Format No. QSP/7.1/01.F01 (B)

Issue No.04 Rev. No 5 Dated: June 2, 2016

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

College of Engineering Studies

Dehradun

COURSE PLAN

Programme : B. Tech. (All SoCSE Branches)

Course : Mathematics-I

Subject Code : MATH-1002

No. of Credits : 4

Semester : I

Session : July 2017-December 2017

Batch : 2017-2021

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A. PREREQUISITE:

Basic Knowledge of Differentiation and Integration, Mathematical Logic, Matrices and Algebra.

B. PROGRAM OUTCOMES (POs) :

PO1. Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2. Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.

PO4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5. Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

PO8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. COURSE OUTCOMES: At the end of this course student should be able to

CO1. Develop an understanding of differential calculus, multiple integrals and connect them to the applied problems from other disciplines.

CO2. Model the real life problems using the concepts of mathematical logic.

CO3. Develop an understanding of the fundamental concepts of matrices and solution of a system of linear equations by rank method and its application in real life problems.

CO4. Demonstrate a working knowledge of fundamental algebraic structures (e.g., groups, rings and fields).

Table: Correlation of POs v/s COs

PO & CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	-	-	1	-	-	-	-	-	-	-
CO2	3	1	-	-	1	-	-	-	-	-	-	-
CO3	3	1	-	-	1	-	-	-	-	-	-	-
CO4	3	1	-	-	1	-	-	-	-	-	-	-

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

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D. PEDAGOGY

- White board and marker

E. COURSE COMPLETION PLAN

Total Class Room Sessions	42
Total Class Tests	04
Total Assignments	04
Total Tutorial Sheets	04

One Session =60 minutes

F. EVALUATION & GRADING

Student's performance will be evaluated based on the following three components:

F1. Internal Assessment - 30%
F2. Mid-term Examination - 20%
F3. End-term Examination - 50%

F1. INTERNAL ASSESSMENT: WEIGHTAGE – 30%

Internal Assessment shall be done based on the following:

S. No.	Description	% of Weightage out of 30%
1.	Common Class Tests	50%
2.	Assignments/Tutorials (Problems/Presentations)	40%
3.	Attendance and Discipline in the Class	10%

Internal Assessment Record Sheet (including Mid Term Examination marks) *will be displayed online at the end of semester i.e. last week of regular classroom teaching.*

F1.1. CLASS TESTS: Four common class tests will be held through blackboard; two common class tests before the mid-term examination and two common class tests after the mid-term examination. Dates and timings will be intimated from time to time and those who do not appear in tests examinations shall lose their marks.

The marks obtained by the students will be displayed on Blackboard a week before the start of mid-term and end-term examinations respectively.

F1.2. ASSIGNMENTS/ TUTORIALS: Assignments and tutorial sheets will be provided for the individual units. During the tutorial sessions, the students will work on the problems from these sheets. Based on the performance, marks shall be awarded and those who do not attend the tutorial classes shall lose their marks.

F1.3. GENERAL DISCIPLINE: Based on student's regularity, punctuality, sincerity and behavior in the class.
The marks obtained by the students will be displayed on Blackboard at the end of semester.

F2. MID-TERM EXAMINATION: WEIGHTAGE – 20%
Mid Term examination shall be Two Hours duration and shall be a combination of Short and Long theory/ Numerical Questions.

Date of showing mid-term examination answer sheets: approximately within 10 days after the completion of mid-term examination.

F3. END-TERM EXAMINATION: WEIGHTAGE – 50%
End-term examination shall be three hours duration and shall be a combination of short and long theory/numerical questions.

Date of showing end-term examination answer sheets: approximately within three weeks after the completion of end-term examination.

GRADING:

The overall marks obtained at the end of the semester comprising all the above three mentioned components shall be converted to a grade.

G. COURSE DELIVERY PLAN

Topics	No. of Lectures	Course outcomes addressed	Assignment(s) sheets/ Tutorial(s) sheets
Unit I: Differential Calculus and Multiple Integrals			
1. Higher order derivatives, successive differentiation, Leibnitz's theorem	3		
2. Introduction to partial differentiation	1	**CO 1**	

3. Euler's theorem	2		**Assignment sheet – 1** **Tutorial sheet – 1**
4. Jacobians	1		
5. Maxima and minima	1		
6. Double integrals	2		
7. Change of order of integration	1		
8. Change of variables	1		
9. Triple integrals	2		
10. Applications of double and triple integrals (area, volume, centre of gravity and moment of inertia)	2		
Unit-II: Mathematical Logic			
1. Proposition, logical connectives	1	**CO 2**	**Assignment sheet –2** **Tutorial sheet – 2**
2. Truth tables, tautology, contradiction	1		
3. Normal forms (conjunctive and disjunctive)	1		
4. Converse, inverse, contrapositive	1		
5. Validity of an argument	1		
6. Universal and existential quantifiers	1		
Unit III: Matrices			
1. Linear independence/dependence of vectors, rank of a matrix	2	**CO 3**	**Assignment sheet –3** **Tutorial sheet – 3**
2. Consistency of system of linear equations and its solution	2		
3. Eigen values and Eigen vectors	2		
4. Cayley-Hamilton theorem	1		
5. Diagonalization	2		
Unit IV: Algebraic Structures			
1. Semi group, monoid, group, abelian group-definitions and properties	2	**CO 4**	**Assignment sheet –4** **Tutorial sheet – 4**
2. Subgroup, cyclic group	1		
3. Cosets, Lagrange's theorem	1		
4. Permutation group, alternating group	2		
5. Normal subgroup	1		
6. Homomorphism and isomorphism of groups	2		
7. Rings, integral domains and fields	2		

H. SUGGESTED READINGS

H1. TEXT BOOKS

1. E. Kreyszig, Advanced Engineering Mathematics, 10 ed., Wiley Publications, 2015.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 4 ed., Narosa Publications, 2014.
3. Seymour Lipschutz and Marc Lipson, Discrete Mathematics, 3 ed., Tata Mcgraw Hill Professional, 2009.

H2. REFERENCE BOOKS

1. A. Jeffery, Advanced Engineering Mathematics, 1 ed., Academic Press, 2001.
2. M. Greenberg, Advanced Engineering Mathematics, 2 ed., Pearson, 2003.
3. B. Kolman, R. C. Busby and S. C. Ross, Discrete Mathematical Structures, 6 ed., PHI Learning, 2008.
4. I. N. Herstein, Abstract Algebra, 3rd Edition, Prentice Hall, 2008

GUIDELINES

***Cell Phones and other Electronic Communication Devices*:** Cell phones and other electronic communication devices (such as Blackberries/ Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.

E-Mail and online learning tool: Each student in the class should have an e-mail id and a pass word to access the Blackboard system regularly. Regularly, important information – Date of conducting class tests, guest lectures will be informed via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research

papers/reference material will be mailed/uploaded on online learning platform from time to time.

Attendance: Students are required to have **minimum attendance of 75%** in each subject. Students with less than said percentage shall **NOT** be allowed to appear in the end semester examination.

Course outcome assessment: To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through tests, assignments, mid-term and/or end-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which is designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the course outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.

Passing criterion: Student has to secure minimum 40% marks of the "highest marks in the class scored by a student in that subject (in that class/group class)" individually in both the 'end-semester examination' and 'total marks' in order to pass in that paper.

Sample format for Indirect Assessment of Course Outcomes

NAME:
ENROLLMENT NO*:*
SAP ID:
COURSE:
PROGRAM:

Please rate the following aspects of course outcomes of Mathematics I (MATH 1002):
Use the scale 1- 4*

Sl. No.		**1**	**2**	**3**	**4**
1.	CO1. Develop an understanding of differential calculus, multiple integrals and connect them to the applied problems from other disciplines.				
2.	CO2. Model real life problems using concepts of mathematical logic.				
3.	CO3. Develop an understanding of the fundamental concepts of matrices and solution of a system of linear equations by rank method and its application in real life problems.				
4.	CO4. Demonstrate a working knowledge of fundamental algebraic structures (e.g., groups, rings, and fields).				

* 1 Below Average 3 Good

2 Average 4 Very Good