Ph:0863-2227649

HINDU COLLEGE, GUNTUR – 522 003

(Re-accredited by NAAC as Grade 'A' with CGPA 3.07)
Main Road, Opp. Sri Venkateswara Vignan Mandir, Guntur

HCG/Bridge Course/Mathematics/June/2019/01 15-06 - 2018

CIRCULAR

It is here by informed that Bridge Course for Mathematics will be conducted for all I B.Sc. /B.A. Mathematics combination I Semester Students as per the time table given below. The main objective of the course is to bridge the gap between subjects studied at Intermediate level and subjects they would be studying in undergraduate course, Hence all the Mathematics students are requested to attend the classes without fail to improve your skills.

BRIDGE COURSE SCHEDULE

Day	Time
19-06-2018 to 20-06-2018	11.40 – 12.30 AM
21-06-2018 to 23-06-2018	10.00 – 10.50 AM
25-06-2018 to 27-06-2018	11.40 – 12.30 AM
28-06-2018 to 30-06-2018	10.00 – 10.50 AM

(Y.GOWRY SANKAR)
Principal

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Bridge Course

…Educating the young minds

Bridge course is conducted before the first semester in order to preparestudents to meet the requirements of undergraduation course at HINDU COLLEGE, GUNTUR. Department of Mathematics of Hindu College developed a teaching module which helps to close the gap between two levelsof competence. The Bridge Course inculcates skills and knowledge to enhance qualityof Mathematics in higher education. Bridge course is an effort to work to galvanize skills and needs ofthe students as per the requirements of local and global conditionings. It givesopportunities to the students of all the faculties to persue additional need based andskill courses.

With a view to enhance the comprehension in subjects we frame a bridge course to first semester B.A/B.Sc. programme of Mathematics students. The essentials and fundamentals of Intermediate level Mathematics basics are necessary to understand thesubject at an ease and this will lead to a better appreciation of the subject.

Objective

The bridge course aims to act as a buffer for the new entrants with an objectiveto provide adequate time for the transition to hardcore of degree courses. This givesthem a breather, to prepare themselves before the onset of courses for first year degree programme. During this interaction of TWELVE hours with the faculty and their classmates, the students will be equipped with the knowledge and the confidence needed to takeon bigger challenges in future.

Design

The course consists of 12hours of interactive sessions.

Syllabus

Mathematics is mother of all sciences. It is one module on mathematics is incorporated in the fundamental subjects in the undergraduate bridge course. It would enable the students to curriculum. However, there is a gap in the grasp the

concepts of mathematics quickly and mathematics learnt at the intermediate level and the efficiently in the undergraduation programme.

The Bridge Course was taken for first year Mathematics students. The first yearstudents of the Mathematics department concerned for the same were those who did not have aprevious background and (or) found the subject difficult to comprehend. The studymaterial is prepared by the teaching faculty of the department concerned keeping into

consideration the level of our students since most of our students are from the ruralarea with vernacular medium.

Students are made aware of the basics of the following topics:

Algebra

•Method of Solving Quadratic Equations,

• Partial Fractions,

• Synthetic Division

• Factorization,

• Elementary Row transformation

Differentiation – I

•Derivatives of all elementary functions

•Rules of differentiation:

•Derivative of sum, Difference, product rule, Quotient rule

•Derivatives of composite functions-chain rule

•Derivatives of hyperbolic functions

•Derivatives of inverse trigonometric functions by substitution

•Derivatives of functions defined explicity, implicity, Parametrically

Integration

•Integral of a function

•Standard forms of the integral calculus

•Definite Integrals

•Integrals reducible to standard forms by substitution

•Integration by partial functions

•Integration by parts and Bernoulli’s Rule

Differential Equations

• Variable separable method

• Homogeneous Equations

• Linear differential equations

HINDU COLLEGE :: GUNTUR

Department of Mathematics

BRIDGE COURSE – ATTENDANCE SHEET

Class: I B.Sc. / B.A. Academic Year : 2018-19

Sections: M.P.C.

Name of the Faculty members: Y. UDAY KUMAR

Designation: Lecturers in Mathematics

		Cl no.	1	2	3	4	5	6	7	8	9	10	11
Sl.No	Student Name	Date	19/6	20/6	21/6	22/6	23/6	25/6	26/6	27/6	28/6	29/6	30/6
1	CHALLA PRATHAP REDDY		1	2	3	4	5	6	7	8	9	10	11
2	KAKANI PRUDHAVISAI			1	2		3	4	5		6	7	8
3	CHAKKERALA LAKSHMIGANESH		1		2	3	4	5	6	7	8		9
4	SHAIK SHAHEED		1	2	3	4	5	6	7	8	9	10	11
5	SHAIK BAJISYEDA		1	2		3	4	5		6	7	8	9
6	CHINTALACHERUVU NAGA TIRUPATIREDDY			1	2		3	4	5		6	7	8
7	NARNEPATI VINAYBABU		1	2	3	4	5	6	7	8	9	10	11
8	SHAIK MABUSUBHANI		1	2		3	4	5		6	7	8	9
9	ALLU GOPIREDDY		1	2		3	4	5		6	7	8	9
10	KONDAVEETI NAGAVAMSIKRISHNA				1	2		3	4	5		6	7
11	MONDITHOKA MERCY			1	2		3	4	5		6	7	8
12	JANGA UMAMAHESWARA REDDY		1	2	3	4	5	6	7	8	9	10	11
13	PAGALLA SHALEMRAJU		1	2	3	4	5	6	7	8	9	10	11
14	BELLAMKONDA GEETHAPRABHUDEVA			1	2		3	4	5		6	7	8
15	MANDADAPU GOPIKRISHNA		1	2		3	4	5		6	7	8	
16	RAVURI SUDHEERKUMAR		1	2		3	4	5		6	7	8	9
17	SATULURI NAGA VEERA			1	2		3	4	5		6	7	8
18	ALLA RAVI BABU		1	2		3	4	5		6	7	8	9
19	DODDA NAAGESH KUMAR		1	2		3	4	5	6		7	8	9
20	ALLA THIRUPATHI RAJU		1	2	3	4	5	6	7	8	9	10	11
21	GORANTLA VENUGOPALARAO		1	2	3	4	5	6	7	8	9	10	11
22	CHINTALAPATI SESHASAISRIKAR			1	2	3	4	5	6	7	8	9	10
23	THOKA BALARAJESH			1	2	3	4	5	6	7	8	9	10
24	VEMPA NARESHKUMAR		1	2	3	4	5	6	7	8	9	10	11
25	CHALLA ANILKUMAR		1	2	3	4	5	6	7	8	9	10	
26	BHAVIRISETTY SUNIL		1	2	3	4	5	6	7	8	9	10	11
27	CHOPPALLI ESWAR TEJA				1	2	3	4	5	6	7	8	9
28	UDARA AJAYKUMAR		1	2	3	4	5	6	7	8	9	10	11
29	SHAIK NAZMA		1	2	3	4	5	6	7	8	9	10	11

HINDU COLLEGE :: GUNTUR

Department of Mathematics

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Class: I B.Sc. / B.A. Academic Year : 2018-19

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Sl.No	Student Name	Date	19/6	20/6	21/6	22/6	23/6	25/6	26/6	27/6	28/6	29/6	30/6
30	BHANAVATH SONYANAIK		1	2		3	4	5		6	7	8	9
31	MUNAGOTI VENUBABU		1	2	3	4	5	6	7	8	9	10	11
32	RAMAVATH GANESH NAIK		1	2	3	4	5	6	7	8	9	10	11
33	KATARI SRAVANI		1	2	3	4	5	6	7	8	9	10	
34	GUDIPUDI PRAVEEN KUMAR		1	2	3	4	5	6	7			8	9
35	MEKALA MANIKANTA		1	2	3	4	5	6	7	8	9	10	11
36	YERUVA CHINNA MANI KANTA		1	2	3	4	5	6	7	8	9	10	11
37	SHAIK ABDUL MATEEN		1	2	3	4	5	6	7	8	9	10	11
38	BANAVATH HANUMA NAIK		1	2	3	4	5	6	7	8	9	10	11
39	UYYALA GOPI		1	2	3	4	5	6	7	8	9	10	11
40	ALLA RAJANI		1	2	3	4	5	6	7	8	9	10	11
41	TELLAPATI NARASIMHA		1	2	3	4	5	6	7	8	9	10	11
42	BHAVIRISETTY PAVAN KALYAN		1	2	3	4	5	6	7	8	9	10	11
43	BATHULA PRASAD		1	2	3	4	5	6	7	8	9	10	11
44	MOGILI KOTAIAH		1	2	3	4	5	6	7	8	9	10	11
45	SIDDHARTHA ROY KONATHAM		1	2	3	4	5	6	7	8	9	10	11
46	SANI MALLIKHARJUNA		1	2	3	4	5	6	7	8	9	10	11
47	KARUMANCHI DINESH		1	2	3	4	5	6	7	8	9	10	11
48	SHAIK NAGUL SHAREEF		1	2	3	4	5	6	7	8	9	10	11
49	KANDRU SANDEEP		1	2	3	4	5	6	7	8	9	10	11
50	REPUDI SURENDRA BABU		1	2	3	4	5	6	7	8	9	10	11
51	MEDA CHANDRA SEKHAR		1	2	3	4	5	6	7	8	9	10	11
52	MUDAVATHU SAI NAIK		1	2	3	4	5	6	7	8	9	10	11
53	VARUN GANJI		1	2	3	4	5	6	7	8	9	10	11

Principal

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Hindu College, Guntur
Department of Mathematics

1. MATRICES

INTRODUCTION OF MATRICES:

A simple form of matrices may have been used by the Mayans (and maybe other cultures; see below), the true mathematical use of a matrix was first formulated around 1850, by English mathematician, poet, and **musician James Sylvester** (1814–1897).

APPLICATIONS OF MATRICES IN REAL WORLD: In everyday **applications**, **matrices are used** to represent **real**-world data, such as the traits and habits of a certain population. They are **used** in geology to measure seismic waves. **Matrices** are rectangular arrangements of expressions, numbers and symbols that are arranged in columns and rows.

DEFINATION: A *matrix* is a rectangular array of elements. The elements can be symbolic expressions or/and numbers. Matrix $[A]$ is denoted by

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & & & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$ is called an m×n *matrix*.

e.g. $\begin{bmatrix} 2 & 3 & 4 \\ 1 & -8 & 5 \end{bmatrix}$ is a 2×3 matrix.

e.g. $\begin{bmatrix} 2 \\ 7 \\ -3 \end{bmatrix}$ is a 3×1 matrix.

Order of a Matrix: - A matrix having m rows and n columns is called a matrix of order m× n or simply m× n matrix (read as an **m by n matrix).**

e.g. $\begin{bmatrix} 2 & 0 & 3 & 6 \\ 3 & 4 & 7 & 0 \\ 1 & 9 & 2 & 5 \end{bmatrix}$ is a matrix of order 3×4.

e.g. $\begin{bmatrix} 1 & 0 & -2 \\ 2 & 1 & 5 \\ -1 & 3 & 0 \end{bmatrix}$ is a matrix of order 3.

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Special Types of matrices:

1. Square matrix: A matrix in which numbers of rows are equal to number of columns is called a square matrix.

$$Ex: \quad A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \qquad B = \begin{pmatrix} 1 & 3 & 5 \\ -6 & 8 & 9 \\ 5 & 1 & -6 \end{pmatrix}$$

2. Diagonal matrix: A square matrix A = $(a_{ij})_{n\,X\,n}$ is called a diagonal matrix if each of its non-diagonal element is zero. That is $a_{ij} = 0$, if $i \neq j$ and at least one element $a_{ii} \neq 0$

$$Ex: \quad A = \begin{bmatrix} a_{11} & 0 & 0 \\ 0 & a_{22} & 0 \\ 0 & 0 & a_{33} \end{bmatrix} \qquad B = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & -6 \end{pmatrix}$$

3. Identity Matrix : A diagonal matrix whose diagonal elements are equal to 1 is called identity matrix and denoted by I_n . that is $a_{ij} = \begin{cases} 0, i \neq j \\ 1, i = j \end{cases}$

$$Ex: \ I_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

4. Upper Triangular matrix :

A square matrix said to be a Upper triangular matrix if $a_{ij} = 0 \; if \;\; i > j$

$$Ex: \quad A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ 0 & a_{22} & a_{23} \\ 0 & 0 & a_{33} \end{bmatrix} \qquad B = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 8 & 2 \\ 0 & 0 & -6 \end{pmatrix}$$

5. Lower Triangular Matrix:

A square matrix said to be a Lower triangular matrix if $a_{ij} = 0 \; if \;\; i < j$

$$Ex: \quad A = \begin{bmatrix} a_{11} & 0 & 0 \\ a_{21} & a_{22} & 0 \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \qquad B = \begin{pmatrix} 1 & 0 & 0 \\ -6 & 8 & 0 \\ 5 & 1 & -6 \end{pmatrix}$$

6. Symmetric Matrix: A square matrix $A = (a_{ij})_{m\,X\,n}$ said to be a symmetric if $a_{ij} = a_{ji} \;\; for \; all \; i \; and \; j$

$$Ex: \quad A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{12} & a_{22} & a_{23} \\ a_{13} & a_{23} & a_{33} \end{bmatrix} \qquad B = \begin{pmatrix} 1 & 3 & 5 \\ 3 & 8 & 9 \\ 5 & 9 & -6 \end{pmatrix}$$

7. Skew-Symmetric Matrix: A square matrix $A = (a_{ij})_{m\,X\,n}$ said to be a symmetric if $a_{ij} = -a_{ji} \;\; for \; all \; i \; and \; j$

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$Ex: \quad A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ -a_{12} & a_{22} & a_{23} \\ -a_{13} & -a_{23} & a_{33} \end{bmatrix} \qquad B = \begin{pmatrix} 1 & 3 & 5 \\ -3 & 8 & 9 \\ -5 & -9 & -6 \end{pmatrix}$

8. Zero Matrix: A matrix whose all elements are zero is called as Zero Matrix and order $n\ X\ m$ Zero matrix denoted by $O_{n\ X\ m}$.

$Ex: O_{3\ X\ 2} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$

9. Row Matrix: A matrix consists a single row is called as a row vector or row matrix.

$Ex: \ A = [a_{11} \quad a_{12} \quad a_{13}] \qquad B = (1 \quad 2 \quad 3)$

10. Column Matrix: A matrix consists a single column is called a column vector or column matrix

$Ex: \ A = \begin{pmatrix} a_{11} \\ a_{21} \\ a_{31} \end{pmatrix} \qquad B = \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$

11. Submatrix: If some row(s) or/and column(s) of a matrix $[A]$ are deleted (no rows or columns may be deleted), the remaining matrix is called a submatrix of $[A]$.

Ex: 1 $[A] = \begin{bmatrix} 4 & 6 & 2 \\ 3 & -1 & 2 \end{bmatrix}$

Solution:-

$\begin{bmatrix} 4 & 6 & 2 \\ 3 & -1 & 2 \end{bmatrix}, \begin{bmatrix} 4 & 6 \\ 3 & -1 \end{bmatrix}, [4 \quad 6 \quad 2], [4], \begin{bmatrix} 2 \\ 2 \end{bmatrix}$ are some of the sub matrices of [A]

12. *Powers of matrices*: For any square matrix A and any positive integer n, the symbol A^n denotes $\underbrace{A \cdot A \cdot A \cdots A}_{n \text{ factors}}$.

Note: (1) $(A+B)^2 = (A+B)(A+B)$
$= AA + AB + BA + BB$
$= A^2 + AB + BA + B^2$

(2) If $AB = BA$, then $(A+B)^2 = A^2 + 2AB + B^2$

13. DETERMINANTS: Let $A = [a_{ij}]$ be a square matrix of order n. The determinant of A, detA or |A| is defined as follows:

(a) If n=2, $\det A = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} = a_{11}a_{22} - a_{12}a_{21}$

(b) If n=3, $\det A = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$

$= a_{11}\begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12}\begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13}\begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$

or $= -a_{12}\begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{22}\begin{vmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{vmatrix} - a_{32}\begin{vmatrix} a_{11} & a_{13} \\ a_{21} & a_{23} \end{vmatrix}$

14. Multiplication of Determinants: Let $|A| = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$, $|B| = \begin{vmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{vmatrix}$ Then

$$|A||B| = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}\begin{vmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{vmatrix} = \begin{vmatrix} a_{11}b_{11}+a_{12}b_{21} & a_{11}b_{12}+a_{12}b_{22} \\ a_{21}b_{11}+a_{22}b_{21} & a_{21}b_{12}+a_{22}b_{22} \end{vmatrix}$$

Properties :

(1) det(AB)=(detA)(detB) i.e. $|AB| = |A||B|$

(2) |A|(|B||C|)=(|A||B|)|C| N.B. A (BC)=(AB)C

(3) |A||B|=|B||A| N.B. AB≠BA in general

(4) |A|(|B|+|C|)=|A||B|+|A||C| N.B. A (B+C)=AB+AC

15. <u>INVERSE MATRIX</u>:

i) The inverse of a 2×2 matrix A, is another 2×2 matrix denoted by A^{-I} with the property that $A^{-I}A = AA^{-I} = I$.The inverse of a 2×2 matrix can also be determined.

If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ represents any 2×2 matrix, then the inverse of **A**, written as $\mathbf{A^{-1}}$, is found by

$$A^{-1} = \begin{pmatrix} \frac{d}{\det A} & \frac{-b}{\det A} \\ \frac{-c}{\det A} & \frac{a}{\det A} \end{pmatrix}$$ When a 2×2 matrix is multiplied by its inverse, the result is the identity matrix $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

ii) Let A = $\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ The Inverse of a 3 X 3 Matrix is $A^{-I} = \frac{1}{|A|} Adj\ A$

Minors and cofactors of a Matrix

Let A = $\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$

Minor of $a_{ij} \equiv M_{ij}$, is determinant obtained by deleting ith row and jth column.

$M_{11} = \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix}$ is determinant obtained by deleting 1st row and 1st column

$$M_{11} = \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix}, M_{12} = \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix}, M_{13} = \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$

$$M_{21} = \begin{vmatrix} a_{12} & a_{13} \\ a_{32} & a_{33} \end{vmatrix}, M_{22} = \begin{vmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{vmatrix}, M_{23} = \begin{vmatrix} a_{11} & a_{12} \\ a_{31} & a_{32} \end{vmatrix}$$

$$M_{13} = \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}, M_{32} = \begin{vmatrix} a_{11} & a_{13} \\ a_{21} & a_{23} \end{vmatrix}, M_{33} = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$$

Signs of Cofactors

- For 2x2 – matrix $\begin{bmatrix} + & - \\ - & + \end{bmatrix}$
- For 3x3 – matrix $\begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix}$
- For 4x4 – matrix $\begin{bmatrix} + & - & + & - \\ - & + & - & + \\ + & - & + & - \\ - & + & - & + \end{bmatrix}$

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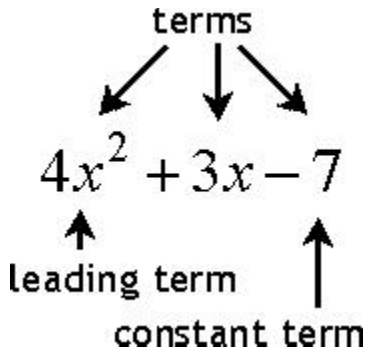
2. POLYNOMIALS

Polynomials are one of the most important concepts in algebra and throughout mathematics and science. They are used to form polynomial equations, which encode a wide range of problems, from elementary word problems to complicated problems in the sciences; they are used to define polynomial functions, which appear in settings ranging from basic chemistry and physics to economics, and are used in calculus and numerical analysis to approximate other functions. Polynomials are used to construct polynomial rings, one of the most powerful concepts in algebra and algebraic geometry.

By now, you should be familiar with variables and exponents, and you may have dealt with expressions like $3x^4$ or $6x$. Polynomials are sums of these "variables and exponents" expressions. Each piece of the polynomial, each part that is being added, is called a "term". Polynomial terms have variables which are raised to whole-number exponents (or else the terms are just plain numbers); there are no square roots of variables, no fractional powers, and no variables in the denominator of any fractions. Here are some examples:

$6x^{-2}$	This is NOT a polynomial term...	...because the variable has a negative exponent.
$1/x^2$	This is NOT a polynomial term...	...because the variable is in the denominator.
$sqrt(x)$	This is NOT a polynomial term...	...because the variable is inside a radical.
$4x^2$	This IS a polynomial term...	...because it obeys all the rules.

Here is a typical polynomial:



- Give the degree of the following polynomial: $2x^5 - 5x^3 - 10x + 9$

  This polynomial has four terms, including a fifth-degree term, a third-degree term, a first-degree term, and a constant term.

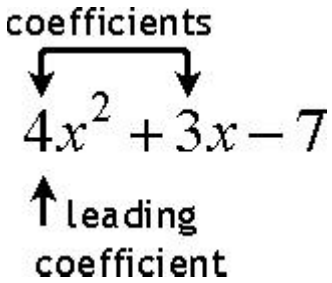
  This is a fifth-degree polynomial.

- Give the degree of the following polynomial: $7x^4 + 6x^2 + x$

  This polynomial has three terms, including a fourth-degree term, a second-degree term, and a first-degree term. There is no constant term.

  This is a fourth-degree polynomial.

  When a term contains both a number and a variable part, the number part is called the "coefficient". The coefficient on the leading term is called the "leading" coefficient.



  In the above example, the coefficient of the leading term is 4; the coefficient of the second term is 3; the constant term doesn't have a coefficient.

  The "poly" in "polynomial" means "many". I suppose, technically, the term "polynomial" should only refer to sums of *many* terms, but the term is used to refer to anything from one term to the sum of a zillion terms. However, the shorter polynomials do have their own names:

- a one-term polynomial, such as $2x$ or $4x^2$, may also be called a "monomial" ("mono" meaning "one")
- a two-term polynomial, such as $2x + y$ or $x^2 - 4$, may also be called a "binomial" ("bi" meaning "two")
- a three-term polynomial, such as $2x + y + z$ or $x^4 + 4x^2 - 4$, may also be called a "trinomial" ("tri" meaning "three")

Polynomials classified by degree

Degree	Name	Example
$-\infty$	zero	0
0	(non-zero) constant	1
1	linear	$x + 1$
2	quadratic	$x^2 + 1$
3	cubic	$x^3 + 1$
4	quartic (or biquadratic)	$x^4 + 1$
5	quintic	$x^5 + 1$
6	sextic or hexic	$x^6 + 1$
7	septic or heptic	$x^7 + 1$
8	octic	$x^8 + 1$
9	nonic	$x^9 + 1$
10	decic	$x^{10} + 1$

Usually, a polynomial of degree 4 or higher is referred to as a *polynomial of degree n*, although the phrases *quartic polynomial* and *quintic polynomial* are also used. The names for degrees higher than 5 are even less common. The names for the degrees may be applied to the polynomial or to its terms. For example, a constant may refer to a zero degree polynomial or to a zero degree term.

The polynomial 0, which may be considered to have no terms at all, is called the **zero polynomial**. Unlike other constant polynomials, its degree is not zero. Rather the degree of the zero polynomial is either left explicitly undefined, or defined to be negative (either –1 or –∞).The latter convention is important when defining Euclidean division of polynomials.

Polynomials classified by number of non-zero terms

Number of non-zero terms	Name	Example
0	zero polynomial	0
1	monomial	x^2
2	binomial	$x^2 + 1$
3	trinomial	$x^2 + x + 1$

Further, polynomials may be classified by the number of terms (using the minimal number of terms, that is, not counting zero terms and combining like terms). The word *monomial* can be ambiguous, used either to refer to a polynomial with just a single term, as above, or to refer to the particular case of monic monomials, that is, having coefficient 1.

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3. Binomial Theorem

The Binomial Theorem is used to expand out brackets of the form $(a+b)^n$, where *n* is a whole number.

n	$(a+b)^n$	*Coefficients*
0	$(a+b)^0 = 1$	1
1	$(a+b)^1 = a+b$	1 1
2	$(a+b)^2 = a^2+2ab+b^2$	1 2 1
3	$(a+b)^3 = a^3+3a^2b+3ab^2+b^3$	1 3 3 1
4	$(a+b)^4 = a^4+4a^3b+6a^2b^2+4ab^3+b^4$	1 4 6 4 1

Note 1: The coefficients in these expansions form **Pascal's Triangle**. These numbers can also be found using the $\boxed{{}^nC_r}$ button on a calculator. For example, the coefficients for the expansion of $(a+b)^7$ are:

$${}^7C_0 = 1 \qquad {}^7C_1 = 7 \qquad {}^7C_2 = 21 \qquad {}^7C_3 = 35$$

$${}^7C_4 = 35 \qquad {}^7C_5 = 21 \qquad {}^7C_6 = 7 \qquad {}^7C_7 = 1$$

Note 2: As the power of *a* decreases by 1, the power of *b* increases by 1. In each term, when you add together the powers of *a* and *b* together you get *n*.

So, $(a+b)^7 = a^7+7a^6b+21a^5b^2+35a^4b^3+35a^3b^4+21a^2b^5+7ab^6+b^7$

The binomial expansion is the series expansion of $(a+b)^n$. There are different versions depending on whether n is an integer or a real number.

Binomial expansion for integer *n*

This is a *finite* series given by:

$$(a+b)^n = \sum_{r=0}^{n} \binom{n}{r} a^r b^{n-r}$$

$$= b^n + nab^{n-1} + \frac{n(n-1)}{2!}a^2b^{n-2} + \ldots + na^{n-1}b + a^n$$

Binomial expansion for real *n*

This is an *infinite* series expansion of $(1+x)^n$, valid *only* when $|x|<1$:

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)(n-2)}{3!}x^3 + \ldots$$

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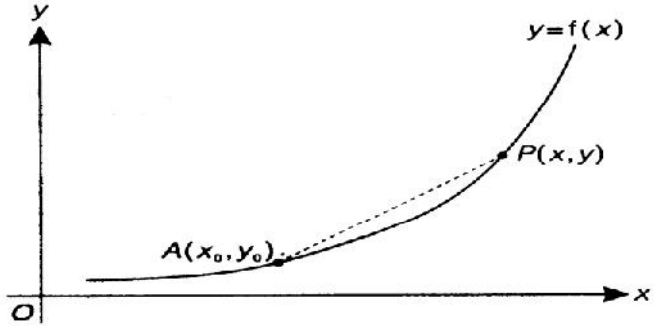
4. DIFFERENTIATION

INTRODUCTION



Let $A(x_0, y_0)$ be a fixed point and $P(x, y)$ be a variable point on the curve $y = f(x)$ as shown on about figure. Then the slope of the line *AP* is given by $\frac{y - y_0}{x - x_0}$ or $\frac{f(x) - f(x_0)}{x - x_0}$. When the variable point *P* moves closer and closer to *A* along the curve $y = f(x)$, i.e. $x \to x_0$. the line *AP* becomes the tangent line of the curve at the point *A*. Hence, the slope of the tangent line at the point *A* is equal to $\lim_{x \to x_0} \frac{f(x) - f(x_0)}{x - x_0}$. This term is defined to be the derivative of $f(x)$ at $x = x_0$ and is usually denoted by $f'(x_0)$. The definition of derivative at any point x may be defined as follows.

Definition Let $y = f(x)$ be a function defined on the interval $[a, b]$ and $x_0 \in (a, b)$.

$f(x)$ is said to be differentiable at x_0 (or have a derivative at x_0) if the limit $\lim_{x \to x_0} \frac{f(x) - f(x_0)}{x - x_0}$ exists. This lime value is denoted by $f'(x_0)$ or $\left.\frac{dy}{dx}\right|_{x=x_0}$ and is called the derivative of $f(x)$ at x_0.

If $f(x)$ has a derivative at every point x in (a, b), then $f(x)$ is said to be differentiable on (a, b).

Remark As $x \to x_0$, the difference between x and x_0 is very small, i.e. $x - x_0$ tends to zero. Usually, this difference is denoted by h or Δx. Then the derivative at x_0 may be rewritten as $\lim_{h \to 0} \frac{f(x_0 + h) - f(x_0)}{h}$. (First Principle)

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RULES OF DIFFERENTIATION

Composite functions

$$\frac{d}{dx}ku = k\frac{du}{dx} \qquad \frac{d}{dx}(u \pm v) = \frac{du}{dx} \pm \frac{dv}{dx} \qquad \frac{d}{dx}uv = u\frac{dv}{dx} + v\frac{du}{dx}$$

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2} \qquad \frac{dy}{dx} = \frac{dy}{du}\cdot\frac{du}{dx} \qquad \frac{dy}{dx} = \frac{1}{\frac{dx}{dy}}$$

Algebraic functions

$$\frac{d}{dx}x^k = kx^{k-1}$$ where ***k*** must be ***independent*** of ***x*** (usually a constant)

Inverse functions *(esp.: inverse of trigo func)*

$$\text{If} \quad y = f^{-1}(x) \quad \text{then} \quad \frac{dy}{dx} = \frac{1}{\frac{df(y)}{dy}}$$

Trigonometric functions

$$\frac{d}{dx}\sin x = \cos x \qquad \frac{d}{dx}\cos x = -\sin x \qquad \frac{d}{dx}\tan x = \sec^2 x$$

$$\frac{d}{dx}\sec x = \sec x\tan x \qquad \frac{d}{dx}\csc x = -\csc x\cot x \qquad \frac{d}{dx}\cot x = -\csc^2 x$$

Inverse Trigonometric functions

$$\frac{d}{dx}(\sin^{-1}x) = \frac{1}{\sqrt{1-x^2}}, \quad \frac{d}{dx}\cos^{-1}x = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}\tan^{-1}x = \frac{1}{1+x^2}, \quad \frac{d}{dx}\cot^{-1}x = \frac{-1}{1+x^2}$$

$$\frac{d}{dx}\sec^{-1}x = \frac{1}{|x|\sqrt{x^2-1}}, \quad \frac{d}{dx}\csc^{-1}x = \frac{-1}{|x|\sqrt{x^2-1}}$$

Logarithmic functions

$\frac{d}{dx}e^x = e^x$ $\qquad$ $\frac{d}{dx}\ln x = \frac{1}{x}$

$\frac{d}{dx}a^x = a^x \ln a$ $\qquad$ $\frac{d}{dx}\log_a x = \frac{1}{x \ln a}$

Parametric functions (commonly use in Rate of change)

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

Leibniz's Theorem Let f and g be two functions with nth derivative. Then

$\frac{d^n}{dx^n}[f(x)g(x)] = \sum_{r=0}^{n} C_r^n f^{(r)}(x) g^{(n-r)}(x)$ where $f^{(0)}(x) = f(x)$.

MEAN VALUE THEOREM:

Let $y = f(x)$ be a function defined on an interval **I**. f is said to have an ***absolute maximum*** at *c* if $f(c) \geq f(x), \forall x \in$ **I** and $f(c)$ is called the ***absolute maximum value***. Similarly, *f* is said to have an ***absolute minimum*** at *d* if $f(d) \leq f(x), \forall x \in$ **I** and $f(d)$ is called the ***absolute minimum value***.

Theorem: - Rolle's Theorem

If a function $f(x)$ satisfies all the following three conditions:

(1) $f(x)$ is continuous on the closed interval $[a,b]$,

(2) $f(x)$ is differentiable in the open interval (a,b),

(3) $f(a) = f(b)$; then there exists at least a point $\xi \in (a,b)$ such that $f'(\xi) = 0$.

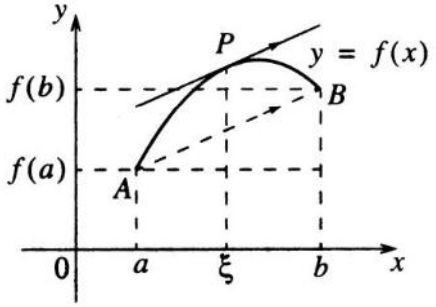
Theorem:-Mean Value Theorem

If a function $f(x)$ is (1) continuous on the closed interval $[a,b]$ and

(2) differentiable in the open interval (a,b),

then there exists at least a point $\xi \in (a,b)$ such that

$$\frac{f(b) - f(a)}{b - a} = f'(\xi).$$



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5. INTEGRATION

I) Integrals of Rational and Irrational Functions.

1. $\int x^n dx = \frac{x^{n+1}}{n+1} + C$
2. $\int c\, dx = cx + C$
3. $\int \frac{f'(x)}{f(x)} dx = \log|f(x)| + C$
4. $\int \frac{f'(x)}{\sqrt{f(x)}} dx = 2\sqrt{f(x)} + C$
5. $\int f^n(x)\ f'(x) dx = \frac{f^{n+1}(x)}{n+1} + C$
6. $\int \frac{1}{1+x^2} dx = \mathrm{Tan}^{-1} x + C$
7. $\int \frac{1}{\sqrt{1-x^2}} dx = \mathrm{Sin}^{-1} x + C$
8. $\int \frac{-1}{\sqrt{1-x^2}} dx = \mathrm{Cos}^{-1} x + C$
9. $\int u.v\, dx = u \int v dx - \int \left[\frac{d}{dx}(u) \int v dx\right] dx$

II) Integrals of Trigonometric Functions.

1. $\int \mathrm{Sin}\, x dx = -\mathrm{Cos}\, x + C$
2. $\int \mathrm{Cos}\, x dx = \mathrm{Sin}\, x + C$
3. $\int Tan\, x dx = \log|\sec x| + C$
4. $\int \mathrm{Sec}\, x dx = \log|\sec x + \tan x| + C$
5. $\int Cotx\, dx = \log|\mathrm{Sin}\, x| + C$
6. $\int Cosec\ x\, dx =$
7. $\int Tan^2\, x dx = Tanx - x + C$
8. $\int Sec^2\, x\, dx = Tanx + C$

III) Integrals of Exponential and Logarithmic Functions.

1. $\int \log x dx = x \log x - x + C$
2. $\int e^x dx = e^x + C$
3. $\int a^x dx = \frac{a^x}{\log a} + C$
4. $\int e^{ax} \sin bx\, dx = \frac{e^{ax}}{a^2+b^2}[a\ \mathrm{Sin}\, bx - b\ Cosbx] + C$
5. $\int e^{ax} \mathrm{Cos}\, bx\, dx = \frac{e^{ax}}{a^2+b^2}[a\ \mathrm{Cos}\, bx + b\ Sinbx] + C$

iv) Standard Results :

1. $\int \frac{1}{x} dx = \ln x + c$
2. $\int a^x dx = \frac{a^x}{\ln a} + c$
3. $\int \sec x \tan x dx = \sec x + c$
4. $\int \csc^2 x dx = -\cot x + c$
5. $\int \csc x \cot x dx = -\csc x + c$
6. $\int \frac{1}{\sqrt{x^2 - a^2}} dx = \ln \left| \frac{x + \sqrt{x^2 - a^2}}{a} \right| + c$
7. $\int \frac{1}{\sqrt{a^2 - x^2}} dx = \sin^{-1} \frac{x}{a} + c$
8. $\int \frac{1}{x^2 + a^2} dx = \frac{1}{a} \tan^{-1} \frac{x}{a} + c$
9. $\int \frac{1}{\sqrt{x^2 + a^2}} dx = \ln \left| \frac{\sqrt{x^2 + a^2} + x}{a} \right| + c$
10. $\int u dv = uv - \int v du.$

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6. COMPLEX NUMBERS

(1) A ***complex number*** z is a number of the form $a+bi$ where a, b are real numbers and $i^2=-1$.

(2) The set **C** of all complex numbers is defined by **C**= $\{a+bi : a,b \in R \text{ and } i^2=-1\}$

where a is called the ***real part*** of z and $a=\text{Re}(z)$ and

b is called the ***imaginary part*** of z and $b=\text{Im}(z)$.

(3) z is said to be ***purely imaginary*** if and only if $\text{Re}(z)=0$ and $\text{Im}(z)\neq 0$.

(4) When $\text{Im}(z)=0$, the complex number z is ***real***.

NOTE: $i^3=i^2\cdot i=-i$, $i^4=i^2\cdot i^2=1$, $i^5=i^4\cdot i=i$, $i^6=i^4\cdot i^2=-1$.

Operations On Complex Numbers

Let $z_1=a+bi$ and $z_2=c+di$. Then

(1) $z_1+z_2=(a+c)+(b+d)i$

(2) $z_1-z_2=(a-c)+(b-d)i$

(3) $z_1z_2 = (a+bi)(c+di)$
$= (ac-bd)+(ad+bc)i$

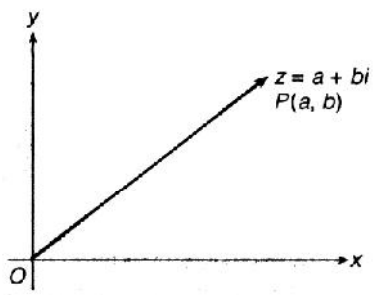
(4) $\frac{z_1}{z_2} = \frac{a+bi}{c+di}\cdot\frac{c-di}{c-di}=\frac{ac+bd}{c^2+d^2}+\frac{(bc-ad)}{c^2+d^2}i$, where $z_2\neq 0$.

NOTE: (i) $\frac{1}{i}=\frac{i}{i^2}=\frac{i}{-1}=-i$;

(ii) $\frac{1}{z_2}=\frac{1}{c+di}=\frac{c-di}{c^2+d^2}=\frac{1}{c^2+d^2}\overline{z_2}$.

Geometrical Representation of a Complex Number:

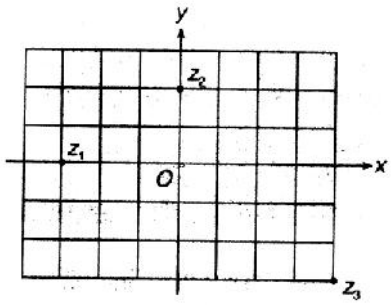
From the definition of complex numbers, a complex number $z=a+bi$ is defined by the two real numbers a and b. Hence, if we consider the real part a as the $x-coordinate$ in the rectangular coordinates system and the imaginary part b as the $y-coordinate$, then the complex number z can be represented by the point (a,b) on the plane. This plane is called the ***complex plane*** or the ***Argand diagram***. On this plane, real numbers are represented by points on $x-axis$ which is called the ***real axis***; imaginary numbers are represented by points on the $y-axis$ which is called the ***imaginary axis***. The number 0 is represented by the origin ***O***.



Any point (a,b) on this plane can be used to represent a complex number $z=a+bi$.

For example, as shown in Figure, the z_1, z_2, z_3 represents respectively the complex numbers.

$$z_1 = -3, z_2 = 2i, z_3 = 4 - 3i$$



Polar Form of a Complex Number

A. Polar Form

A complex number $z = a + bi$ can be represented by a vector $\overrightarrow{OP}$ as shown in Figure.
The length of the vector $\overrightarrow{OP}$, $r = \left|\overrightarrow{OP}\right|$, is called the modulus of the complex number z, and it is denoted by $|z|$. The angle between the vector $\overrightarrow{OP}$ and the positive real axis is defined to be the argument or amplitude of z and is denoted by $\arg z$ or amp z.
$\arg z$ is infinitely many-valued, that is, $\arg z = \theta + 2k\pi$, *where* $k \in Z$.
If $\arg z$ lies in the interval $-\pi < \theta \le \pi$, we call this value the ***principal value***.

Complex Conjugate:

Definition: Let $z = a + bi$, where $a, b \in R$. The complex conjugate of z, denoted by $\bar{z}$ is defined as $\bar{z} = a - bi$

Theorem: Properties of Complex Conjugate

Let z be a complex number. Then

(1) z is real if and only if $\bar{z} = z$.

(2) $\bar{\bar{z}} = z$

(3) $z\bar{z} = |z|^2$

(4) $|\bar{z}| = |z|$

(5) $\arg \bar{z} = -\arg z \ (z \neq 0)$

(6) $z + \bar{z} = 2\,\mathrm{Re}(z)$

(7) $z - \bar{z} = 2i\,\mathrm{Im}(z)$

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8. Integration and partial fractions

(I) The method

This method allows you to integrate functions of the form $\frac{1}{(x+2)(x-3)^2}$.

Note that neither substitution nor integration by parts is likely to help, here.

However, it is possible to split $\frac{1}{(x+2)(x-3)^2}$ into several fractions, which are easier to integrate.

It is easier to explain (and to understand) how it works through examples rather than to give an overview of the rigorous mathematical theory.

First, the degree of the numerator has to be smaller than the degree of the denominator. They are three cases:

(i) The denominator of the fraction contains only simple binomials. Example:

$$\frac{2x}{(x+2)(x-3)} = \frac{A}{x+2} + \frac{B}{x-3}.$$

(ii) The denominator of the fraction contains a repeated binomial. Example:

$$\frac{1}{(x+2)(x-3)^2} = \frac{A}{x+2} + \frac{B}{x-3} + \frac{C}{(x-3)^2}.$$

(iii) The denominator of the fraction contains an irreducible quadratic. Example:

$$\frac{1}{(x+2)(x^2+x+1)} = \frac{A}{x+2} + \frac{Bx+C}{x^2+x+1}.$$

By irreducible quadratic, we mean here a quadratic with no real root.
Once the fraction has been split into smaller fractions, it is just a matter of finding the coefficients.

Example: Let us consider $\frac{2x}{(x+2)(x-3)}$. According to the above,

$$\frac{2x}{(x+2)(x-3)} = \frac{A}{x+2} + \frac{B}{x-3}.$$

Now, multiply both sides of the equality by $(x+2)(x-3)$:

$2x = A(x-3) + B(x+2),$

and, after rearrangements, $2x = x(A+B) + (2B-3A)$.

The polynomial on the right hand side is identically equal to the polynomial on the left hand side if and only if their coefficients are equal, i.e. if and only if

$\begin{cases} A+B=2 \\ 2B-3A=0 \end{cases}$. Solving for A and B, we obtain $A=\frac{4}{5}$ and $B=\frac{6}{5}$ so that

$$\frac{2x}{(x+2)(x-3)} = \frac{4}{5(x+2)} + \frac{6}{(x-3)}.$$

Hence $\int \frac{2x}{(x+2)(x-3)}dx = \int \frac{4dx}{5(x+2)} + \int \frac{6dx}{5(x-3)} = \frac{4}{5}\ln(x+2) + \frac{6}{5}\ln(x-3).$

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9.TRIGONOMETRY IDENTITIES

1. $sin\theta = \frac{opposite}{hypotenuse}$

2. $cos\theta = \frac{adjacent}{hypotenuse}$

3. $tan\theta = \frac{opposite}{adjacent}$

4. $cosec\theta = \frac{hypotenuse}{opposite}$

5. $sec\theta = \frac{hypotenuse}{adjacent}$

6. $cot\theta = \frac{adjacent}{opposite}$

7. $\sin(-\theta) = -sin\theta$

8. $\cos(-\theta) = cos\theta$

9. $\sin(\pi - \theta) = sin\theta$

10. $cos(\pi - \theta) = -cos\theta$

11. $\sin(\pi + \theta) = -sin\theta$

12. $cos(\pi + \theta) = -cos\theta$

13. $sin^2\theta + cos^2\theta = 1$

14. $1 + tan^2\theta = sec^2\theta$

15. $1+cot^2\theta = cosec^2\theta$

16. $\sin(A + B) = sinAcosB + cosAsinB$

17. $\sin(A - B) = sinAcosB - cosAsinB$

18. $\cos(A + B) = cosAcosB - sinAsinB$

19. $\cos(A - B) = cosAcosB + sinAsinB$

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20. $\tan(A+B) = \frac{tanA+tanB}{1-tanAtanB}$

21. $\tan(A-B) = \frac{tanA-tanB}{1+tanAtanB}$

22. $\sin(2\theta) = 2sin\theta cos\theta$

23. $\cos(2\theta) = (cos^2\theta - sin^2\theta)$ or $(1 - 2sin^2\theta)$ or $(2cos^2\theta - 1)$

24. $\tan(2\theta) = \frac{2tan\theta}{1-tan^2\theta}$

25. **Product Identities**

$$\sin x\cos y = \frac{1}{2}[\sin(x+y)+\sin(x-y)]$$

$$\sin x\sin y = \frac{1}{2}[\cos(x-y)-\cos(x+y)]$$

$$\cos x\cos y = \frac{1}{2}[\cos(x+y)+\cos(x-y)]$$

$$\cos x\sin y = \frac{1}{2}[\sin(x+y)-\sin(x-y)]$$

HINDU COLLEGE, GUNTUR

(A NAAC ACCREDITED 'A' GRADE INSTITUTION)

Department of Botany

BRIDGE COURSE

2018 – 19

Sri K.V.S. Durga Prasad — **Head of the Department**

Sri G.Madhu — **Principal**

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(Re-accredited by NAAC as Grade 'A' with CGPA 3.07)
Main Road, Opp. Sri Venkateswara Vignan Mandir, Guntur

HCG/Bridge Course/Botany/June/2019/01 15-06 - 2018

CIRCULAR

It is here by informed that Bridge Course for Mathematics will be conducted for all I B.Sc. B.Z.C Semester I Students as per the time table given below. The main objective of the course is to bridge the gap between subjects studied at Intermediate level and subjects they would be studying in undergraduate course, Hence all the Biology students are requested to attend the classes without fail to improve your skills.

BRIDGE COURSE SCHEDULE

Day	Time
19-06-2018 to 30-06-2018	11.40 – 12.30 AM

(Y.GOWRY SANKAR)
Principal

PRINCIPAL
HINDU COLLEGE, GUNTUR

Bridge Course

…Educating the young minds

Bridge course is conducted before the first semester in order to prepare students to meet the requirements of under graduation course at HINDU COLLEGE, GUNTUR. Department of Botany of Hindu College developed a teaching module which helps to close the gap between two levels of competence. The Bridge Course inculcates skills and knowledge to enhance quality of Mathematics in higher education. Bridge course is an effort to work to galvanize skills and needs of the students as per the requirements of local and global conditionings. It gives opportunities to the students of all the faculties to pursue additional need based and skill courses.

Syllabus

S.no.	Topic	Subtopic	Duration
1.	Botany	Introduction Scope Branches More Trends Scientists	2 hours
2.	Classification	Whitlaker system 5 kingdoms	2 hours
3.	Plant Kingdom	Classification Thallophyta Bryophyta Pteridophyta Spermatophyta	3 hrs
4.	Examination		

Question Paper

Answer all the questions 10 x 2 = 20

1. Who is the father of Botany?

2. Who is the father of Botany in India?

3. What is Lichenology?

4. What is Biotechnology?

5. Mention the 5 Kingdoms of Whitlaker?

6. What are Monera and give one example?

7. What are Algae?

8. Mention Saprophytic Fungi

9. Which are called Amphibians of Plant Kingdom?

10. Which are first true land plants?

Name of the Institution
HINDU COLLEGE
GUNTUR

Student's Attendance Register

CLASS :

..... సం॥ ..... నెల విద్యార్థుల హాజరుపట్టిక

SEMESTER : Bridge Course 2018-19 I BSc. BZC

June

అడ్మిషన్ నెం. Admn. No.	వరుస నెం. S. No.	విద్యార్థి పేరు Name of the Student	వయసు / కులము Age-Cast	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	హాజరైన రోజులు Pres. days	శాతం	UNIT-II	సమాధానం Remarks
	1.	A Varun		/	/	/	/	A	/	/	/																								7	16		
	2.	B. Spandana		/	/	/	/	/	/	A	/																								7	16		
	3.	SK. Ameen		/	/	/	/	/	/	/	/																								8	18		
	4.	N. Vijay Sahit Kumar		/		A	/	/	/	/	/																								7	18		
	5.	G. Bhavanka		/	/	/	/	A	/	/	/																								7	16		
	6.	K. Sri Sahith		/	/	/	A	/	/	A	/																								6	16		
	7.	V. Suresh		/	/	A	/	/	/	A	/																								6	14		
	98.	A Sasonic Stu°		/	/	/	/	A	/	/	/																								7	18		
	9.	Ch. Sekhar Kumar		/	A	A	/	/	/	/	/																								6	14		
	10.	C. V. Thi. Vi. Ram Reddy		/	/	/	A	/	/	/	/																								7	16		
	11.	Sai Soothen		/	A	/	/	/	/	A	/																								6	14		
	12.	A. Venkateswarlu		/	/	/	/	A	/	/	/																								7	16		
	D.																																				

Bioanalytical Chem

HINDU COLLEGE, GUNTUR

(A NAAC ACCREDITED 'A' GRADE INSTITUTION)

DEPARTMENT OF COMPUTER SCIENCE

BRIDGE COURSE

2018 – 19

Smt. B. Udaya Lakshmi — HOD of Computer Science

Dr. Y. Gowri Sankar — Principal

Ph:0863-2227649

HINDU COLLEGE, GUNTUR – 522 003

(Re-accredited by NAAC as Grade 'A' with CGPA 3.07)

Main Road, Opp. Sri Venkateswara Vignan Mandir, Guntur

HCG/Bridge Course/Computer Science/June/2019/01 14- 06 - 2019

CIRCULAR

It is here by informed that Bridge Course for Computer Science will be conducted for all I B.Sc Computer Science combination I Semester Students as per the time table given below. The main objective of the course is to bridge the gap between subjects studied at Intermediate level and subjects they would be studying in undergraduate course, Hence all the Computer Science students are requested to attend the classes without fail to improve your skills.

BRIDGE COURSE SCHEDULE

Day	Time
17-06-2019 to 19-06-2019	10.00 – 10.50 AM
20-06-2019 to 22-06-2019	11.40 – 12.30 AM
24-06-2019 to 26-06-2019	10.00 – 10.50 AM
27-06-2019 to 29-06-2019	10.00 – 10.50 AM

(Y. GOWRI SANKAR)

Principal

PRINCIPAL
HINDU COLLEGE, GUNTUR

Bridge Course
Department Of Computer Science
Hindu College

==========

Bridge course is conducted before the first semester in order to prepare students to meet the requirements of under graduation course at HINDU COLLEGE, GUNTUR. Department of Computer Science of Hindu College developed a teaching module which helps to close the gap between two levels of competence. The Bridge Course inculcates skills and knowledge to enhance quality of Computer Science in higher education. Bridge course is an effort to work to galvanize skills and needs of the students as per the requirements of local and global conditionings. It gives opportunities to the students of all the faculties to persue additional need based and skill courses.

With a view to enhance the comprehension in subjects we frame a bridge course to first semester B.Sc. programme of Computer Science students. The essentials and fundamentals of Intermediate level Computer Science basics are necessary to understand the subject at an ease and this will lead to a better appreciation of the subject.

Objective

The bridge course aims to act as a buffer for the new entrants with an objective to provide adequate time for the transition to hardcore of degree courses. This givesthem a breather, to prepare themselves before the onset of courses for first year degree programme. During this interaction of TWELVE hours with the faculty and their classmates, the students will be equipped with the knowledge and the confidence needed to takeon bigger challenges in future.

Design

The course consists of 12hours of interactive sessions.

Syllabus

Computer Science is mother of all sciences. It is one module on Computer Science is incorporated in the fundamental subjects in the undergraduate bridge course. It would enable the students to curriculum. However, there is a gap in the grasp the

concepts of Computer Science quickly and Computer Science learnt at the intermediate level and the efficiently in the under graduation programme.

The Bridge Course was taken for first year Computer Science students. The first year students of the Computer Science department concerned for the same were those who did not have a previous background and (or) found the subject difficult to comprehend. The study material is prepared by the teaching faculty of the department concerned keeping into bringing the awareness in ICT tools in students

Students are made aware of the basics of the following topics:

Basics of Computer Science – 4 Hours

Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working – Central Processing Unit – I/O Devices - Primary, Auxiliary and Cache Memory – Memory Devices.

Operating System – 4 Hours

Software, Hardware, Firmware and People ware – Definition and Types of Operating System – Functions of an Operating System – MS-DOS – MS Windows – Desktop, Computer, Documents, Pictures, Music, Videos, Recycle Bin, Task Bar – Control Pane.

MS-Word Hours 4 Hours

Features of MS-Word – MS-Word Window Components – Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format – Page Borders and Shading – Inserting Symbols, Shapes, Word Art.

HINDU COLLEGE :: GUNTUR

Department of Computer Science

BRIDGE COURSE – ATTENDANCE SHEET

Class: I B.Sc Computer Science
Sections: M.P.Cs. and M.S.Cs.
Name of the Faculty member: Udaya Lakshmi
Designation: Lecturer in Computer Science

			Cl no.	1	2	3	4	5	6	7	8	9	10	11	12
Sl.No	Roll.No	Student Name	Date	17/6	18/6	19/6	20/6	21/6	22/6	24/6	25/6	26/6	27/6	28/6	29/6
1	1	M. MADHU		1	2	3	4	5	6	7	8	9	10	11	12
2	2	S. KHAJA SIRAJ			1	2		3	4	5		6	7	8	9
3	3	S. DEEPAK SAI		1		2	3	4	5	6	7	8		9	10
4	4	C. SANJAY		1	2	3	4	5	6	7	8	9	10	11	12
5	5	S. DURGA SAI		1	2		3	4	5		6	7	8	9	
6	6	D. MADHU BABU			1	2		3	4	5		6	7	8	9
7	7	M. ACHYUTH GANESH		1	2	3	4	5	6	7	8	9	10	11	12
8	8	T.KRISHNA MOHAN		1	2		3	4	5		6	7	8	9	
9	9	R.SIVA SAI		1	2		3	4	5		6	7	8	9	
10	10	G.VAMSI				1	2		3	4	5		6	7	8
11	11	V. BHAVANI PRASAD			1	2		3	4	5		6	7	8	9
12	12	D. GOPI CHAND		1	2	3	4	5	6	7	8	9	10	11	12
13	13	K SIVA TEJA		1	2	3	4	5	6	7	8	9	10	11	12

PRINCIPAL

PRINCIPAL
HINDU COLLEGE, GUNTUR

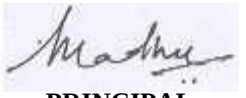
HINDU COLLEGE :: GUNTUR

Department of Computer Science

BRIDGE COURSE – ATTENDANCE SHEET

Class: I B.Sc Computer Science
Sections: M.P.Cs. and M.S.Cs.
Name of the Faculty member: Udaya Lakshmi
Designation: Lecturer in Computer Science

			Cl no.	1	2	3	4	5	6	7	8	9	10	11	12
Sl.No	Roll.No	Student Name	Date	17/6	18/6	19/6	20/6	21/6	22/6	24/6	25/6	26/6	27/6	28/6	29/6
14	14	P. BHAVANI PRASAD			1	2		3	4	5		6	7	8	9
15	15	B.SUBHANI													
16	16	N NIKIL BABU		1	2		3	4	5		6	7	8	9	
17	17	P. SRIKANTH			1	2		3	4	5		6	7	8	9
18	18	V. MAHESH		1	2		3	4	5		6	7	8	9	
19	19	M SAMEL		1	2		3	4	5	6		7	8	9	10
20	20	M. HARI PRIYA		1	2	3	4	5	6	7	8	9	10	11	12
21	21	B. DEEPIKA		1	2	3	4	5	6	7	8	9	10	11	12
22	22	R. MARIKARJUNA			1	2	3	4	5	6	7	8	9	10	
23	23	S.KALYAN			1	2	3	4	5	6	7	8	9	10	
24	24	G.VARDHAN KUMAR		1	2	3	4	5	6	7	8	9	10	11	12
25	25	P. SESIKUMAR		1	2	3	4	5	6	7	8	9	10		
26	26	K.SURESH		1	2	3	4	5	6	7	8	9	10	11	



PRINCIPAL

PRINCIPAL
HINDU COLLEGE, GUNTUR

BRIDGE COURSES

Spoken English Syllabus 2018-2019

DATE	SYLLABUS
15-06-2018	Introduction
18-06-2018	Grammar Introduction
19-06-2018	Units And Measurements
20-06-2018	Location And Position
22-06-2018	Basic Conversation
23-06-2018	My Family
25-06-2018	My Body And Health
26-06-2018	My Place
27-06-2018	My Finance
28-06-2018	My Career
29-06-2018	Reading And Speaking Exercises
30-06-2018	Writing And Listening Exercise

BRIDGE COURSES FINANCIAL ACCOUNTING SYALLABUS

DATE	SYALLABUS
15-06-2018	Introduction to Accounting, Need and Importance of Accounting
18-06-2018	Classification of Accounts and Conventions of Accounting
19-06-2018	Book-keeping and Golden Rules of Accounting & Accounting Cycle
20-06-2018	Accounting Equation
22-06-2018	Journal and Ledger Introduction
23-06-2018	Meaning and Process of Journalizing and Ledger posting rules
25-06-2018	Subsidiary Books – Need and Importance & Types of Subsidiary Books
26-06-2018	How to prepare Types of Subsidiary Books & Cash Journal of Subsidiary Books and its types – Introduction
27-06-2018	Final Accounts – Introduction, Need and Importance of Financial Accounting
28-06-2018	Trading and Profit & Loss A/C's – Introduction and its Proforma of Balance Sheet
29-06-2018	Adjustments Introductions – Need and Importance
30-06-2018	In adjustments, Outstandings expenses, Incomes Prepaid, Bad debts

BRIDGE COURSES FUNDAMENTALS OF COMPUTER SYLLABUS

DATE	SYALLABUS
15-06-2018	Definition of a computer
18-06-2018	Characteristics of computers
19-06-2018	Applications of computers
20-06-2018	Block diagram of a digital computer
22-06-2018	Classification of computers based on size and working
23-06-2018	Uses of computers, generations of computers
25-06-2018	Number systems: binary, hexa and octal
26-06-2018	Central processing unit Input / Output devices
27-06-2018	Memory devices
28-06-2018	Software, hardware, firmware and Peopleware
29-06-2018	Fundamentals of Internet
30-06-2018	Internet Applications

BRIDGE COURSES FINANCIAL ACCOUNTING SYALLABUS

DATE	SYALLABUS
12-06-2019	Introduction to Accounting, Need and Importance of Accounting
13-06-2019	Classification of Accounts and Conventions of Accounting
15-06-2019	Book-keeping and Golden Rules of Accounting & Accounting Cycle
17-06-2019	Accounting Equation
18-06-2019	Journal and Ledger Introduction
19-06-2019	Meaning and Process of Journalizing and Ledger posting rules
20-06-2019	Subsidiary Books and its types – Introduction
22-06-2019	Subsidiary Books – Need and Importance & Types of Subsidiary Books
24-06-2019	How to prepare Types of Subsidiary Books & Cash Journal
25-06-2019	Final Accounts – Introduction, Need and Importance of Financial Accounting
26-06-2019	Trading and Profit & Loss A/C's – Introduction and its Proforma of Balance Sheet
27-06-2019	Adjustments Introductions – Need and Importance
28-06-2019	Trading and Profit & Loss A/C's – balance sheets with adjustments
29-06-2019	In adjustments, Outstandings expenses, Incomes Prepaid, Bad debts

BRIDGE COURSES FUNDAMENTALS OF COMPUTERS SYALLABUS

DATE	SYALLABUS
12-06-2019	Definition of a computer
13-06-2019	Characteristics of computers
15-06-2019	Applications of computers
17-06-2019	Block diagram of a digital computer
18-06-2019	Classification of computers based on size and working
19-06-2019	Uses of computers, generations of computers
20-06-2019	Number systems: binary, hexa and octal
22-06-2019	Central processing unit
24-06-2019	Input / Output devices
25-06-2019	Memory devices
26-06-2019	Software, hardware, firmware and Peopleware
27-06-2019	Fundamentals of Internet
28-06-2019	Internet Applications
29-06-2019	World Wide Web – Introduction

HINDU COLLEGE :: GUNTUR
DEPT. OF COMMERCE
2018-19

Class: II BCom
Subject: Financial Accounts
No. of classes conducted: 12 days
Name of faculty:Ch.Neela Krishna Veni

SNO	ROLL NO	NAME OF THE STUDENT	NO. OF CLASSES ATTENDED
1	590	K.V.Pranati	11
2	596	Sd.Jafar	12
3	598	P.Chandra Teja	12
4	599	S.Kedarnadh	12
5	601	T. Bala Subramanyam	12
6	602	T.Swathi	12
7	603	V . Vamsi	12
8	604	Ch.Poorna Mahesh Kumar	10
9	606	V.Nagasarla	11
10	611	D. Janaki Sriram	10
11	613	G.Sravani	12
12	614	Sk.Siddiq	10
13	624	Y.Chaitanya	10
14	625	P.Gopi	11
15	703	K.Tirupathi Rao	11
16	718	B.Narasimha Rao	11
17	745	B.Naga Raju	11
18	748	D.Pavithra	11
19	753	P.Nagaraju	12
20	826	T.Daya Sagar	12
21	827	B.Blessy	11
22	829	P.Manoj	10
23	835	G.V.Sriram	12
24	838	Ch.Sravani	12
25	839	K.Mary Sravani	10
26	840	Sk.Jelani	12
27	841	K.Bindupriya	12
28	843	N.Sai Akhil	10
29	845	P.Anil Kumar	10
30	847	P.Siva Parvathi	11

HINDU COLLEGE :: GUNTUR
DEPT. OF COMMERCE
2018-19

Class: II Bcom
Subject: Spoken English
No. of classes conducted: 12 days
Name of faculty: T.Rama krishna

SNO	ROLL NO	NAME OF THE STUDENT	NO. OF CLASSES ATTENDED
1	590	K.V.Pranati	12
2	596	Sd.Jafar	11
3	598	P.Chandra Teja	10
4	599	S.Kedarnadh	11
5	601	T. Bala Subramanyam	10
6	602	T.Swathi	11
7	603	V . Vamsi	12
8	604	Ch.Poorna Mahesh Kumar	12
9	606	V.Nagasarla	12
10	611	D. Janaki Sriram	11
11	613	G.Sravani	12
12	614	Sk.Siddiq	11
13	624	Y.Chaitanya	12
14	625	P.Gopi	12
15	703	K.Tirupathi Rao	10
16	718	B.Narasimha Rao	11
17	745	B.Naga Raju	12
18	748	D.Pavithra	10
19	753	P.Nagaraju	10
20	826	T.Daya Sagar	10
21	827	B.Blessy	12
22	829	P.Manoj	12
23	835	G.V.Sriram	11
24	838	Ch.Sravani	11
25	839	K.Mary Sravani	12
26	840	Sk.Jelani	11
27	841	K.Bindupriya	11
28	843	N.Sai Akhil	11
29	845	P.Anil Kumar	11
30	847	P.Siva Parvathi	12

Ph:0863-2227649

HINDU COLLEGE, GUNTUR – 522 003

(Re-accredited by NAAC as Grade 'A' with CGPA 3.07)
Main Road, Opp. Sri VenkateswaraVignanMandir, Guntur

HCG/Bridge Course/Geology/June/2019/01 02-07-2018

CIRCULAR

It is here by informed that bridge course for geology will be conducted for I B.Sc. Geology semester– 1 students as per time table given below 2018-19 batch for **10 days.** The main objective of the course is to motivate both the slow and quick learners to enhance their Skills &Knowledge in**.** Hence all the geology students mentioned above are informed to attend the classes without fail to improve your skills.

BRIDGE COURSE SCHEDULE

Date	Time
02-7-2018 to 12-7-2018	11:40 to 12:30 am

Y. SREEKANTH
Convener

(G. MADHU)
Principal

PRINCIPAL
HINDU COLLEGE, GUNTUR

BRIDGE COURSE
….Educating the young minds

Bridge course is conducted before the first semester in order to prepare students to meet the requirements of under graduation course at HINDU COLLEGE GUNTUR .Department of Geology of Hindu college developed a teaching model which helps to close the gap between to levels of competence .The bridge course inculcate skills and knowledge to enhance quality of geology in higher education .Bridge course is an effort to work galvanize skills and needs of the students as per the requirements of local and global conditions .it gives opportunities to students of all the faculty to pursue additional need based and skill courses .

The essential and fundamentals of geology are necessary to understand the subject and this will lead to better appreciation of the subject.

OBJECTIVE:

The bridge course aims to act as a buffer for the new entrance with an objective to provide adequate time for the transition to hard core of degree courses. This gives them a breather to prepare themselves before the onset of courses for first year degree programme. During this interaction of TWELVE hours with the faculty and their classmates the students will be equipped with knowledge and the confidence needed to take on bigger challenges in future

DESIGN:

The course consists of twelve hours of interactive sessions

Special programmes for students

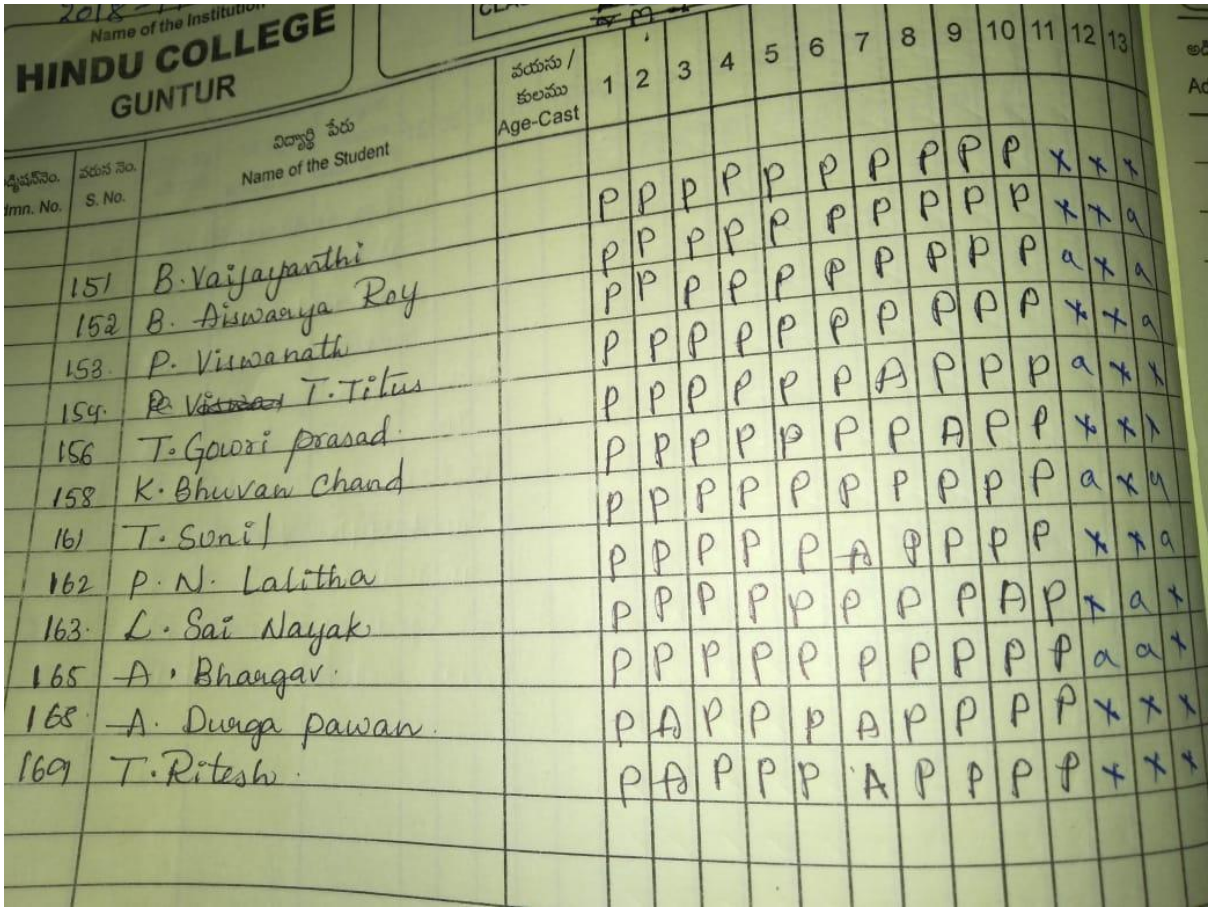
In order to motivate students remedial classes are organised to enhance their skills. Teaching faculty of department of geology designed programme for the benefit of geology students

- Good number of assessment tests are conducted
- Learning material prepared and provided to students for their reference
- Tutorial classes are also conducted with personal care of each and every student
- Extra classes are organised to clarify doubts critical topics are re-explained for better understanding by the students appropriate counselling with additional teaching is done which eventually results in students attending the classes regularly.

- Such students are given regular class tests in order to improve their performance in the university exam further faculty members revise the tough topic as per the students requisition and provide university question and discuss the way of presenting the answers in the exam to score marks

Syllabus

General aspects .definition of geology, basic assumption of geology, its relationship with other sciences branches of geology, aim and applications of geology, earth as a planet, its shape, size and density moment ,origin and age of the earth.



HINDU COLLEGE, GUNTUR

(A NAAC ACCREDITED 'A' GRADE INSTITUTION)

DEPARTMENT OF STATISTICS

BRIDGE COURSE 2018-19

2018 – 19

Dr. N. Viswam
HOD of Statistics

Dr. Y. Gowri Sankar
Principal

Ph:0863-2227649

HINDU COLLEGE, GUNTUR – 522 003

(Re-accredited by NAAC as Grade 'A' with CGPA 3.07)
Main Road, Opp. Sri Venkateswara Vignan Mandir, Guntur

HCG/Bridge Course/Statistics/June/2019/01 15-06 - 2018

CIRCULAR

It is here by informed that Bridge Course for Statistics will be conducted for all I B.Sc. /B.A. Statistics combination Semester I Students as per the time table given below. The main objective of the course is to bridge the gap between subjects studied at Intermediate level and subjects they would be studying in undergraduate course. Hence all the Statistics students are requested to attend the classes without fail to know the basics of Statistics.

BRIDGE COURSE SCHEDULE

Day	Time
19-06-2018 to 30-06-2018	10.50 – 11.40 AM

(Y.GOWRY SANKAR)
Principal

PRINCIPAL
HINDU COLLEGE, GUNTUR

Bridge Course

…Educating the young minds

Bridge course is conducted before the first semester in order to preparestudents to meet the requirements of under graduation course at HINDU COLLEGE, GUNTUR. Department of Statistics of Hindu College developed a teaching module which helps to close the gap between two levelsof competence. The Bridge Course inculcates skills and knowledge to enhance quality of Statistics in higher education. Bridge course is an effort to work to galvanize skills and needs ofthe students as per the requirements of local and global conditionings. It gives opportunities to the students of all the faculties to pursue additional need based and skill courses.

Syllabus

1. Central Tendency

- Mean
- Median
- Mode
- Geometric Mean
- Harmonic Mean

2. Measures of Dispersion

- Range
- Standard Deviation\
- Mean Deviation
- Quartile Deviation

3. Theory of Probability

- Definition of Probability
- Experiment
- Output
- Sample Space
- Trial
- Conditional Probability

- Independent Events

4. Random Variables

- Discrete Distributions, pmf
- Continuous Distributions, pdf

Name of the Institution

HINDU COLLEGE
GUNTUR

Student's Attendance Register June 2018

CLASS: I B.Sc./B.A. 2018-19

Dept. of Statistics

అడ్మిషన్‌నెం. Admn. No.	వరుస నెం. S. No.	విద్యార్థి పేరు Name of the Student	వయసు / కులము Age-Cast	19/6 1	20/6 2	21/6 3	22/6 4	23/6 5	25/6 6	26/6 7	27/6 8	9	10	11	12	13
1.		P. Bhavani Prasad		/	/	/	/	/	/	/	/					
2.		B. Sk. M. Subhani		/	/	/	/	/	.	/	/					
3.		J. Sudha Rani		/	/	/	/	/	/	/	/					
4.		P. Srikanth		/	/	/	/	/	/	/	.					
5.		R. Naga Jyothi		/	/	/	/	/	/	/	/					
6.		M. Srinivas		/	/	/	/	/	/	/	/					
7.		T. Rama Krishna		/	/	/	.	/	/	/	/					
8.		G. vardhan kumar		/	/	/	/	/	/	/	/					
9.		MD. Hussain khan		/	/	/	.	/	/	/	/					
10.		M. Hari Priya		/	/	/	/	/	.	/	/					
11.		M. Mohit		/	/	/	/	/	/	/	.					
12.		N. Bhanu Prasad		/	/	/	/	/	/	/	/					
13.		T. Swethaswi		/	/	/	/	/	/	/	/					
14.		A. Tulasi Priya		/	/	/	/	/	/	/	/					
15.		K. Aruna		/	/	/	/	/	/	/	/					
16.		A. Naga Sai Rudramanyu		/	/	/	/	/	/	/	/					
17.		R. Suresh Baby		/	/	/	.	/	/	/	/					
18.		M. Issac star		/	/	/	/	/	/	/	/					
19.		D. Ganga Siva Naga Prakash		/	/	/	/	/	/	/	/					
20.		R. Rishmika		/	/	/	/	/	/	/	/					
				M	M	M	M	M	M	M	M					

BRIDGE COURSE - 2018-19

Attendance

HINDU COLLEGE :: GUNTUR

DEPARTMENT OF ZOOLOGY

BRIDGE COURSE - ATTENDANCE SHEET

CLASS: I B.SC, ACADEMIC YEAR:2018-2019

SECTION: C.B.Z

NAME OF THE FACULTY MEMBERS : V. KUSUMA KUMARI & C.D.BALA SWAMY

DESIGNAION: LECTURES IN ZOOLOGY

S.NO	ROLL. NO	STUDENT NAME	DATE	19/6	20/6	21/6	22/6	24/6	25/6	26/6
1	101	A.VARUN		/	/	/	/	/	/	/
2	103	G.TRIVIKRAM		/	/	/	/	/	/	/
3	104	B.SPANDHANA		/	/	/	/	/	/	/
4	106	SK.AMREEN		/	/	/	/	/	/	/
5	107	DHARMA TEJA SINGH		/	a	/	/	a	/	/
6	108	N.VIJAY SAHITH		/	/	/	/	/	/	/
7	111	CH. RAJESH		a	/	/	/	/	a	/
8	112	Y.PRIYANKA		/	/	/	/	/	/	/
9	114	K.SAHIT		/	/	/	/	/	/	/
10	116	V.SURESH		/	/	a	a	/	/	/
11	117	Y.PRAVEEN KUMAR NAIK		/	/	/	/	a	/	/
12	118	A.VENKATESWARLU		/	/	/	/	/	/	/
13	123	A.SASANK SAI		/	/	/	a	/	/	/
14	125	CH.SESHU KUMAR		/	a	a	/	/	a	/
15	129	SK.THAHEER		/	/	/	/	/	/	/

Department of Zoology

Hindu College, Guntur

Bridge Course – Syllabus

1. Kingdom – Animalia
2. Chordates
3. Ecology and its Importance
4. Evolution
5. Aqua Culture

DEPARTMENT OF ZOOLOGY

HINDU COLLEGE: GUNTUR

BRIDGE COURSE – Q.P

1. The exploitation of aquatic organism is called
   a) Poultry b) Fishery
   c) Agriculture d) Dairy ( )

2. Lancelets belongs to sub phylum
   a) Cephaloctrorolata b) Urochorolata
   c) Vertebrata d) Cyclostomata ( )

3. Example for Parazoa is
   a) Fish b) Hydra
   c) Sponge d) Man ( )

4. Ecology of single species is
   a) Autecology b) Synecology
   c) Physiology d) Biology ( )

5. The word Organic evolution coined by
   a) Menolel b) Odom
   c) Darwin d) Herbert spencer ( )

6. Who proposed Mutation theory
   a) De vries b) Darwin
   c) Lamark d) Russel ( )

7. Culture of pearl oyster and sea weed is called
   a) Fishery b) Mari culture
   c) Api culture d) Seri culture ( )

8. Which organ gives support to the body
   a) Notochord b) Nerve cord
   c) Gill slits d) tail ( )

9. Heart of chordates is_____ in position
   a) Ventral b) dorsal
   c) Lateral d) None ( )

10. Tunicates are included in which subphylum
   a) Uro chordata b) Vertebrata
   c) Cephalo chordata d) Fishes ( )

11. Which organ is the unique habitat for hundreds of Species of microbes
   a) Lung b) Heart
   c) Intestine d) Liver ( )

12. In Subphylum vertebrata notochord is replaced by____
   a) Vertebral column b) Brain
   c) Bone d) cartilage ( )

13. Who done the decaudalization experiment
   a) Darwin b) weismann
   c) Lamarck d) Wallace ( )

14. The craft used in fishery is _____
   a) trap b) Cast nets
   c) dip net d) Raft ( )

15. Hardy and weinberg explained the _____ in the population.
   a) Equilibrium b) osmosis
   c) density d) Mortality ( )