 20 M**	
9	**Module 1**	Write about aggregate demand and aggregate supply	CO 1	BL 1
10	**Module 2**	Explain about the Life cycle Hypothesis theory of Consumption	CO 2	BL 1
11	**Module 2**	Write about MEC and MEI	CO 2	BL 1
12	**Module 3**	Write about product market equilibrium	CO 3	BL 1
13	**Module 4**	Write about the causes of Inflation	CO 4	BL 1
14	**Module 4**	What is Deflation, write about its measures	CO 4	BL 1

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c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
1	15	1	2	10	1	5
2	15	2	2	10	1	5
3	15	3	2	10	1	5
4	15	4	2	10	1	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Class room sessions(hrs)
1	1	Understand	15
2	1	Analyse	15
3	3	Understand	15
4	2	Analyse	15

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SEMESTER - II

MACRO ECONOMICS- DATA ANALYSIS

1. Course Description

Programme:	BSc	Max. Hours:30
Course Code:	U26/ECM/DSC/201/P	Hours per week:2
Course Type:	DSC	Max. Marks:50
No. of credits:	1	

2. Course Objectives

To understand the practical applicability and calculation of various macroeconomic concepts

3. Course Outcomes

On completion of the course the student will be able to:

CO1: Calculate the National Income and the concepts of Real and Nominal GDP

CO2: Evaluate the performance of the Economy bases on Inflation

CO3: Analyse the occupational distribution of India

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4. Course Content

- National income, concepts, methods, circular flow of income, national income accounting,
- Real GDP, Nominal GDP, GDP deflator, National Income in Current prices and Constant prices
- Big Data Accounting in National Income
- Consumption function, Investment function, Equilibrium income
- Accelerator and Multiplier
- Inflation - basket of commodities
- Fiscal Deficit
- National Income Through Occupational Distribution/sectoral Contribution of growth (GDP) India and Telangana

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Osmania University, Hyd-7

SEMESTER II

PROBABILITY DISTRIBUTIONS PRACTICAL (CONVENTIONAL)

1.Course Description

Programme : B.Sc
Course Code :U26/STA/DSC/201/P
Course Type : DSC 2A
No of Credits : 1

No of Hrs allotted: 2Hrs./Week
Max . Marks: 50

2.Course Objectives :

- To develop computational skills in fitting discrete and continuous probability distributions to observed frequency data using appropriate statistical methods.
- To enable students to interpret fitted distributions by comparing observed and expected frequencies and assessing the suitability of theoretical models for real datasets.

3.Course Outcomes:

CO 1 : **Apply** appropriate methods to fit Binomial, Poisson, Negative Binomial, Geometric, Normal, Exponential, and Cauchy distributions to given data.

CO 2 : **Analyze** and **interpret** observed and expected frequencies using direct, recurrence relation, area, and ordinate methods to assess the suitability of fitted distributions.

4.Course Content :

1. Fitting of Binomial distribution for n and p=q=1/2
2. Fitting of Binomial distribution –Recurrence Relation Method
3. Fitting of Poisson distribution –Direct Method
4. Fitting of Poisson distribution – Recurrence relation Method.
5. Fitting of Negative Binomial Distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal Distribution – Area Method.
8. Fitting of Normal Distribution – Ordinates Method.
9. Fitting of Exponential distribution.
10. Fitting of Cauchy distribution.

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Practicals Using MS-EXCEL AND SPSS

1. Fitting of Binomial distribution
2. Fitting of Poisson Distribution
3. Fitting of Normal Distribution
4. Fitting of Exponential distribution
5. Fitting of Cauchy Distribution

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Model Question Paper – End Semester Exam Practical

Course Code: U26/STA/DSC/201/P **Max. Marks: 50**
Credits : 1 **Time: 2 Hrs.**

Answer any THREE questions. **3 x 10= 30**

1. The screws produced by a certain machine were checked by examining samples of 12.The following table shows the distribution of 128 samples according to the number of defective pieces recorded. Fit a Binomial distribution using recurrence relation.

No.of defective pieces	0	1	2	3	4	5	6	7	8	9	10	11	12
No.of samples	2	5	6	8	10	15	20	25	14	10	7	5	1

2. The number of ISD calls made from a telephone booth was tabulated on a day-wise basis as follows .Use the direct formula to fit a Poisson distribution .

No.of ISD calls	0	1	2	3	4	5	6	7
No.of samples	11	25	56	40	22	13	5	0

3. The waiting time X(in minutes) of a railway booking counter is exponentially distributed. The following data is obtained for 200 passengers.

Waiting time	0-5	5-10	10-15	15-20	20-25	25-30	30-35
No.of samples	2	5	6	8	10	15	20

4. Fit a normal distribution by AREAS method to the following data and find the expected frequencies.

C . I	3-6	6-9	9-12	12-15	15-18	18-21	21-24	24-27	27-30
f	4	9	23	43	57	53	36	18	7

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PRACTICAL EVALUATION

S. No	Evaluation	Marks
1	Written Exam	30M
2	Lab	10M
3	Viva	5M
4	Record	5M
	Total	50M

Prepared by	Checked &Verified by	Approved by
Name and Signature of the teaching faculty (G.Priyanka)	Name and Signature of HoD (Dr. Ch.Yugandhar)	Name and Signature of Principal (Prof. T. Uma Joseph)

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