Teerthanker Mahaveer University Moradabad

Faculty of Engineering

Department of Mathematics

Notice along with Agenda Points for "Board of Studies" Meeting

A Meeting of Board of Studies is scheduled on 21/07/2023 in the Principal Office, FoE in offline mode. Following agenda points will be discussed as follows:

1. NEP-2020-based curriculum development for 4-year B.Sc. (Hons/Hons with research) Mathematics UG program for the session of 2023-24.
2. Syllabus revision and course matrix of existing Diploma syllabus of Mathematics, B.Sc. (H) & M. Sc. Mathematics
3. Approval for the Diploma English courses

Detailed of BoS Members are as follows:

1. Prof. R. K. Dwivedi, Principal, FoE
2. Prof. Seema Sharma (External Expert)
3. Dr. Himansh Kumar (Internal Expert)
4. Dr Ajit Kumar (Head)
5. Dr Vipin Kumar
6. Dr Abhinav Saxena
7. Dr Alok Gahlot
8. Dr Narottam Singh Chauhan
9. Dr. Kamesh Kumar
10. Mr. Ashok Kumar
11. Mr. VS Rawat

With warm regards

Dr. Ajit Kumar 20/07/2023

Head, Department of Mathematics, FoE

Teerthanker Mahaveer University
Faculty of Engineering
Department of Mathematics
Minutes of Meeting- "Board of Study"

A Meeting of Board of Studies (BoS) was held on 21/07/2023 in the principal's office, FoE in offline mode. Following points have been discussed regarding the syllabus of 2023-24 onwards according to NEP-2020 & guidelines given by University for UG program- 4-year B.Sc. (Hons. /Hons. with Research) in Mathematics and existing syllabus of B.Sc. (H) and M.Sc. Mathematics program for session 2023-24.

Following members were present in meeting:

1. Prof. Seema Sharma (External Expert)
2. Dr. Himansh Kumar (Internal Expert)
3. Dr Ajit Kumar (Head)
4. Dr Vipin Kumar
5. Dr. Narottam Singh Chauhan
6. Dr Alok Gahlot
7. Dr Kamesh Kumar
8. Dr. Abhinav Saxena
9. Mr. Ashok Kumar
10. Mr. V S Rawat

Following points were discussed in the meeting:

1. Department of Mathematics suggested no change in existing syllabus of B.Sc. (H) & M.Sc.-Mathematics for the academic session 2023-24. BoS members agreed on this point.
2. According to **National Education policy-2020, Department of Higher Education, U.P. Government, Lucknow,** Department proposed the semester-wise syllabi structured of UG program- 4-year B.Sc. (Hons. /Hons. with Research) in Mathematics for the academic session 2023-24. Experts and BoS members appreciate the syllabus and recommended for the same. **(Annexure-I)**. BoS members agreed and recommended for this point.
3. BoS recommended the revised syllabus of Mathematics (DIP111-Applied Mathematics-I & DIP201-Applied Mathematics-II) for Diploma Program.
4. Dr. Sandeep Verma, Head, Department of Humanities has taken initiative for approval the Diploma English syllabus of TGE104- English Communication-I & TGE204-English Communication-II. Ms. Indu Tripathi has presented the syllabus for same. BoS recommended the revised syllabus of English for Diploma Program.

5. Summary of added, deleted & revision course:

S. No	Name & code of the courses added	Name & code of the courses deleted	Name & code of the courses where revision is not more than20%	Name of the stakeholder from where the inputs have been received	Need /rationale to justify the revision
1	DIP104-English Communication-I	DIP103-English Communication-I		Faculty, students, external and academic Professionals	Contents has reduced & modified at per the difficulty level
2	DIP204-English Communication-II	-		Faculty, students and academic professionals	Contents has reduced & modified at per the difficulty level
3			DIP111-Applied Mathematics-I	Faculty, students and academic professionals	Contents has reduced & modified at per the difficulty level
4			DIP201- Applied Mathematics-II	Faculty, students and academic professionals	Contents has reduced & modified at per the difficulty level

The meeting ended with a vote of Thanks.

Head

Department of Mathematics

Course Code: TGE104	Ability Enhancement Compulsory Course **English Communication – I**	L-1 T-0 P-2 C-2
Course Outcomes	**On completion of the course, the students will be:**	
CO1.	Understanding the basics of English communication	
CO2.	Understanding the basics of listening skills	
CO3.	Applying rules of grammar in sentence construction.	
CO4.	Drafting application on common issues	
CO5.	Demonstrating effective speaking skills	
Course Content:		
Unit-1:	**Basics of Communication:** Meaning of Communication; Importance of English Communication; Process of Communication; Types of Communication: Verbal Communication, Non-Verbal Communication; Strategies for Effective Communication: 7 C's of Communication; Barriers to Communication	**08**
Unit-2:	**Functional Grammar:** Sentence Construction: Subject and Predicate; Tense: Present, Past and Future; Common Errors in Sentences; Vocabulary Building: Synonyms, Antonyms	**10**
Unit-3:	**Listening Skills:** Meaning; Difference between Listening & Hearing, Importance of Listening; Types of Listening; Process of Listening; Strategies for Effective Listening; Barriers to Listening; Listening TED talks and speeches of eminent speakers	**06**
Unit - 4	**Speaking Skills:** Art of Public Speaking, Short Speeches for JAM (Just a Minute) Session: Describing Pictures, Places, Situations, Scenes;	**08**
Unit - 5	**Writing Skills:** Writing Application on Common Issues	**08**
Reference Books:	1. Kumar, Sanjay. &Pushp Lata. "Communication Skills" New Delhi: Oxford University Press. 2. Nesfield J.C. "English Grammar Composition & Usage" Macmillan Publishers 3. Agrawal, Malti "Professional Communication" Krishna Prakashan Media (P) Ltd. Meerut. 4. Wren & Martin "High School English Grammar and Composition" S.Chand&Co.Ltd., New Delhi. 5. Joseph, Dr C.J. & Myall E.G. "A Comprehensive Grammar of Current English" Inter University Press, Delhi 6. Chaudhary Sarla "Basic Concept of Professional Communication" Dhanpat Rai Publication, New Delhi 7. Taylor Grant, English Conversation Practice, Tata McGraw Hill New Delhi. 8. Bansal, R.K. and J.B. Harrison, Spoken English, Orient Longman, New Delhi	

DR. SANDEEP VERMA

Indu Tripathi.

	9. Sethi J & Dhamija P.V., A Course in Phonetics and Spoken English, Prentice Hall of India, New Delhi. 1989

Evaluation Scheme

Internal Evaluation (40 marks)			External Evaluation (60 marks)	
20 marks	10 marks	10 marks	20 marks	40 marks
Best two CTs	Assignment (Oral)	Attendance	Viva-voce*	Written

***Parameters of viva**

Knowledge of frequently asked questions	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 marks

Note- 1- External Viva-voce will be coordinated by concerned faculty.
2- The viva-voce will be carried out by one external examiner assigned by university exam cell.

DR. SANDEEP VERMA

Course Code: TGE204	Ability Enhancement Compulsory Course **English Communication – II**	L-1 T-0 P-2 C-2
Course Outcomes	**On completion of the course, the students will be:**	
CO1.	Understanding the mechanics of writing.	
CO2.	Understanding the basics of reading comprehension.	
CO3.	Applying rules of grammar in sentence construction and paragraph writing	
CO4.	Drafting different types of report	
CO5.	Demonstrating presentation skills	
Course Content:		
Unit-1:	**Functional Grammar:** Synthesis of Sentences: Simple, Compound and Complex Sentences; Vocabulary Building: Prefixes, Suffixes	**12**
Unit-2:	**Technical Communication:** Report Writing: Features of a good Report, Significance of Report Writing, Types of Report, Format and Structure of Report, Steps towards Report Writing	**06**
Unit-3:	**Presentation Strategies:** Planning, Preparation, Delivery; Defining Purpose, Organizing Content, Audience, Locale, Using Audio-Visual Aids, 5Ps of Voice Dynamics; 5Ws & 1H of Presentation;	**10**
Unit - 4	**Reading Comprehension:** Meaning of Reading Comprehension, Strategies of Reading Comprehension: 4Ss of Reading Comprehension; Reading Comprehension of Short Passages	**06**
Unit - 5	**Mechanics of Writing:** Paragraph Writing: Meaning, Structure, Essentials of a good Paragraph; Methods of developing a Paragraph.	**06**
Reference Books:	1. Kumar, Sanjay. &Pushp Lata. "Communication Skills" New Delhi: Oxford University Press. 2. Nesfield J.C. "English Grammar Composition & Usage" Macmillan Publishers 3. Agrawal, Malti "Professional Communication" Krishna Prakashan Media (P) Ltd. Meerut. 4. Wren & Martin "High School English Grammar and Composition" S.Chand&Co.Ltd., New Delhi. 5. Joseph, Dr C.J. & Myall E.G. "A Comprehensive Grammar of Current English" Inter University Press, Delhi 6. Chaudhary Sarla "Basic Concept of Professional Communication" Dhanpat Rai Publication, New Delhi 7. Bansal, R.K. and J.B. Harrison, Spoken English, Orient Longman, New Delhi 8. Sethi J & Dhamija P.V., A Course in Phonetics and Spoken English, Prentice Hall of India, New Delhi. 1989	

DR. SANDEEP VERMA

Evaluation Scheme

Internal Evaluation (40 marks)			External Evaluation (60 marks)	
20 marks	10 marks	10 marks	20 marks	40 marks
Best two CTs	Assignment (Oral)	Attendance	Viva-voce*	Written

***Parameters of viva**

Knowledge of frequently asked questions	Body Language	Communication skills	Confidence	**TOTAL**
05 Marks	05 Marks	05 Marks	05 Marks	**20 marks**

Note- 1- External Viva-voce will be coordinated by concerned faculty.
2- The viva-voce will be carried out by one external examiner assigned by university exam cell.

DR. SANDEEP VERMA

Course Code: DIP111	Diploma in Engineering - Semester-I **Applied Mathematics – I**	L-4 T-0 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the concepts of Arithmetic progression, Geometric progression & binomial theorem.	
CO2.	Understanding the concepts of Determinants, vector algebra, Complex Number and Co – ordinate Geometry.	
CO3.	Applying the concept of Arithmetic progression, Geometric progression & binomial theorem in real life situation.	
CO4.	Applying the concept of Determinants, vector algebra, & Complex Number in solving simple and identified engineering problems.	
CO5.	Applying the concept of Co – ordinate Geometry to understand 2 – D & 3 – D objects.	
Course Content:		
Foundation Course – Not for Grading	**Number system:** Rational numbers, Laws of exponents for real numbers. **Polynomials:** Polynomials of one variable, factorization of polynomials Algebraic identities. **L.C.M.:** Prime factorization, L.C.M. of two numbers, L.C.M. of three numbers. **Linear equations in two variables:** Graph of a linear equation in two variables, Equations of lines parallel to x axis and y axis.	**8 Hours**
Unit-1:	**Arithmetic Progression-** Identification of an A.P., n^{th} term, Sum to n terms, Arithmetic mean. **Geometric Progression-** Identification of a G.P., n^{th} term, Sum to n terms, Sum to infinite terms Geometric mean.	**8 Hours**
Unit-2:	**Determinants:** Elementary properties of determinants of order 2 and 3, Consistency of equations by Crammer's rule of non-homogeneous and homogeneous system of linear equations.	**8 Hours**
Unit-3:	**Vector Algebra:** Definition and types of vectors, addition and subtraction of vectors. Dot and Cross product of two vectors, Scalar and vector triple products.	**8 Hours**
Unit-4:	**Complex Numbers:** Definition of complex number, conjugate of complex numbers, addition, subtraction, multiplication and division of complex numbers, rationalization, modulus and amplitude, polar form, square root.	**8 Hours**
Unit-5:	**Straight line:** General equation, different forms of straight lines, angle between two lines, shortest distance. **Sphere:** General equation, centre and radius of a sphere, equation of a sphere passing through three points, Equation of sphere whose ends of diameter are given.	**8 Hours**
Text Books:	1. Luthra, H.R., Applied Mathematics-I, Bharat Bharati Prakashan & Co., Meerut.	
Reference Books:	1. Sharma, R D, Applied Mathematics, Dhanpat Rai Publications. 2. Grewal B S, Elementary Engineering Mathematics, Khanna Publication. *** Latest editions of all the suggested books are recommended.**	

Course Code: DIP201	Diploma in Engineering - Semester-II **Applied Mathematics – II**	L-4 T-0 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding of function and test for their continuity & differentiability.	
CO2.	Understanding of Differential and Integral calculus.	
CO3.	Applying differentiation to find velocity, acceleration, maximum and minimum.	
CO4.	Applying Integration to find areas bounded by simple curves.	
CO5.	Applying mathematical tool to understand engineering principles and concept.	
Course Content:		
Unit-1:	**Function:** Definition of function with examples, different types of functions and domain & range of algebraic function. Limits (left hand limit, right hand limit) of functions. Continuity of functions.	**8 Hours**
Unit-2:	**Differential Calculus:** Definition of derivative, elementary formulae of differentiation, product rule, division rule, Methods of finding derivative-function of a function, logarithmic differentiation, differentiation of implicit functions.	**8 Hours**
Unit-3:	**Application of Differentiation:** Finding increasing/decreasing functions, velocity, acceleration with the help of differentiation, Finding tangent and normal to the different curves.	**8 Hours**
Unit-4:	**Integral Calculus:** Definition of integration, elementary formula of integration. Methods of Integration: Integration by substitution, Integration by parts and Integration by partial fraction.	**8 Hours**
Unit-5:	**Application of Integration:** Length of simple curves, Trapezoidal Rule, Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$: their application in simple cases (algebraic function only).	**8 Hours**
Text Books:	1. Luthra, H.R., Applied Mathematics-I, Bharat Bharati Prakashan & Co., Meerut.	
Reference Books:	1. Sharma, R D, Applied Mathematics, Dhanpat Rai Publications. 2. Grewal B S, Elementary Engineering Mathematics, Khanna Publication. 3. Sinha Dr. K, Applied Mathematics-I, BBP Publications Pvt, Ltd., Meerut. *** Latest editions of all the suggested books are recommended.**	

तीर्थंकर महावीर विश्वविद्यालय
Teerthanker Mahaveer University
An Ultimate Destination for World Class Education

Faculty of Engineering

Attendance Sheet for BoS

Date: 21/07/2023

Department of Mathematics
Attendance Sheet

S. No.	External Expert/Chairperson/Faculty Name	Designation	Signature
1	Prof. Seema Sharma	Professor	
2	Dr. Ajit Kumar	HoD	
3	Dr. Himansh Kumar	External expert of other department	
4	Dr. Vipin Kumar	Associate Professor	
5	Dr. Kamesh Kumar	Assistant Professor	
6	Dr. Abhinav Saxena	Associate Professor	
7	Dr. Alok Kumar Gahlot	Assistant Professor	
8	Dr. Narottam Singh Chauhan	Assistant Professor	
9	Mr. Ashok Kumar	Assistant Professor	
10	Mr. V S Rawat	Assistant Professor	
11.	Prof. Sandeep Verma	Humanities, Head	
12.	Ms. Indu Tripathi	Assistant Prof., HU	

Study & Evaluation Scheme

of

Master of Science (Mathematics)

[Applicable for Academic Session 2023-24]

[As per CBCS guidelines given by UGC]

Accredited with NAAC A Grade

12-B Status from UGC

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

TEERTHANKER MAHAVEER UNIVERSITY
(Established under Govt. of U.P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P.)

Study & Evaluation Scheme	
SUMMARY	
Institute Name	*Faculty of Engineering*
Programme	*M.Sc. Mathematics*
Duration	*Two Years full time (Four Semesters)*
Medium	*English*
Minimum Required Attendance	*75%*
Credits	
Maximum Credits	*95*
Minimum Credits Required for Degree	*92*

Assessment:

Evaluation	Internal	External	Total
Theory	40	60	100
Practical/ Dissertations/ Project Reports/ Viva-Voce	50	50	100

Class Test-1	Class Test-2	Class Test-3	Assignment(s)	Attendance& Participation	Total
Best two out of three					
10	10	10	10	10	40

Duration of Examination	External	Internal
	3 Hours	1.5 Hours

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers' continuous evaluation. (i.e., both internal and external). A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

 # Provision for delivery of 25% content through online mode.

 # Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.

 # Maximum no of years required to complete the program: N+2 (N=No of years for program)

Question Paper Structure	
1	*The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.*
2	*Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.*
3	*The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.*

IMPORTANT NOTES:	
1	*The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to of attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember, Understand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy).*
2	*Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.*
3	*There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.*

Program Structure-M.Sc. Mathematics

A. Introduction:

M.Sc. Mathematics is a two-year post-graduate programme designed to extend students' knowledge and refine their abilities to solve complex problems accurately. M.Sc. Mathematics introduces students to a wide choice of modules in interesting areas such as Abstract Algebra, Real Analysis, Complex Analysis, Topology, Operation research, graph theory & number theory etc. This programme also gives an opportunity for students to conduct independent researches in pure to applied mathematics. Besides the programme, focuses on propelling students' numeracy skills and the ability to use mathematical concepts to the model the solution to mathematical problems. The programme also enables the students to develop the ability to consolidate and communicate mathematics logically and briefly in a variety of forms. Students who want to pursue higher education in the field of Mathematics can opt for PhD in the same discipline.

The programme structure and credits for M.Sc. are finalized based on the stakeholders' requirements and general structure of the programme. Minimum number of classrooms contact teaching credits for the M.Sc. program will be 95 credits (one credit equals 1.0 hour) and Project will be of 07 credits. The minimum number of the credits for award of M.Sc. degree will be 92 credits. Out of 88 credits of classroom contact teaching, 55 credits are to be allotted for core courses (CC), 06 credits are allotted to Ability-Enhancement Compulsory Course (AECC), 02 credits are allotted to Skill-Enhancement Compulsory Course (SECC), 05 credits are allotted to Generic Elective Course (GEC), 15 credits are allotted to Program/Discipline Specific Elective Course (DSEC), 04 credits are allotted to Skill-Enhancement Course (SEC), 01 credits are allotted to Laboratory Course (LC). Credits distribution is given below in tabular form:

M.Sc. Mathematics: Two-Year (4-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S. No.	**Type of Course**	**Credit Hours**	**Total Credits**
1	Core Course (CC)	7 Courses of 5 Credits each (Total Credit Hrs. 7X5) 5 Courses of 4 Credits each (Total Credit Hrs. 5X4)	55
2	Ability-Enhancement Compulsory Course (AECC)	2 Courses of 3 Credits each (Total Credit Hrs. 2X3)	06
3	Skill-Enhancement Compulsory Course (SECC)	1 Courses of 2 Credits each (Total Credit Hrs. 1X2)	02
4	Generic Elective Course (GEC)	1 Courses of 4 Credits each (Total Credit Hrs. 1X4) 1 Courses of 1 Credits each (Total Credit Hrs. 1X1)	05
5	Program/Discipline Specific Elective Course (DSEC)	3 Courses of 5 Credits each (Total Credit Hrs. 3X5)	15
6	Skill-Enhancement Course (SEC)	4 Courses of 1 Credits each (Total Credit Hrs. 4X1)	04
8	PROJ-Viva Voce	1 Courses of 2 Credits each (Total Credit Hrs. 1X2) 1 Courses of 5 Credits each (Total Credit Hrs. 1X5)	07
9	LC (Laboratory Courses)	1 Courses of 1 Credits each (Total Credit Hrs. 1X1)	01
10	MOOC-Optional (credits will consider only in case a student fails to secure minimum required credits for the award of degree)	As per approval from Hon'ble Vice chancellor	
Total Credits			**95**

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our university.

The following is the course module designed for the M.Sc. program:

- ***Core competency:*** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. We are offered core course in all semesters like operation research, Differential Equation, Real Analysis, Topology, Number Theory etc with the 4 & 5 credit of each.

- ***Program/Discipline Specific Elective Course (DSEC):*** A Post graduate student is expected to be capable of demonstrating comprehensive knowledge and understanding of both theoretical and experimental/applied mathematics knowledge in various fields of interest like Statistics Software & Tools, Numerical Techniques & its lab etc.

- ***Skilled communicator:*** The course curriculum incorporates basics and advanced training in order to make a post graduate student capable of expressing the subject through technical writing as well as through oral presentation.

- ***Critical thinker and problem solver:*** The course curriculum also includes components that can be helpful to post graduate students to develop critical thinking ability by way of solving problems/numerical using basic &advance knowledge and concepts of mathematics.

- ***Sense of inquiry:*** It is expected that the course curriculum will develop an inquisitive characteristic among the students through appropriate questions, planning and reporting experimental investigation.

- ***Skilled project manager:*** The course curriculum has been designed in such a manner as to enabling a post graduate student to become a skilled project manager by acquiring knowledge about mathematical project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.

- ***Ethical awareness/reasoning:*** A post graduate student requires understanding and developing ethical awareness/reasoning which the course curriculums adequately provide.

- ***Lifelong learner:*** The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.

- ***Skill Enhancement Course (SEC):*** Skill enhancement Course is a credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general

reasoning ability for a better performance, as desired in corporate world. There shall be Two courses of Aptitude in Semester I, II semesters and two courses of Soft Skills in I&II Semesters and will carry credit.

- ***Skill Enhancement Compulsory Course:*** This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

C. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of two-years M.Sc. Mathematics:

PSO – 1	**Understanding** the skills set required in industries, laboratories, Banks, Insurance Companies, Educational/Research institutions, administrative positions.
PSO – 2	**Applying** the knowledge for Professional Growth: Keep on discovering new avenues in the chosen field and exploring areas that remain conducive for research and development.
PSO – 3	**Applying** Skills like time management, crisis management, stress interviews and working as a team for successful career.
PSO – 4	**Analyzing the** problems by using problem solving skills and apply them independently to problems in pure and applied mathematics.
PSO – 5	**Evaluating** quantitative models arising in social science, business and other contexts.
PSO – 6	**Creating** and applying appropriate techniques, resources and modern technology in multidisciplinary environment.

D. Pedagogy & Unique practices adopted:

"Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will **emphasize on experiential learning:**

- ***Role Play & Simulation:*** Role-play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning. Therefore, role-play& simulation exercises such as virtual share trading, marketing simulation etc. are being promoted for the practical-based experiential learning of our students.

- ***Video Based Learning (VBL)&Learning through Movies (LTM):*** These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through movies. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through VBL & LTM is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting VBL & LTM, wherever possible.

- ***Field/Live Projects:*** The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other their regular classes.

- ***Industrial Visits:*** Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

- ***MOOCs:*** Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs. University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.
  Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through only NPTEL could be given 2 credits for each MOOC course.
  For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

  a) This is recommended for every student to take at least one MOOC Course throughout the programme.
  b) There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
  c) The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 credits defined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.
  d) Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.
  e) After completion of MOOC course, Student will submit the photo copy of Completion certificate of MOOC Course to the Examination cell as proof.
  f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.
  g) College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.

- ***Special Guest Lectures (SGL) &Extra Mural Lectures (EML):*** Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of

the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

- ***Student Development Programs (SDP):*** Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

- ***Industry Focused programes:*** Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses are to be delivered by industry experts to provide practice-based insight to the students.

- ***Special assistance programe for slow learners & fast learners:*** write the note how would you identify slow learners, develop the mechanism to correcting knowledge gap. Terms of advance topics what learning challenging it will be provided to the fast learners.

- ***Induction program:*** Every year 3 weeks induction program is organized for 1st year students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.

- **Mentoring scheme:** There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.

- **Extra-curricular Activities:** organizing& participation in extracurricular activities will be mandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.

- **Career & Personal Counseling:** - Identifies the problem of student as early as possible and gives time to discuss their problems individually as well as with the parents. Counseling enables the students to focus on behavior and feelings with a goal to facilitate positive change.
  Its major role lies in giving: Advice, Help, Support, Tips, Assistance, and Guidance.
  Strategies: a) Once in a week the counselors meet the students in order to inquire about problems. b) Available 24x7 on SOS basis.
- **Participation in Workshops, Seminars & writing & Presenting Papers:** Departments plan to organize the workshops, Seminars & Guest lecturers time to time on their respective topics as per academic calendar. Students must have to attend these programs. This participation would be count in the marks of general Discipline & General Proficiency which is the part of course scheme as noncredit course.
- **Formation of Student Clubs, Membership & Organizing & Participating events:** Every department has the departmental clubs with the specific club's name. The entire student's activity would be performed by the club. One faculty would be the coordinator of the student clubs & students would be the members with different responsibility.

- **Capability Enhancement & Development Schemes:** The Institute has these schemes to enhance the capability and holistic development of the students. Following measures/ initiatives are taken up from time to time for the same: Career Counseling, Soft skill development, Remedial Coaching, Bridge Course, Language Lab, Yoga and Meditation, Personal Counseling

- **Library Visit & Utilization of E-Learning Resources:** Student can visit the library from morning 10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.
  - **a)** Institute Library & Information is subscribing online e-books and e-journals databases (DELNET and EBSCO host E-databases) as per the requirement of the institute and fulfilling AICTE norms. IP based access is given to all computers connected on campus LAN to access e-journals.
  - **b)** For the effective utilization of resources, Information Literacy training programs are conducted to the staff and students.
  - **c)** Wi-Fi enabled campus
  - **d)** Regular addition of latest books and journals
  - **e)** Well maintained e-library to access e-resources

Study & Evaluation Scheme

M.Sc. (Mathematics)-Semester I

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Tota
1	CC-1	MAT111	Differential Equations	4	1	-	5	40	60	100
2	CC-2	MAT112	Real Analysis	4	-	-	4	40	60	100
3	CC-3	MAT113	Linear Algebra	4	-	-	4	40	60	100
4	AECC-1	MAT115	Research Methodology	3	-	-	3	40	60	100
5	GEC-1		Generic Elective Course: Generic Elective-I	3	1	-	4	40	60	100
6	GEC-2		Generic Elective Course (Lab): Generic Elective-II	-	-	2	1	50	50	100
7	SEC-1	TPC105	Advance Arithmetic & Reasoning	-	-	2	1	50	50	100
8	SEC-2	TPC102	Self Development of Scientists	-	-	2	1	50	50	100
9	DGP-1	MGP111	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**18**	**2**	**6**	**23**	**450**	**450**	**900**

M.Sc. (Mathematics)-Semester II

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-4	MAT211	Complex Analysis	4	-	-	4	40	60	100
2	CC-5	MAT212	Advance Abstract Algebra	4	1	-	5	40	60	100
3	CC-6	MAT213	Numerical Techniques	4	1	-	5	40	60	100
4	CC-7	MAT214	Topology	4	-	-	4	40	60	100
5	CC-8	MAT215	Operations Research	4	1	-	5	40	60	100
6	LC-1	MAT261	Numerical Techniques (Lab)	-	-	2	1	50	50	100
7	SEC-3	TPC205	Advance Algebra and Data Management	-	-	2	1	50	50	100
8	SEC-4	TPC202	Soft Skills for Workplace Effectiveness of Scientists	-	-	2	1	50	50	100
9	DGP-2	MGP211	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**20**	**3**	**6**	**26**	**450**	**450**	**900**

MOOC Course:

1	MOOC-1	MOOC12	MOOC Program –I (Optional)	-	-	-	2	-	100	100

M.Sc. (Mathematics)-Semester III

S. No	Category	Course Code	Course		Periods			Credit	Evaluation Scheme		
					L	T	P		Internal	External	Total
1	CC-9	MAT311	Functional Analysis		4	-	-	4	40	60	100
2	CC-10	MAT316	Advanced Partial Differential Equations		4	1	-	5	40	60	100
3	AECC-2	MHM320	Human values & Professional Ethics		3	-	-	3	40	60	100
4	DSEC-1		Discipline Specific Elective Courses	Discipline Specific Elective Course-I	4	1	-	5	40	60	100
5	DSEC-2			Discipline Specific Elective Course-II	4	1	-	5	40	60	100
6	PROJ-1	MAT392	Industrial Training & Presentation		-	-	4	2	50	50	100
7	DGP-3	MGP311	Discipline & General Proficiency		-	-	-	-	100	-	100
			Total		**19**	**3**	**4**	**24**	**350**	**350**	**700**

MOOC Course:

1	MOOC-2	MOOC13	MOOC Program –II (Optional)	-	-	-	2	-	100	100

M.Sc. (Mathematics)-Semester IV

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC-11	MAT411	Number Theory	4	1	-	5	40	60	100
2	CC-12	MAT412	Advance Discrete Mathematics	4	1	-	5	40	60	100
3	DSEC-3		Discipline Specific Elective Courses: Discipline Specific Elective Course-III	4	1	-	5	40	60	100
4	SECC-1	MAT461	MATLAB Programming	-	1	2	2	50	50	100
5	PROJ-2	MAT492	Project	1	-	8	5	50	50	100
6	DGP-4	MGP411	Discipline & General Proficiency	-	-	-	-	100	-	100
			Total	**13**	**4**	**10**	**22**	**320**	**280**	**600**

ELECTIVE COURSES OFFERED

S. No	Code	Course	L	T	P	Credit
		Semester I - Generic Elective I				
1	MAT116	Computer System & Programming in C++	3	1	0	4
		Semester I- Generic Elective II (Lab)				
2	MAT161	Computer System & Programming in C++ (Lab)	-	-	2	1
		Semester III-Discipline Specific Elective Course-I - (Any one)				
3	MAT314	Graph Theory	4	1	0	5
4	MSC014	Database Management System	4	1	0	5
		Semester III-Discipline Specific Elective Course-II - (Any one)				
5	MAT315	Probability & Mathematical Statistics	4	1	0	5
6	MSC013	Statistical Techniques in Data Mining	4	1	0	5
		Semester IV-Discipline Specific Elective Course-III - (Any one)				
7	MAT414	Fuzzy sets & its application	4	1	0	5
8	MAT415	Calculus of variations and Integral Equation	4	1	0	5