Evaluation Scheme & Syllabus

for
All Branches of B. Tech.

AS PER AICTE MODEL CURRICULUM

Department of Mathematics

Faculty of Engineering &Technology

V.B.S. Purvanchal University, Jaunpur

B. Tech First Year (All branches) Structure in accordance with AICTE Model Curriculum
Effective W.E.F. Academic Session 2019-20

SEMESTER – I

Code	SUBJECT	PERIODS			Evaluation Scheme				End Sem		Total	credit
		L	T	P	CT	TA	TOTAL	PS	TE	PE		
KAS103	Mathematics-I	3	1	0	30	20	50	-	100	-	150	4

SEMESTER – II

Code	SUBJECT	PERIODS			Evaluation Scheme				End Sem		Total	credit
		L	T	P	CT	TA	TOTAL	PS	TE	PE		
KAS203	Mathematics-II	3	1	0	30	20	50	-	100	-	150	4

SEMESTER – III

Code	SUBJECT	PERIODS			Evaluation Scheme				End Sem		Total	credit
		L	T	P	CT	TA	TOTAL	PS	TE	PE		
KAS401	Engineering Science Course ESC] Mathematics-IV (PDE, Prob. & Stats.)	3	1	0	30	20	50	-	100	-	150	4

SEMESTER – IV

Code	SUBJECT	PERIODS			Evaluation Scheme				End Sem		Total	credit
		L	T	P	CT	TA	TOTAL	PS	TE	PE		
KAS401	Engineering Science Course ESC] Mathematics-IV (PDE, Prob. & Stats.)	3	1	0	30	20	50	-	100	-	150	4

Mathematics- IV will run in three branches of Engineering **in III semester and for remaining** three branches in IV semester. Combination of these branches will be as CSE, IT and ME; EE, ECE and EIE.

* **AICTE Guidelines in Model Curriculum:**

After successful completion of 160 credits, a student shall be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours only, if he/she completes additional university recommended courses only (Equivalent to 20 credits; NPTEL Courses of 4 Weeks, 8 Weeks and 12 Weeks shall be of 2, 3 and 4 Credits respectively) through MOOCs. For registration to MOOCs Courses, the students shall follow NPTEL Site http://nptel.ac.in/ as per the NPTEL policy and norms. The students can register for these courses through NPTEL directly as per the course offering in Odd/Even Semesters at NPTEL. These NPTEL courses (recommended by the University) may be cleared during the B. Tech degree program (not necessary one course in each semester). After successful completion of these MOOCS courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through their college of study only. The student shall be awarded Hons. Degree (on successful completion of MOOCS based 20 credit) only if he/she secures 7.50 or above CGPA and passed each subject of that Degree Programme in single attempt without any grace marks.

KAS-103 MATHEMATICS-I L 3 T 1 MAX. MARKS 100

(Common to all B. Tech. Courses and effective for admitted in July, 2019 batch of Engg.)

Module 1: Matrices [08]

Types of Matrices: Symmetric, Skew-symmetric and Orthogonal Matrices; Hermitian and Skew Hermitian Matrices, Inverse and Rank of matrix using elementary transformations, Rank-Nullity theorem; System of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its applications, Eigen values and Eigenvectors; Diagonalisation of a Matrix.

Module 2: Differential Calculus- I [08]

Introduction to limits, continuity and differentiability, Rolle's Theorem, Lagrange's Mean value theorem and Cauchy Mean value theorem, Successive Differentiation (nth order derivatives), Leibnitz theorem and its applications, Envelope, Involutes and Evolutes, Curve tracing: Cartesian and Polar co-ordinates.

Module 3: Differential Calculus-II [08]

Partial derivatives, Total derivative, Euler's Theorem for homogeneous functions, Taylor and Maclaurin's theorems for a function of one and two variables, Maxima and Minima of functions of several variables, Lagrange Method of Multipliers, Jacobians, Approximation of errors.

Module 4: Multivariable Calculus-I [08]

Multiple integration: Double integral, Triple integral, Change of order of integration, Change of variables, Applications: Areas and volumes, Center of mass and Center of gravity (Constant and variable densities).

Module 5: Vector Calculus [08]

Vector differentiation: Gradient, Curl, Divergence and their Physical interpretations, Directional derivatives, Tangent and Normal planes. Vector Integration: Line integral, Surface integral, Volume integral, Gauss's Divergence theorem, Green's theorem, Stoke's theorem (without proof) and their applications.

COURSE OUTCOMES

1. Solving linear simultaneous equations.
2. Understanding the concept of limit, continuity and differentiability and apply in the study of Rolle's, Lagrange and Cauchy mean value theorem and Leibnitz theorems.
3. Applications of partial derivatives in maxima, minima, series expansions of functions and Jacobians.
4. Evaluation of multiple integrals and their applications for finding area, volume, centre of mass and centre of gravity.
5. Familiarity with concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals.

Text Books:-

1. **B. V. Ramana**, Higher Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd., 2008.
2. **B. S. Grewal**, Higher Engineering Mathematics, Khanna Publisher, 2005.
3. **R K. Jain & S R K. Iyenger**, Advance Engineering Mathematics, Narosa Publishing House 2002.

Reference Books

1. **E. Kreyszig,** Advance Engineering Mathematics, John Wiley & Sons, 2005.
2. **Peter V. O'Neil**, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
3. **Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas**, Calculus, Eleventh Edition, Pearson.
4. **D. Poole, Linear Algebra** : A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. **Ray Wylie C and Louis C Barret,** Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.
6. **Chandrika Prasad**. Advanced Engineering Mathematics,
7. **Murray Spiegel**, Schaum's Outline of Advanced Mathematics for Engineers and Scientists

KAS 203 MATHEMATICS-II L 3 T 1 MAX MARKS 100

(Common to all B. Tech. Courses and effective for admitted in July, 2019 batch of Engg.)

Module 1: Ordinary Differential Equation of Higher Order [10]

Linear differential equation of nth order with constant coefficients, Simultaneous linear differential equations, Second order linear differential equations with variable coefficients, Solution by changing independent variable, Reduction of order, Normal form, Method of variation of parameters, Cauchy-Euler equation, Series solutions (Frobenius Method).

Module 2: Multivariable Calculus-II [08]

Improper integrals, Beta & Gama function and their properties, Dirichlet's integral and its applications, Application of definite integrals to evaluate surface areas and volume of revolutions.

Module 3: Sequences and Series [08]

Definition of Sequence and series with examples, Convergence of sequence and series, Tests for convergence of series, Fourier series, Half range Fourier sine and cosine series.

Module 4: Complex Variables – Differentiation [08]

Limit, Continuity and differentiability, Functions of complex variables, Analytic functions, Cauchy-Riemann equations (Cartesian and Polar form), Harmonic function, Analytic functions, Conformal mapping, Mobius transformation and their properties

Module 5: Complex Variables –Integration [08]

Complex integrals, Contour integrals, Cauchy- Goursat theorem, Cauchy integral formula, Taylor's series, Laurent's series, Liouvilles's theorem, Singularities, Classification of Singularities, zeros of analytic functions, Residues, Cauchy Residue theorem, Evaluation of real integrals of the type $\int_{-\infty}^{\infty} f(x)\,dx$ and $\int_0^{\pi} f(cos\theta, sin\theta)\,d\theta$.

COURSE OUTCOMES

1. Understand the concept of differentiation and apply for solving differential equations.
2. Remember the concept of definite integral and apply for evaluating surface areas and volumes.
3. Understand the concept of convergence of sequence and series. Also evaluate Fourier series
4. Illustrate the working methods of complex functions and apply for finding analytic functions.
5. Apply the complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.

Text Books:-

1. **B. V. Ramana**, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. **B. S. Grewal,** Higher Engineering Mathematics, Khanna Publisher, 2005.
3. **R. K. Jain & S. R. K. Iyenger**, Advance Engineering Mathematics , Narosa Publishing - House, 2002.

Reference Books:-

1. **E. Kreyszig**, Advance Engineering Mathematics, John Wiley & Sons, 2005.
2. **Peter V. O'Neil**, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
3. **Maurice D. Weir, Joel Hass, Frank R.Giordano, Thomas,** Calculus, Eleventh Edition, Pearson.
4. **G.B Thomas, R L Finney**, Calculus and Analytical Geometry, Ninth Edition Pearson, 2002.
5. **James Ward Brown and Ruel V Churchill,** Fourier Series and Boundary Value Problems, 8th Edition-Tata McGraw-Hill
6. **D. Poole** , Linear Algebra : A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. **Veerarajan T.**, Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
8. **Charles E Roberts Jr**, Ordinary Diffrential Equations, Application, Model and Computing, CRC Press T&F Group.
9. **James Ward Brown and Ruel V Churchill**, Complex Variables and Applications, 8th Edition, Tata McGraw-Hill.

KAS401 Mathematics-IV

Partial Differential Equations, Probability and Statistics

Module I: Partial Differential Equations

Origin of Partial Differential Equations, Linear and Nonlinear Partial Differential Equations of first order, Lagrange's Equations, Charpit's method, Cauchy's method of Characteristics, Solution of Linear Partial Differential Equation of Higher order with constant coefficients, Equations reducible to linear partial differential equations with constant coefficients.

Module II: Applications of Partial Differential Equations:

Classification of linear partial differential equation of second order, Method of separation of variables, Solution of wave and heat conduction equation up to two dimension, Laplace equation in two dimensions, Equations of Transmission lines.

Module III: Statistical Techniques I:

Introduction: Measures of central tendency, Moments, Moment generating function (MGF), Skewness, Kurtosis, Curve Fitting, Method of least squares, Fitting of straight lines, Fitting of second degree parabola, Exponential curves, Correlation and Rank correlation, Regression Analysis: Regression lines of y on x and x on y, regression coefficients, properties of regressions coefficients.

Module IV: Statistical Techniques II:

Probability and Distributions: Introduction, Addition and multiplication law of probability, Conditional probability, Baye's theorem, Random variables (Discrete and Continuous Random variables), Probability mass function and Probability density function, Expectation and variance, Discrete and Continuous Probability distribution: Binomial, Poisson and Normal distributions.

Module V: Statistical Techniques III:

Sampling and Testing of Hypothesis: Introduction, Sampling Theory (Small and Large) , Hypothesis, Null hypothesis, Alternative hypothesis, Testing a Hypothesis, Level of significance, Confidence limits, Test of significance of difference of means, Z-test, t-test and Chi-square test.

COURSE OUTCOMES

	Course Outcome (CO)	**Bloom's Knowledge Level (KL)**
	At the end of this course, the students will be able to:	
CO 1	Remember the concept of partial differential equation and to solve partial differential equations	K_1 & K_3
CO 2	Analyze the concept of partial differential equations to evaluate the problems concerned with partial differential equations	K_4 & K_5
CO 3	Understand the concept of correlation, moments, skewness and kurtosis and curve fitting	K_2
CO 4	Remember the concept of probability to evaluate probability distributions	K_1 & K_5
CO 5	Apply the concept of hypothesis testing and statistical quality control to create control charts	K_3 & K_6

K_1 –Remember, K_2 – Understand, K_3 – Apply, K_4 – Analyze, K_5 – Evaluate, K_6 – Create

Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quiz.
c. Tutorials and assignments.
d. Sessional examination.
e. Final examination.

Award of Internal/External Marks:

Assessment procedure will be as follows:

1. These will be comprehensive examinations held on-campus (Sessionals).
2. Quiz.
   a. Quiz will be of type multiple choice, fill-in-the-blanks or match the columns.
   b. Quiz will be held periodically.
3. Tutorials and assignments
   a. The assignments/home-work may be of multiple choice type or comprehensive type at least one assignment from each Module/Unit.
   b. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.
4. Final examinations.

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 .
3. S. Ross: A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. SC Gupta and VK Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Delhi

Reference Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
2. R.K. Jain and S.R.K. Iyenger: Advance Engineering Mathematics; Narosa Publishing House, New Delhi.
3. J.N. Kapur: Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.