

# Government Polytechnic, Pune

'180 OB' – Scheme

Course Title: **ADVANCED MATHEMATICS III**

(Course Code: **..SC2104.**)

Diploma programme in which this course is offered	Semester in which offered
ET Engineering	THIRD
03/23	

## 1. RATIONALE

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

## 2. 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

## 3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PA	ESE	PA	
2	1	-	3	40	10	-	25	75

## 4. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. required
1	Integration by substitution method	1	2
2	Integration on the type $1/ax^2+bx+c$ , $1/\sqrt{ax^2+bx+c}$ , $1/(asinx+bcosx+c)$ , $1/(asin^2x+bcos^2x+c)$ .	1	2
3	Integration using By Part Rule	1	2
4	Integration by partial fraction method.	2	2
5	Examples on Definite integral and it's properties	2	2
6	Examples on Mean and R.M.S. value	2	2

7	Modulus and Amplitude of complex number and Solve examples on complex number using De Moivre's theorem.	3	2
8	Find roots of complex number.	3	2
<b>Total</b>			16

S.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
<b>Total</b>		<b>100</b>

### 5. 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.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	LCD Projector	1-8
2	Interactive Classroom	1-8

## 6. THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
<b>Units 1 : Integration</b>	1.1. Obtain the given simple integral(s) using substitution method. 1.2. Integrate given simple functions using the integration by parts. 1.3. Evaluate the given simple integral by partial fractions.	Methods of Integration: a) Integration by substitution. b) Integration by parts c) Integration by partial fractions.
<b>Unit 2: Definite Integrals</b>	2 .1. Solve given simple problems based on properties of definite integration. 2.2 Utilize the concept of definite integration to find mean value of the function. 2.3. 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.
<b>Unit 3: Complex Number</b>	3.1. Solve given problems based on complex number. 3.2 Solve examples on complex number using De Moivre's theorem 3.3 Find roots of complex number.	3.1 Cartesian, polar and exponential form of a complex number. 3.2 Algebra of complex number. 3.3 De Moivre's theorem 3.4 General form of complex number

## 7. 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	04	12	08	16(24)
II	Definite Integrals	09	02	08	08	12(18)
III	Complex number	14	06	04	08	12(18)
<b>Total</b>		<b>32</b>	<b>12</b>	<b>24</b>	<b>24</b>	<b>40(60)</b>

## 8. 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 with the use of free tutorials available on internet.
- Use graphical software's: EXCEL, DPLLOT and GRAPH for related topics.
- Use MathCAD as Mathematical Tool and solve the problems on Calculus.
- Identify problems based on applications of differential equations and solve these problems.

## 9. 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/sub topics.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
- Use Flash/Animations to explain various components, operation
- Teacher should ask the students to go through instruction and Technical manuals

## 10. SUGGESTED MICRO-PROJECTS (Only for Class Declaration Courses)

**Only one micro-project** is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be *individually* undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. 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. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty: N.A.

## 11. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Higher Engineering Mathematics	Grewal B.S	Khanna Publications, New Delhi
2	A Text Book of Engineering Mathematics	Dutta D	New Age Publications, New Delhi
3	Mathematics for Polytechnic students	S.P. Deshpande	Pune Vidyarthi Griha Prakashan
4	Advance Engineering Mathematics	H.K. Das	S. Chand & Co. Ltd. Delhi
5	Advance Engineering Mathematics	Krezig, Ervin	Wiley Publications New Dehli.

## 12. SOFTWARE/LEARNING WEBSITES

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

### 13. PO - COMPETENCY- CO MAPPING

#### (A) Program Outcomes(POs)

(What s/he will continue to do at the entry point of industry soon after the diploma Programme)

**1. Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the Electronics and Telecommunication related engineering problems.

**2. Problem analysis:** Identify and analyze well-defined Electronics and Telecommunication related engineering problems using codified standard methods.

**3. Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs in Electronics and Telecommunication engineering.

**4. Engineering Tools, Experimentation and Testing:** Apply modern Electronics and Telecommunication engineering tools and appropriate technique to conduct standard tests and measurements.

**5. Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.

**6. Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities in diverse and multidisciplinary fields.

**7. Life-long learning:** Ability to analyze individual needs and engage in updating in the context of technological changes in Electronics and Telecommunication engineering.

#### (B) Program Specific Outcomes (PSOs)-

Student will able to

**PSO1:** Work for testing, installation, operation and maintenance of various Electronics and Telecommunication equipment.

**PSO2:** Work in automation and power system to solve practical problems in the field of Electronics and Telecommunication Engineering and cope up with changing technology.

**PSO3:** Design, estimate and execute Electronics and Telecommunication installation and work as entrepreneur and /or exhibit project management skills working in a team.

#### (C) COURSE OUTCOMES-

COURSE NAME	COURSE OUTCOMES(CO)
<b>ADVANCED MATHEMATICS III</b> (SC 2104 )	a. Solve the given problems of integration using suitable methods.
	b. Apply the concept of integration to find Mean and Root Mean Square value.
	c. Using the general form of Complex number find the all roots of complex number

Name of Course: **ADVANCED MATHEMATICS III**

Course Code: SC-2104

Semester: III

CO-PO Matrices of course

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>
<u>1</u>	2	2	1	-	-	-	1
<u>2</u>	3	3	1	-	-	1	2
<u>3</u>	3	3	-	1	-	-	1
<u>AVERAGE</u>	2.6	2.6	0.6	0.33	-	0.16	<u>1.17</u>

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

CO-PSO Matrices of course

CO	PSO1	PSO2	PSO3
1	-	-	-
2	1	-	-
3	1	-	-
Averag	0.6	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

PREPARED BY:

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4.		Consultant from Industry	
5.		Faculty from nearby Institute	
6.		R.B.T.E.Representative	

14.Question Paper Profile for theory paper :

T= Unit/Topic Number

L= Level of Question

M = Marks

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
<b>01</b>	1	R	2	1	R	2	2	R	2	3	R	2	3	R	2	3	R	2	<b>04/06</b>
<b>02</b>	1	U	4	1	U	4	1	U	4	1	A	4	1	A	4	3	A	4	<b>04/06</b>
<b>03</b>	2	U	4	2	U	4	2	A	4	2	A	4	3	U	4	3	A	4	<b>04/06</b>

R-Remember

U-Understand

A-Analyze/ Apply