

GOVERNMENT POLYTECHNIC, PUNE

‘180 OB’ – Scheme

Programme	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme code	01/02/ 03 /04/05/06/07/08/16/ 17 /21/22/ 23 /24/26
Name of Course	ADVANCED MATHEMATICS III
Course Code	SC2104
Prerequisite	SC1102 – Applied Mathematics II
Class Declaration	NO

1. TEACHING AND EXAMINATION SCHEME

1. TEACHING AND EXAMINATION SCHEME									
Teaching Scheme (In Hours)			Total Credits (L+T+P)		Examination Scheme				
					Theory		Tutorials		Total Marks
L	T	P	C		ESE	PA	ESE	PA	
02	01	00	03	Marks	40	10	–	25	75
				Exam Duration	2 Hrs	30 min.	–	--	—

Legends : L- Lecture, P- Practical, T- Tutorial, C- Credits ,ESE-End Semester Examination, PA- Progressive Assessment (Test I,II/TermWork) , *- Practical Exam, \$- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;

2. RATIONALE

The student shall learn various techniques in integration and use these techniques to their related Engineering problems.

3. COMPETENCY

The aim of this course is to help the student to attain the following industry identified Competency through various teaching learning experiences:

- **Solve various engineering related problems using the principles of advanced mathematics**

4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Solve the given problems of integration using suitable methods.
2. Apply the concept of integration to find Mean and Root Mean Square value.
3. Using the general form of Complex number find the all roots of complex number

5. SUGGESTED PRACTICALS/ EXERCISES

Sr. No.	Unit No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Relevant COs	Approx. Hrs. required
1	1	Integration by substitution method	1	2
2	1	*Integration on the type $1/ax^2+bx+c$, $1/\sqrt{ax^2+bx+c}$, $1/(a\sin x+b\cos x+c)$, $1/(a\sin^2 x+b\cos^2 x+c)$.	1	2
3	1	*Integration using By Part Rule	1	2
4	2	Integration by partial fraction method.	2	2
5	2	*Examples on Definite integral and its properties	2	2
6	2	*Examples on Mean and R.M.S. value	2	2
7	3	Modulus and Amplitude of complex number and Solve examples on complex numbers using De Moivre's theorem.	3	2
8	3	Find roots of complex number.	3	2
9	All	*Complete a Micro- project as per the guidelines in point no. 11 towards the fulfillment of the COs of the course.	All	4
Total				16

*Experiment No. 9 compulsory, perform experiment 2 or 3 and experiment 5 or 6.

Sr.No.	Performance Indicators	Weightage in %
a.	Prepare experimental set up	-
b.	Handling of instruments during performing practical.	-
c.	Follow Safety measures	-
d.	Accuracy in calculation	20
e.	Answers to questions related with performed practices.	40
f.	Submit journal report on time	20
g.	Follow Housekeeping	10
h.	Attendance and punctuality	10
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	Experiment Sr. No.
1	LCD Projector	1-8
2	Interactive Classroom	1-8

7. THEORY COMPONENTS

Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Units I : Integration (09 hrs, 16 marks)	
1a. Obtain the given simple integral(s) using a substitution method. 1b. Integrate given simple functions using the integration by parts. 1c. Evaluate the given simple integral by partial fractions.	1.1 Methods of Integration: a. Integration by substitution. b. Integration by parts c. Integration by partial fractions.
Unit II: Definite Integrals (09 hrs, 12 marks)	
2a. Solve given simple problems based on properties of definite integration. 2b. Utilize the concept of definite integration to find mean value of the function. 2c. Invoke the concept of definite integration to find root mean square value of function.	2.1 Definite Integration: a. Simple examples b. Properties of definite integral (without proof) and simple examples. 2.2 Applications of integration : a. Mean Value. b. Root Mean Square Value.
Unit III: Complex Number (14 hrs, 12 marks)	
3a. Solve given problems based on complex number. 3b. Solve examples on complex number using De Moivre's theorem 3c. Find roots of complex numbers.	3.1 Cartesian, polar and exponential form of a complex number. 3.2 Algebra of complex numbers. 3.3 De Moivre's theorem 3.4 General form of complex number

8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Integration	09	02	08	06	16
II	Definite Integrals	09	02	04	06	12
III	Complex number	14	04	04	04	12
Total		32	08	16	16	40

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

- Identify engineering problems based on real world problems and solve them with the use of free tutorials available on the internet.
- Use graphical software's: EXCEL, DPLOT and GRAPH for related topics.
- Use Math CAD as a Mathematical Tool and solve the problems on Calculus.
- Identify problems based on applications of differential equations and solve these problems.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- Massive open online courses (**MOOCs**) may be used to teach various topics/subtopics.
- About **15-20% of the topics/subtopics** which is relatively simpler or descriptive in nature is to be given to the students for **self-directed learning** and assess the details development of the COs through classroom presentations (see implementation guideline for.)
- Use Flash/Animations to explain various components, operation
- Teachers should ask the students to go through instruction and Technical manuals.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs.(Affective Domain Outcomes) .Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission.. The student ought to submit a micro-project by the end of the semester to develop the industry oriented COs.

A suggested list is given here. Similar micro-project could be added by the concerned faculty.

- Prepare charts displaying the area of irregular shapes using the concept of integration.
- Prepare charts displaying the volume of irregular shapes using the concept of integration.
- Prepare charts displaying formulae of complex numbers.

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publisher, Edition Year of publication and ISBN Number
1.	Higher Engineering Mathematics	Grewal B. S.	Khanna publication New Delhi , 2013 ISBN: 8174091955
2.	A text book of Engineering Mathematics	Dutta. D	New age publication New Delhi, 2006 ISBN: 978-81-224-1689-3
3.	Advance Engineering Mathematics	Kreysizg, Ervin	Wiley publication New Delhi 2016 ISBN: 978-81-265-5423-2
4.	Advance Engineering Mathematics	Das H.K.	S Chand publication New Delhi 2008 ISBN: 9788121903455
5.	Engineering Mathematics Volume I (4 th edition)	Sastry S.S.	PHI Learning, New Delhi, 2009 ISBN: 978-81-203-3616-2

13. SOFTWARE/LEARNING WEBSITES

- a. www.scilab.org/ -SCI Lab
- b. www.mathworks.com/product/matlab/ -MATLAB
- c. [Spreadsheet Applications](#)
- d. www.dplot.com
- e. <https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig>

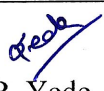

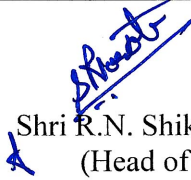
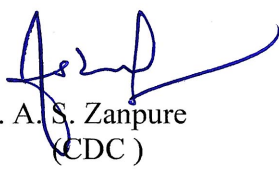
14. PO - COMPETENCY- CO MAPPING

CO-PO Mapping of course

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
1	2	2	1	-	-	-	1
2	3	3	1	-	-	1	2
3	3	3	-	1	-	-	1

CO-PSO Mapping of course

CO	PSO1	PSO2	PSO3
1	1	-	-
2	2	-	-
3	2	-	-

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<p>Sign: </p> <p>Name: Shri R.N. Shikari (Head of Program)</p>	<p>Sign: </p> <p>Name: Shri. A. S. Zanpure (CDC)</p>