BHAKTA KAVI NARSINH MEHTA UNIVERSITY

FACULTY OF SCIENCE

MATHEMATICS

Syllabus of B.Sc.Semester-1

According to Choice Based Credit System

Effective From June-2018

Bhakta Kavi Narsinh Mehta University

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JUNAGADH.

Syllabus of B.Sc.Semester-1
According to Choice Based Credit System
(Effective from June – 2018)

• **Programme:**	**B.Sc.**
• **Semester:**	**1**
• **Subject:**	**Mathematics**
• **Course code:**	**01 (A)**
• **Title of the course**	**Calculus.**
• **Distribution of Marks for External Examination:**	**Total → 70 Marks**
• **Distribution of Marks for Internal Examination:**	**Assignments → 10 Marks** **QUIZ test →10 Marks** **Internal exam. → 10 Marks** **Total Marks →30 Marks**
• **Credit Of The Course**	**4 Credits**

B.Sc. SEMESTER -1
MATHEMATICS PAPER 01 (A) - Theory
(CALCULUS)

UNIT 1: **[14MARKS]**

(a) **Mean Value Theorems**:
Rolle's, Lagrange's and Cauchy's mean valuetheorems and problems related to it.

(b) **Taylor's theorem &Expansions** :
Taylor's theorem (Without proof),Maclaurin's theorem(Without proof), Taylor's and Maclaurin's infinite series expansions, expansions of ***exp(x),*** $\sin x$, $\cos x$, $(1+x)^n$, $\log(1+x)$ under proper conditions.

UNIT 2: **[14MARKS]**

(a) **Indeterminate Forms**:
La 'Hospital's rules for various indeterminate forms (Without proof).
Various indeterminate forms like $\frac{0}{0}$ form, $\frac{\infty}{\infty}$ form, $0\cdot\infty$ form, $\infty-\infty$ form, 0^0 form, ∞^0 form.

(b) **Differential Equations of First Order and First Degree:**
Introduction & review of studied methods to solve first order and first degree diff. equations.
Bernaulli's diff. equation, Exact diff. equation.

UNIT 3:

[14MARKS]

(a) **Differential equations of first order and higher degree:**
Differential equations of first order and first degree solvable for x, solvable for y, solvable for p. Clairaut's&Lagrange's forms of diff. equations.

(b) Linear differential equations of higher order **with constant coefficients,** meanings of complimentary function(C.F.) & particular integral(P.I.), operator D, meaning of auxiliary equation, roots of auxiliary equation f(D)y=0, real and complex roots of auxiliary equation f(D)y=0.

UNIT-4:**Linear differential equations of higher order [14MARKS]**

Operator $\frac{1}{D}$, solution of diff. equations of the form f(D)y=X, methods to find particular integral(PI) when $X = e^{ax}, X = \sin(ax+b), X = \cos(ax+b), X = x^m, X = e^{ax}V$. Applications to LCR circuits.

UNIT-5:**Linear differential equations with variable coefficients [14MARKS]**

Homogeneous linear equation, first & second methods for finding complementary function(CF), method for finding particular integral (PI), the symbolic functions $f(\theta)$&$\frac{1}{f(\theta)}$, particular integral(PI) corresponding to a term of the formx^{α} in the second method.

*Note:

- There shall be **SIX** periods of 55 minutes per week for Mathematics-**01(A)-Theory.**
- There shall be one question paper of 70 marks & $2\frac{1}{2}$ hoursfor Mathematics**01(A)-Theory**

Format of Question Paper
(*Effective from Academic Year 2018-19 onwards*)

- There shall be FIVE questions from all five units one each of 14 marks.
- Each question will be of the following form

Question no.	(A)	Answer any one out of two (Theory Question)	07 Marks
	(B)	Answer any one out of two (Applications/Examples/Problems/Theory)	04 Marks
	(C)	Answer any three out of five (Short Answer/One word/One line/True or False/Fill up blanks)	03 Marks
		TOTAL	**14 MARKS**

Reference Books:

(1) Differential Calculus by Shanti Narayan
(2) Differential Calculus by Gorakh Prasad
(3) Integral Calculus by Shanti Narayan
(4) Integral Calculus by Gorakh Prasad
(5) Differential Equations by D. A. Murray
(6) A Text book of Calculus, S. C. Arora and Ramesh Kumar, Pitamber Publishing Company Ltd. Delhi.
(7) Calculus: Concept and Context, Second edition, By James Stewart Pitamber Publishing Company Ltd. Delhi.
(8) Calculus, By G. B. Thomas and R. L. Finney, Pearson Education, 2007.

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Syllabus of B.Sc.Semester-1
According to Choice Based Credit System
(Effective from June – 2018)

• **Programme:**	**B.Sc.**
• **Semester:**	**1**
• **Subject:**	**Mathematics**
• **Course code:**	**01 (B) (Practical)**
• **Title of the course**	**Mathematics Practical**
• **Total Marks of External Practical Examination:**	**35 Marks**
• **Total Marks of Internal Practical Examination:**	**15 Marks** **Continuous Internal Assessment of Practical Work**
• **Total Marks for Practical Examination:**	**External → 35 Marks** **Internal → 15 Marks** **Total → 50 Marks**
• **Credit Of The Course**	**2 Credits**

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B.Sc. SEMESTER - 1 (CBCS)

MATHEMATICS PAPER- 01(B) (Practical)

Mathematics Practical

[50 Marks / 3Hours]

Practical No. (1) (A) Draw the graph of $y = \sin x$ or $y = \cos x$ or $y = \tan x$.

(B) Draw the graph of $y = \sec x$ or $y = \operatorname{cosec} x$ or $y = \cot x$.

Practical No. (2) (A) Draw the graph of $y = \sin^{-1}x$ or $y = \cos^{-1}x$ or $y = \tan^{-1}x$.

(B) Draw the graph of $y = \sec^{-1}x$ or $y = \operatorname{cosec}^{-1}x$ or $y = \cot^{-1}x$.

Practical No .(3) Successive differentiation

Find n^{th} derivative of $y = \frac{x}{x^2+a^2}$ or similar type of example.

Practical No .(4) Show that the n^{th} derivative of $y = \tan^{-1} x$ is

$y_n = (-1)^{n-1} .(n-1)![\sin\{n(\frac{\pi}{2} - y)\} sin^n(\frac{\pi}{2} - y)]$

or similar type of example.

Practical No .(5) If $y = \sin mx + \cos mx$ then show that $y_n = m^n\sqrt{1 + (-1)^n \sin 2mx}$

or similar type of example.

Practical No.(6) Use reduction formula to evaluate following

(1) $\int \sin^6 x dx$, (2) $\int \cos^7 x dx$ and (3) $\int \sin^4 x \cos^4 x dx$

or similar type of example.

Practical No .(7) Use reduction formula to evaluate following

(1) $\int_0^{2a} x^2\sqrt{2ax - x^2}\,dx$, (2) $\int_0^{\infty} \frac{x^2}{(1+x^2)^{9/2}}\,dx$, (3) $\int_0^{a} x^4(a^2 - x^2)^{3/2}\,dx$

or similar type of example..

Practical No .(8) Use reduction formula to evaluate following

(1) $\int_0^{\infty} \frac{1}{(1+x^2)^3}\,dx$, (2) $\int_0^{2} \frac{x^4}{\sqrt{4-x^2}}\,dx$, (3) $\int_0^{\infty} \frac{1}{(a^2+x^2)^4}dx$

or similar type of example.

Practical No. (9) Find orthogonal trajectory of the (i) circle $x^2 + y^2 = 2ax$

(ii) parabola $y = ax^2$.

Practical No. (10) Find orthogonal trajectory of (i) $\left(\frac{dy}{dx}\right)^2 = \frac{a}{x}$

(ii) $ay^2 = x^3$.

Note:

- There shall be **SIX** periods of **1 hour** per week per batch of **15** students.
- **10** practical should be done during semester-**1.**
- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
- There shall be one question paper of **35 Marks** and **3 Hours** for external practical examination.
- There shall be 15 marks for Internal Practical Examination
  (i.e. Continuous internal assessment of performance of each student during the practical work.)
- Use of ICT tools and web resources will be appreciated for internal assessment.

Formatof Question Paper for Practical Examination:

Question 1	Answer any THREE out of FIVE	[9+9+9]=	27 Marks
Question 2	Journal and Viva:		8 Marks
	Total (External)		**35 Marks**
	Internal Practical Examination	15 Marks	
	Total		50 Marks