Solapur University, Solapur Semester Pattern Syllabus B.Sc.II Mathematics (w.e.f. June 2011)

## Details of Syllabus of B.Sc.II MATHEMATICS

- There will be **Three Theory periods** per week for each theory paper and **three periods** per week for a **Problem Solving Session**[**PSS II** (**A**) **and PSS II** (**B**)].
- There will be **four** theory papers each carrying **50 marks**.
- Problem Solving Session PSS-II of 100 Marks in which [PSS II (A) and PSS II (B)] each of 50 marks.

Theory-200 marks Problem Solving Session [PSS – II ]-100 marks Total - 300 marks

Theory Papers:	
Semester – III	
Paper – V : Differential Calculus – II	Marks 50
Paper – VI : Differential Equations – II	Marks 50

Semester – IV	
Paper –VII : Integral Calculus	Marks 50
Paper –VIII : Integral Transforms	Marks 50

Problem Solving Session[PSS – II]: Marks 100 (Three Hours in a week with whole Class as a Batch)

(Differential Calculus, Differential Equations, Integral Calculus and Integral Transform)

## Semester-III Paper –V (Differential Calculus)

### Unit-1 Curvature :

Definition of Curvature ,Length of arc as a function, Derivative of an arc, Radius of curvature, Cartesian Equation, Parametric Equations, Polar Equations , Pedal Equations. (15)

## **Unit-2 Jacobians:**

Definition of a Jacobian, Jacobian of a function of function, Jacobian of implicit function, Condition of dependent functions (statement only)

(10)

## Unit- 3 Maxima and Minima :

Definiton of Maximum value and minimum value of a function of one, two and three variables, Necessary condition for extreme values(Statements only), sufficient condition for extreme values (Statements only), Use of second order derivatives. Applications. Maxima and Minima of a function of two variables, Lagrange's Method of undetermined multipliers of two and three variables. (20)

#### **Recommended Book**

Paper- V (Differential Calculus) Differential Calculus by Shanti Narayan and P.K.Mittal S.Chand Publication Revised Edition 2005.

Unit 1:14.1,14.2,14.3. Unit 2:12.1,12.2,12.3,12.4 Unit 3:9.1,9.2,9.3,9.4,9.5,9.6,9.7.

# Paper -VI

# (Differential Equation)

# Unit 1:- Differential Equations of the first order and of degree higher than the first :

Equations that can be resolved into factors of the first degree, Equations solvable for x, Equations solvable for y, Clairaut's equation, Equations reducible to clairaut's form. (15)

# **Unit 2 : Homogeneous linear equations :**

Working rule for finding the solution, Equations reducible to Homogeneous form. (10)

# Unit 3 : Linear Equations of the second order :

General form of the second order linear equation, Complete solution when one integral belonging to complementary function is known ,Rules of getting an integral belonging to complementary function , Removal of the First order Derivative, Transformation of the equation by Changing the independent variable. (10)

# **Unit 4. Simultaneous Equations :**

Nature of the solution of simultaneous equations, Rules of solving the Equation. (5)

# **Unit 5. Total Differential Equations:**

Total Differential Equation, Necessary and sufficient condition for the integrability of total differential equation (proof of Necessity only), Condition for exactness, Criterion for exactness, Method of Solving the Equation. (5)

## **Recommended Book :**

Paper –VI (Differential Equation) : Ordinary and Partial Differential Equations :by *M.D.Raisinghania,S.Chand Co.Ltd.Ramanagar,New Delhi-110055(Edition2002)* Unit 1 (Part I) :6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.9, 6.10, 6.11, 6.12.

**Unit 2 (Part I)** :5.1, 5.2, 5.3, 5.6, 5.7.

**Unit 3 (Part II)** :4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11.

**Unit 4 (Part II) :**5.1,5.2, 5.4,5.5,5.6,5.7.

**Unit 5 (Part II) :**6.2,6.3,6.4,6.5,6.6,6.7.

## Semester - IV Paper –VII (Integral Calculus)

## Unit 1: Rectification :

Length of Curve : Cartesian Equations [y = f(x) and x = g(y)], Parametric equations, Polar Equations (5)

## Unit 2 Area (Quadrature):

Quadrature: Cartesian Equations, Polar Equations, Area enclosed by two curves, Sectorial Area. (5)

#### Unit 3 Volume :

Volume of a Solid of revolution.

(5)

#### Unit 4.Beta and Gamma function :

Definition, Properties, Transformations of Gamma function and Beta function and relation between them, Some Important deductions, Duplication Formula. (15)

## **Unit 5** : Multiple integrals :

Double Integrals, Cartesian and polar, Applications of Double Integration (Area of region and Volume of a Solid only), Change of order of integration, Change of Variables. (15)

Recommended Book Paper-VII (Integral Calculus ) Integral Calculas *by Shanti Narayan and P.K.Mittal S.Chand Publication Revised Edition 2005.* Unit 1 : 9.1,9.2,9.3. Unit 2 : 8.1, 8.3. Unit 3 : 10.1,10.2. Unit 4 : 7.1,7.2,7.3,7.4, 7.5. Unit 5 : 12.2,12.3,12.4,12.5.

## **Paper – VIII** (Laplace Transform)

## **Unit 1 Laplace Transform :**

Integral Transform (Definition), Laplace Transform (Definition), Linearity property of Laplace Transform, Piecewise continuous functions, Existence of Laplace Transform, Functions of exponential order, function of class A, First Translation or Shifting Theorem, Second Translation or Shifting Theorem, Change of Scale Property, Laplace Transform of the derivatives of F(t), Laplace Transform of the  $n^{th}$  order derivatives of F(t), Initial value theorem, Final value theorem, Laplace Transform of Integrals, Multiplication by t, Multiplication by t, Evalution of Integrals, periodic functions.

(20)

## **Unit 2 The Inverse Laplace Transform :**

Inverse Laplace Transform, Null Function, Linearity property, Table of Inverse Laplace Transform, First Translation or Shifting Theorem, Second Translation or Shifting Theorem, Change of Scale Property, Use of partial fraction ,Inverse Laplace Transform of the derivatives , Inverse Laplace Transform of Integrals, Multiplication by powers of p, Division by powers of p, Convolution(definition), Convolution theorem, Heaviside's expansion formula, Beta function. (20)

## **Unit 3 Applications of Laplace Transforms :**

Ordinary Differential equations with constant coefficients, Ordinary Differential equations with variable coefficients. (05)

#### **Recommended Book for Paper –VIII (Integral Transform) :**

#### Integral Transform by Vasistha A.R., Gupta R.K., Krishna Prakashan Media Pvt.Ltd.11, Shivaji Road, Meerut India.

- **Unit 1:** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.18, 1.19, 1.20, 1.21.
- **Unit 2:** 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17.

**Unit 3 :** 3.1, 3.2.

#### **Reference Books:**

- 1. Rainville E.D. The Laplace Transform
- 2. Dr.J.R.Goyel and K.P.Gupta Integral Transform Pragati prakashan Meerut.
- 3. Sharma and Gupta, Differential equation ,Krishna Prakashan Media co.,Meerut

## Problem Solving Session [PSS - II] (Differential Calculus , Differential Equations, Integral Calculus and Integral Transforms)

# [ **Part** – A ]

Assignment No.1: Radius of Curvature (Cartesian equations)

Assignment No.2: Radius of Curvature (Polar & Parametric Equations)

**Assignment No.3 :** Maximum and Minimum of function of two variable.

**Assignment No. 4 :** Lagranges Method of undetermined multipliers of two variables.

Assignment No. 5 : Simultaneous Equations.

Assignment No. 6 : Total Differential Equations.

**Assignment No. 7:** Application of Laplace Transform to solve ordinary differential equation with constant and Variable coefficients.

Assignment No. 8: Beta function and Gamma Function

# [ **Part** – **B**]

Assignment No.9: Rectification of Curves / Length of Plane curves (Using Single Variable: Cartesian form)
Assignment No. 10: Rectification of Curves / Length of Plane curves (Using Single Variable: Polar & Parametric form)
Assignment No.11: Area under Curve / Quadrature (Using SingleVariable: Cartesian form)
Assignment No.12: Area under Curve / Quadrature (Using SingleVariable: Polar & Parametric form)
Assignment No.13: Volume of Solid of Revolution (Using SingleVariable: Cartesian form )
Assignment No.14: Volume of Solid of Revolution (Using SingleVariable: Polar & parametric form )
Assignment No.15: Double Integral (Change of Order)
Assignment No.16: Double Integral (Change of Variable)

Solapur University, Solapur         Nature of Question Paper For Semester Pattern         • Faculty of Science (w.e.f. June 2011)		
1 mile :- 2	hrs.	Total Marks-50
Q. No.1)	Multiple choice questions. 1) a) b) c) d) 2)	(10)
	3) 4) 5) 6)	
	7) 8) 9) 10)	
Q.No.2)	Answer any Five of the following i) ii) iii) iii) iv) v) vi)	(10)
Q.No.3)	<ul> <li>A) Answer any Two of the following</li> <li>i)</li> <li>ii)</li> <li>iii)</li> <li>D) Weite the Answer (Sele of Dashbarg (Network))</li> </ul>	(06)
Q.No.4)	<ul> <li>B) Write the Answer/Solve/Problem/Note</li> <li>Answer any Two of the following <ol> <li>i)</li> <li>ii)</li> <li>iii)</li> </ol> </li> </ul>	(04) (10)
Q.No.5)	Answer any Two of the following i) ii) iii)	(10)

#### Problem Solving Sessions [PSS- II (A) and (B)]

There are two PSS of 3 hours each for a batch of 20 students at the end of the year.

#### Problem Solving Session [ PSS – II (A) ] Marks 50

Q.1 Attempt any 4 out of 8 10 marks each (40marks)

Journal (10 marks)

#### Total (50 marks)

#### Problem Solving Session [ PSS – II (B) ] Marks 50

Q.1 Attempt any 4 out of 8 10 marks each (40marks)

Journal (10 marks)

Total (50 marks)

#### Solapur University, Solapur Nature of Question Paper

#### 1. Structure of the courses :-

- A) Each paper of every subject for Arts, Social Sciences & Commerce Faculty shall be of 50 marks as resolved by the respective faculties and Academic Council.
- B) For Science Faculty subjects each paper shall be of 50 marks and practical for every subject shall be of 50 Marks as resolved in the faculty and Academic Council.
- C) For B. Pharmacy also the paper shall be of 50 marks for University examination. Internal marks will be given in the form of grades.
- D) For courses which were in semester pattern will have their original distribution already of marks for each paper.
- B) For the faculties of Education, Law, Engineering the course structure shall be as per the resolutions of the respective faculties and Academic Council.

#### 2. Nature of question paper:

#### A) Nature of questions.

- "20% Marks objectives question" (One mark each and multiple choice questions)
- "40% Marks Short notes / Short answer type questions / Short
  - Mathematical type questions/ Problems. (2 to 5 Marks each)
- "40% Marks Descriptive type questions / Long Mathematical type questions / Problems. (6 to 10 Marks each)
- B) Objective type question will be of multiple choice (MCQ) with four alternatives. This answer book will be collected in first 15 minutes for 10 marks and in first 30 minutes for 20 marks. Each objective question will carry one mark **each**.
- C) Questions on any topic may be set in any type of question. All questions should be set in such a way that there should be permutation and combination of questions on all topics from the syllabus. As far as possible it should cover entire syllabus.
- D) There will be only five questions in the question paper. All questions will be compulsory. There will be internal option (30%) and not overall options. for questions 2 to 5.
- **3**. Practical Examination for B. Sc. I. will be conducted at the end of second semester.
- **4**. Examination fees for semester Examination will be decided in the Board of Examinations.

The structures of all courses in all Faculties were approved and placed before the Academic Council. After considered deliberations and discussion it was decided not to convene a meeting of the Academic Council for the same matter as there is no deviation from any decision taken by Faculties and Academic Council. Nature of Question Paper approved by Hon. Vice Chancellor on behalf of the Academic Council.