

| National Institute of Technology, Raipur (C.G.) |                      |             |                          |              |   |    |                      |    |    |        |     |                      |                      |
|-------------------------------------------------|----------------------|-------------|--------------------------|--------------|---|----|----------------------|----|----|--------|-----|----------------------|----------------------|
| Course of Study & Scheme of Examination         |                      |             |                          |              |   |    | B.Tech. III Semester |    |    |        |     | Branch: Mining Engg. |                      |
| S.No.                                           | Board of Studies     | Sub. Code   | Subject Name             | Periods/week |   |    | Examination Scheme   |    |    |        |     | Total Marks          | Credits<br>L+(T+P)/2 |
|                                                 |                      |             |                          | L            | T | P  | TA                   | FE | SE | T.C.A. | ESE |                      |                      |
| 1                                               | Civil Engg.          | CI20311(MI) | Mech. of Solids & Fluids | 3            | 1 | -  | 20                   | 15 | 15 | 50     | 70  | 120                  | 4                    |
| 2                                               | Computer Sc. & Engg. | CS20312(MI) | Programming with C       | 3            | 1 | -  | 20                   | 15 | 15 | 50     | 70  | 120                  | 4                    |
| 3                                               | Applied Geology      | AG20313(MI) | Geology – I              | 3            | 1 | -  | 20                   | 15 | 15 | 50     | 70  | 120                  | 4                    |
| 4                                               | Mining Engg.         | MI20314(MI) | Mining Surveying – I     | 3            | 1 | -  | 20                   | 15 | 15 | 50     | 70  | 120                  | 4                    |
| 5                                               | Basic Science        | MA20315(MI) | Mathematics – III        | 3            | 1 | -  | 20                   | 15 | 15 | 50     | 70  | 120                  | 4                    |
| 6                                               | Mining Engg.         | MI20316(MI) | Introduction to Mining   | 4            | 1 | -  | 20                   | 15 | 15 | 50     | 70  | 120                  | 5                    |
| 7                                               | Applied Geology      | AG20321(MI) | Geology-I Lab            | -            | - | 3  | 30                   | -  | -  | 30     | 20  | 50                   | 2                    |
| 8                                               | Mining Engg.         | MI20322(MI) | Mining Surveying-I Lab   | -            | - | 3  | 30                   | -  | -  | 30     | 20  | 50                   | 2                    |
| 9                                               | Computer Sc. & Engg. | CS20323(MI) | Programming with C Lab   | -            | - | 3  | 30                   | -  | -  | 30     | 20  | 50                   | 2                    |
| 10                                              | Humanities           | HS20324(MI) | Value Education          | -            | - | 2  | 25                   | -  | -  | 25     | -   | 25                   | 1                    |
| 11                                              | Mining Engg.         | MI20325(MI) | Discipline               | -            | - | -  | 25                   | -  | -  | 25     | -   | 25                   | 1                    |
|                                                 |                      |             | Total                    | 19           | 6 | 11 | 260                  | 90 | 90 | 440    | 480 | 920                  | 33                   |

**Note :** For attendance of a student in every theory and practical class, the teachers are supposed to keep records ultimately in the following format which will be included in the semester mark-sheets.

| Format for attendance |  |  |        |              |
|-----------------------|--|--|--------|--------------|
| Attendance            |  |  |        | Category     |
| > 85                  |  |  | -----> | High “H”     |
| > 70 & < 85           |  |  | -----> | Medium “M”   |
| > 60 & < 70           |  |  | -----> | Low “L”      |
| < 60                  |  |  | -----> | Detained “D” |

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**DEPARTMENT OF MINING ENGINEERING**  
**SYLLABUS**

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|                      |                              |                        |             |
|----------------------|------------------------------|------------------------|-------------|
| Name of Subject:     | Mechanics of Solids & Fluids | Subject Code:          | CI20311(MI) |
| Semester:            | B.Tech. III Sem.             | Board of Studies:      | Civil Engg. |
| Maximum Marks:       | 70                           | Minimum Marks:         | 25          |
| Lecture Periods/Week | Tutorial Periods/Week        | Practical Periods/Week | Credits     |
| 3                    | 1                            | 0                      | 4           |

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**UNIT-1 Concept of Stress and Strain**

Stress and strain at a point; Axial and shear stresses, Ultimate and working stresses; Relation between stress and strain, Poisson's Ratio; Two dimensional state of strain, Principle stresses and Principle planes, Mohr's Circle, Two state of strain, Principle strains and principle axis of strain; Determination of Principle strain from strain measurements; Calculation of Principle stresses from Principle strains; Composite bars in tension and compression; Thermal stresses in composite bars.

**UNIT-2 Bending Stresses in Beams and plates**

Pure bending, Bending Stresses, Section Modulus of rolled and built up sections, Composite beams, Distribution of normal and shear stresses across the section of a simple beam with vertical section of symmetry; Theory of plates.

**UNIT-3 Deflection of beams**

Slope and deflection of beams by deflection methods; Area moment and conjugate beam methods, propped cantilever and fixed beams.

**UNIT-4 Introduction to Fluid Mechanics**

Physical properties of fluids; Compressible and Incompressible fluids; Newtonian and Non-Newtonian fluids.

**UNIT-5 (A) Fluid Statics**

Pressure, density and height relationships; manometer pressure on curved and plane surfaces; Centre of Pressure; Buoyancy; Stability of Immersed and Floating bodies; Fluids in relative equilibrium.

**UNIT-5 (B) Fluid Kinematics**

Classification of flow: Uniform and Non-Uniform; Steady and Non- Steady; Laminar and Turbulent; One, Two, Three dimensional flows; Stream lines; Streak lines; Path lines; Stream Tubes; Elementary Explanation of stream function and velocity potential; Basic idea of flow nets.

**Text Books:**

1. Strength of material by B.S. Punmiya
2. Strength of material by Ramamurtham
3. Fluid Mechanics by Bansal

**Reference Books:**

1. Fluid Mechanics, F. M. White

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**DEPARTMENT OF MINING ENGINEERING**  
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|----------------------|-----------------------|------------------------|--------------|
| Name of Subject:     | Programming with C    | Subject Code:          | CS20312(MI)  |
| Semester:            | B.Tech. III Sem.      | Board of Studies:      | Computer Sc. |
| Maximum Marks:       | 70                    | Minimum Marks:         | 25           |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits      |
| 3                    | 1                     | 0                      | 4            |

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**Unit – 1**

Algorithms and Flowcharts, Introduction to C Language: Relevance of C Language. Data types, Enums, Types of instructions, input/output functions. Operators, precedence and associativity of operators. Type casting, Developing simple C programs, compilation, C Compilers , debugging and testing of programs.

**Unit – II**

Conditional constructs: if statement, if-else statements, nested if-else ,forms of if. Conditional operator, Switch case construct. Loop control structures, nested loops, break and continue statements. goto statement.

Arrays: Syntax and definition, one and multidimensional arrays, reading and writing an array. Introduction to Pointer data types, Pointers and arrays.

**Unit – III**

Functions: Declaring and defining functions, call by value, call by reference, using library functions in programs, Passing arrays into functions. Storage classes, Recursion. Preprocessor directives - #if, #else if, #define etc. Macro definitions

**Unit – IV**

Strings: reading and writing strings, passing a string into a function, using library functions to manipulate strings. Array of strings. Structures: Declaring and using structures. Array of structures, passing structures into function. Pointers to structures Bit fields. Unions.

**Unit – V**

File Handling : reading and writing text files through C programs . File manipulating functions: fputc, fgetc, fgets, fputs, fseek, ftell etc. Working with Binary files , fread and fwrite. Command line arguments. Bitwise operators in C.

**Text Books:**

1. Let us C – Yashwant Kanetkar BPB Publication
2. Programming in ANSI C – E. Balaguruswamy Tata Mc-Graw Hill

**Reference Books:**

1. Programming with C – Ritchie

## DEPARTMENT OF MINING ENGINEERING SYLLABUS

|                      |                       |                        |                 |
|----------------------|-----------------------|------------------------|-----------------|
| Name of Subject:     | Geology-I             | Subject Code:          | AG20313(MI)     |
| Semester:            | B.Tech. III Sem.      | Board of Studies:      | Applied Geology |
| Maximum Marks:       | 70                    | Minimum Marks:         | 25              |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits         |
| 3                    | 1                     | 0                      | 4               |

### UNIT 1: The Earth in Space and Time

Solar System: - Size, Shape, Mass and Density of Earth; A Brief idea of the origin and the age of the Earth; Interior of the Earth:- seismic data, Density and Pressure within the Earth; The internal structure and composition of Earth; Elementary knowledge of Diastrophism, Earthquakes and volcanism:- Volcanic and Earthquake belts, their relationship with Plate Tectonics.

### UNIT 2: Mineralogy

Physical Properties of Minerals; Classification of various Rock forming Minerals; Introduction and preliminary study of principle Rock-Forming Mineral groups:- Garnet, Pyroxene, Amphibole, Mica, Feldspar and Felspathoid, Megascopic Properties of economically important Non-Silicate Minerals.

### UNIT 3: Igneous and Metamorphic Petrology

Elementary knowledge of Magma and its Crystallization; Classification of Igneous Rocks; Textures and Structures of Igneous Rocks; Petrographic Description of Common Igneous Rocks; Agents and Types of Metamorphism; Depth zones, Facies and Grades of Metamorphism and Petrographic Description of Common Metamorphic Rocks.

### UNIT 4: Sedimentary Petrology

Textures and Structures of Sedimentary Rocks; Sedimentary Processes- Weathering, Transportation and Deposition; Classification and Petrographic Description of Common Sedimentary Rocks.

### UNIT 5: Structural Geology

Concept of Deformation; Primary and Secondary Planar & Linear Structure of Rocks; Topography and its Representation. Altitude of strata- Dip and strike; Outcrop patterns; Width of Outcrop and Thickness of beds; Structural Contours; Geological Maps; Study of Unconformity; Folds, Joints, Faults and their influence in Mining Operations.

#### Text Books:

1. Engineering And General Geology : Parbin Singh
2. Physical And Engineering Geology : S.K. Garg
3. Rutley's Elements of Mineralogy : H.H. Read
4. Principles Of Petrology : G.W. Tyrell

#### Reference Books:

1. Structural Geology : M.P. Billings
2. Geological Maps : G.W. Chiplonkar
3. A Text Book of Geology : P.K. Mukherjee
4. Applied Geology : S. Banger
5. Applied Geology : D.V. Reddy
6. Engineering Geology : D.V. Reddy
7. Geology of India (Vol I&II) : R. Vaidyanadhan & M. Ramakrishnan

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**DEPARTMENT OF MINING ENGINEERING**  
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|----------------------|-----------------------|------------------------|--------------|
| Name of Subject:     | Mining Surveying-I    | Subject Code:          | MI20314(MI)  |
| Semester:            | B.Tech. III Sem.      | Board of Studies:      | Mining Engg. |
| Maximum Marks:       | 70                    | Minimum Marks:         | 25           |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits      |
| 3                    | 1                     | 0                      | 4            |

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**UNIT 1: Chain Survey**

Linear Measurements; Types of chains; Tapes; Errors in chaining and corrections in linear measurements; Direct and indirect Ranging; Principles of chain surveying. Offsets, Limiting length of offsets; Booking field notes; Obstacles in chaining; Instruments for setting out right angles.

**UNIT 2: Compass Survey**

Theory of Magnetism; Dip of Magnetic needle; Prismatic Compass; Surveyor's Compass; Bearings; Designation of Bearings; Calculation of Included Angles; Local Attraction; Magnetic Declination.

**UNIT 3: Plane Table Surveying**

Principles of Plane Tabling; Working operations; Methods of Plane Table Surveying; Two and Three point problems.

**UNIT 4: Miner's Dial**

Construction, Use, Tests and Adjustments; Loose and fast Needle surveying; Common sources of errors in Dial surveying; Methods of elimination and compensation.

**UNIT 5: Levelling**

Definitions of important terms used in levelling; Development in levelling Instruments; Types and Constructional details of Dumpy Level, Auto Level; Temporary and Permanent Adjustments; Methods of levelling; Straight edge levelling; Fly levelling; Check levelling; Reciprocal levelling; Longitudinal Sections; Cross- Sectioning; Trigonometric levelling; Methods of booking and reduction of levels; Levelling through drifts and shafts (Including steeply inclined shafts) ; Plumbing measurements of depth of shaft and subsidence.

**Text Books:**

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia

**Reference Books:**

1. Surveying & Levelling by Kanetkar & Kulkarni

**DEPARTMENT OF MINING ENGINEERING**  
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|----------------------|-----------------------|------------------------|-------------|
| Name of Subject:     | Mathematics-III       | Subject Code:          | MA20315(MI) |
| Semester:            | B.Tech. III Sem.      | Board of Studies:      | Basic Sc.   |
| Maximum Marks:       | 70                    | Minimum Marks:         | 25          |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits     |
| 3                    | 1                     | 0                      | 4           |

**Unit - 1 Fourier Series**

Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

**Unit - 2 Laplace Transform**

Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by  $tn$ , Division by  $t$ , Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

**Unit - 3 Partial Differential Equation**

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

**Unit - 4 Complex Variable**

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

**Unit - 5 Statistics**

Random variables, Discrete & continuous probability distributions, Expectation, Mean & Standard Deviation, Moments & moment generating function, Distributions- Binomial, Poisson and Normal distributions.

**Text Books:**

1. Higher Engg. Mathematics by Dr. B.S. Grewal– Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

**Reference Books:-**

1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N. Wartikar & J.N. Wartikar. Vol- II– Pune Vidyarthi Griha Prakashan, Pune.
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.

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**DEPARTMENT OF MINING ENGINEERING**  
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|----------------------|------------------------|------------------------|--------------|
| Name of Subject:     | Introduction to Mining | Subject Code:          | MI20316(MI)  |
| Semester:            | B.Tech. III Sem.       | Board of Studies:      | Mining Engg. |
| Maximum Marks:       | 70                     | Minimum Marks:         | 25           |
| Lecture Periods/Week | Tutorial Periods/Week  | Practical Periods/Week | Credits      |
| 4                    | 1                      | 0                      | 5            |

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**UNIT 1: Exploratory Drilling**

Drilling machines used for exploratory drilling viz. Rotary & Percussive, their attachments; Core Barrels; Conditions of applicability of drilling methods; Borehole Survey, Directional drilling, Underground methods of exploratory drilling.

**UNIT 2: Drivage of Inclines/Drifts/Adits**

Types of Openings; Choice of Openings; Location of Openings; Drilling, blasting, loading and transportation of muck during drivage of inclines/adits/drifts, Ventilation, lighting and drainage, Extension of center line; Organization and cycle of operations; Mechanized methods of drivages of inclines/adits/drifts.

**UNIT 3: Shaft Sinking**

Drilling, blasting, loading and transportation of muck, Ventilation, lighting and drainage, Extension of center line; Shaft lining and its design; Special methods of shaft sinking; Shaft boring; Deepening and widening of shafts. Upward drivage; Organization and cycle of operations.

**UNIT 4: Introduction to Underground Mining**

Definition of important terms, Mine development, Activities involved in development of a mine, Stages in the life of a mine, Introduction to unit operations in underground mining. Choice of method of mining, Introduction to various Underground Mining methods. Introduction to various types of machineries used in Underground mining.

**UNIT 5: Introduction to Surface Mining**

Definition of important terms, Advantages and disadvantages of surface mining, mineral deposits amenable to surface mining, Various surface mining methods, Introduction to unit operations in surface mining. Introduction to various types of machineries used in surface mining.

**Text Books:**

1. Surface Mining : G.B. Misra
2. Mining Engineer's Handbook Vol. 1&2, 2 Edition: Edited by Harold Hartman
3. Introduction to mining : Hartman

**Reference Books:**

1. U.M.S. Notes
2. Elements of Mining Technology Vol. 1&3 : D.J.Deshmukh
3. Mining of Mineral Deposits : Shevyakov
4. Modern Coal Mining : Samir Kumar Das
5. Coal Mining : R.D.Singh
6. Mining : Boki

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**DEPARTMENT OF MINING ENGINEERING**  
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|----------------------|-----------------------|------------------------|-----------------|
| Name of Subject:     | Geology-I Lab         | Subject Code:          | AG20321(MI)     |
| Semester:            | B.Tech. III Sem.      | Board of Studies:      | Applied Geology |
| Maximum Marks:       | 20                    | Minimum Marks:         | 10              |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits         |
| 0                    | 0                     | 3                      | 2               |

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**List of Experiments:**

1. Megascopic Description of Rock Forming Minerals.
2. Megascopic Description of important Igneous, Sedimentary, Metamorphic Rocks.
3. Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips, Rules of V's.
4. Study of Geological Maps and Preparation of Cross Sections.

**Text Books:**

1. Engineering And General Geology : Parbin Singh
2. Physical And Engineering Geology : S.K. Garg
3. Rutley's Elements of Mineralogy : H.H. Read
4. Principles Of Petrology : G.W. Tyrell

**Reference Books:**

1. Structural Geology : M.P. Billings
2. Geological Maps : G.W. Chiplonkar

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**DEPARTMENT OF MINING ENGINEERING**  
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|----------------------|-------------------------|------------------------|--------------|
| Name of Subject:     | Mining Surveying -I Lab | Subject Code:          | MI20322(MI)  |
| Semester:            | B.Tech. III Sem.        | Board of Studies:      | Mining Engg. |
| Maximum Marks:       | 20                      | Minimum Marks:         | 10           |
| Lecture Periods/Week | Tutorial Periods/Week   | Practical Periods/Week | Credits      |
| 0                    | 0                       | 3                      | 2            |

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**List of Experiments:**

**Experiment 1.**

Ranging and Chaining of line of 50 Meter.

**Experiment 2.**

Determination of width of an obstacle which can be seen across but can't be chained.

**Experiment 3.**

Determination of area of a field by Cross staff survey.

**Experiment 4.**

Study of various types of chained.

**Experiment 5.**

Determination of included angle with the help of a Prismatic Compass.

**Experiment 6.**

Plotting a closed traverse and elimination of errors.

**Experiment 7.**

Determination of width of an inaccessible obstacle by intersection.

**Experiment 8.**

Determination of location of instrument station by two point problem.

**Experiment 9.**

Determination of location of instrument station by two point problem.

**Experiment 10.**

Determination of location of instrument station by three point problem.

**Experiment 11.**

Study of Miner's dial.

**Experiment 12.**

Study of Dumpy level.

**Experiment 13.**

Determination of difference in elevation and gradient between two stations using dumpy level.

**Experiment 14.**

Fly leveling by Tilting level.

**Experiment 15.**

Longitudinal sectioning by Level.

**Text Books:**

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia

**Reference Books:**

1. Surveying & Levelling by Kanetkar & Kulkarni

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**DEPARTMENT OF MINING ENGINEERING**  
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|----------------------|------------------------|------------------------|--------------|
| Name of Subject:     | Programming with C Lab | Subject Code:          | CS20323(MI)  |
| Semester:            | B.Tech. III Sem.       | Board of Studies:      | Computer Sc. |
| Maximum Marks:       | 20                     | Minimum Marks:         | 10           |
| Lecture Periods/Week | Tutorial Periods/Week  | Practical Periods/Week | Credits      |
| 0                    | 0                      | 3                      | 2            |

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**List of programs (should not be less than 10):**

1. Write a program to take the radius of a sphere as input and print the volume and surface and surface area of that sphere.
2. Write a program to take a 5-digit number as input and calculate the sum of its digits.
3. Write a program to take three sides of a triangle as input and verify whether the triangle is an isosceles, scalene or an equilateral triangle.
4. Write a program that will take 3 positive integers as input and verify whether or not they form a Pythagorean triplet or not.
5. Write a program to print all the Prime numbers between a given range.
6. Write a program to define a function that will take an integer as argument and return the sum of digits of that integer
7. Write a program to define a macro that can calculate the greater of two of its arguments. Use this macro to calculate the greatest of 4 integers.
8. Write a program to define a recursive function that will print the reverse of its integer argument.
9. Write a program to print the sum of first N even numbers using recursive function.
10. Write a program to sort an array using Bubble sort technique.
11. Write a program that will take the elements of two integer arrays of 5 element each, and insert the common elements of both the array into a third array (Set intersection)
12. Write a program to take 5 names as input and print the longest name.
13. Write a program to define a structure Student that will contain the roll number, name and total marks of a student. The program will ask the user to input the details of 5 students and print the detail of all the students whose total marks is greater than a given value.
14. Write a program to define a union Contact that will contain the members Mobile no and E- mail id. Now define a structure Employee that will contain name, roll number, mode of contact (mob/e-mail) and a variable of type Contact as members. The program will ask the user to give the details of two Employees including mode of contact and the contact num/ E- mail. Print the details of both the Employees.
15. Write a program that will ask the user to input a file name and copy the contents of that file into another file.
16. Write a program that will take any number of integers from the command line as argument and print the sum of all those integers.

**Text Books:**

1. Let us C – Yashwant Kanetkar BPB Publication
2. Programming in ANSI C – E. Balaguruswamy Tata Mc-Graw Hill

**Reference Books:**

2. Programming with C – Ritchie