JHARKHAND RAI UNIVERSITY

MINING ENGINEERING

B.Tech

SYLLABUS

SEMESTER I

Kamre | Ratu Road | Ranchi | Jharkhand

Web : www.jru.edu.in **| Email :** info@jru.edu.in

B.TECH SEMESTER I

B.TECH IN MINING ENGINEERING											
SEMESTER I											
			Periods			Evaluation Scheme				Subject Total	Credit	Hours
S.No.	Subject Code	Name of Subject	L	T	P	Assignment	TA	Total	ESE			
1	9.101	Engineering Mechanics	3	0	0	20	10	30	70	100	3	3
2	9.102	Computer Programming	2	0	0	20	10	30	70	100	2	3
3	9.103	Mathematics I	3	0	0	20	10	30	70	100	3	3
4	9.104	Applied Chemistry	3	0	0	20	10	30	70	100	3	3
5	9.105	Applied Physics I	3	0	0	20	10	30	70	100	3	3
6	40B.101	Life Skills I	2	0	0	20	10	30	70	100	2	2
PRACTICAL/DESIGN/DRAWING/SESSIONAL												
1	9P.101	Engineering Mechanics Lab			2		20	20	30	50	1	2
2	9P.102	Computer Programming Lab			2		20	20	30	50	1	2
3	9P.104	Applied Chemistry Lab			2		20	20	30	50	1	2
4	9P.105	Applied Physics I Lab			2		20	20	30	50	1	2
5	9P.106	Engineering Graphics I			4		20	20	30	50	2	4
6	9P.107	Work Shop Practice I			4		20	20	30	50	2	4
								TOTAL		900	24	33

➢ **MOOCS introduced through SWAYAM in all semester.**

JHARKHAND Rai University

Program: B.Tech
Semester: First
Course: Engineering Mechanics
Course Code: 9.101

L	T	P	C
3	0	0	3

Course Objective:

- ➤ To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.
- ➤ Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration
- ➤ Ability to analyze the forces in any structures.
- ➤ Upon completion of this course, the students can able to apply mathematical knowledge to calculate the deformation behavior of simple structures.
- ➤ Critically analyze problem and solve the problems related to mechanical elements and analyse the deformation behavior for different types of loads.
- ➤ Use scalar and vector analytical techniques for analyzing forces in statically determinate structures
- ➤ Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
- ➤ Apply basic knowledge of Math and physics to solve real-world problems.
- ➤

Unit I

Fundamental of Mechanics-Basic Concepts, Force System and Equilibrium: Force ,moment and couple, Principle of Transmissibility, Varignon's theorem ,Resultant of force system .Concurrent and non-Concurrent coplanar force, free body diagram, Equilibrium Equations and their uses in solving elementary engineering problems.

Unit II

Plane Trusses: The structural Model, simple Trusses, analysis of simple Trusses: method of joints, method of sections. Graphical method. Friction: Introduction, law of coulomb friction, simple contact friction problems, belt friction the square screw thread, rolling resistance.

Unit III

Properties of surfaces: First moment of an area and Centroid, second moment and product of area of a plane area, transfer theorems, relations between second moment and product of area, polar moment of inertia, principal axes, and mass moment of inertia.

Unit IV

Virtual work: Work of a force, principle of virtual work and its application .Kinematics of rigid bodies: Plane motion, Absolute motion, Relative motion, Translating axes. Kinetics of Rigid bodies: Plane motion, work and energy, Impulse and momentum

Suggested Reading:

1. *A Textbook of Engineering Mechanics By D S KUMAR*
2. *A Textbook of Engineering Mechanics By R S KHURMI*
3. *A Textbook of Engineering Mechanics By S.S. BHAVIKATTI*
4. *A Textbook of Engineering Mechanics By R.K.BANSAL*

JHARKHAND Rai University

Program: B.Tech
Semester: First
Course: Engineering Mechanics Lab
Course Code: 9P.101

L	T	P	C
0	0	2	1

List of Experiments:

1. To verify the polygon law of coplanar Forces for a concurrent force system.
2. To find experimentally the reactions at the supports of a simply supported beam and verify the same with analytical values.
3. To verify the principle of moments using the bell crank lever apparatus.
4. To determine the coefficient of static friction between two surfaces.
5. To find screw jack and determine the coefficient of friction between the threads of the screw.
6. To estimate the value of acceleration due to gravity using a compound pendulum.
7. To determine the VR, MA and Efficiency of Screw Jack.
8. To determine the VR, MA and Efficiency of worm and worm wheel machine.
9. To determine the VR, MA and Efficiency of Winch Crab.

JHARKHAND Rai University

Program: B.Tech
Semester: First
Course: Computer Programming
Course Code: 9.102

L	T	P	C
2	0	0	2

Course Objective:

➢ At the end of the course, the student should be able to design C Programs for problems & write and execute C programs for simple applications.

➢ At the end of the course, the student should be able to apply good programming design methods for program development, design and implement C programs for simple applications and develop recursive programs.

Unit I

Problem Solving & Program Planning: Need for problem solving and planning a program. Program design tools - algorithms, flow charts. Program design tools: pseudo codes and decision tables.

Unit II

Basics: Structure of C Program. Programming rules, C Character Set, keywords .Basics: Identifiers, data types, operators, constants and variables, Operators & Expressions.
Handling Input/ Output: Formatting input & output functions .Control Statements: For, do while, while .Decision making statements – if, else if. Control transfer statements - break, continue.

Unit III

Functions: Defining and accessing a function. Passing arguments – call by value, Intro to Pointers & call by address. Function prototypes, recursive functions. Storage Classes: Storage classes and their usage.

Unit IV

Arrays and Strings: Defining arrays; I/O of arrays. I/O of string data; built-in library functions to manipulate strings, array of strings. Structures & Unions: Defining and processing structures .Array of structures, nested structures, Unions & difference from Structures. Intro to File Handling: Opening, reading, writing & closing files.

Suggested Reading:

1. E. Balagurusamy – Programming in ANSI C, 3rd Edn. , TMH, New Delhi, 2004
2. Programming with C, B.S.Gottfried (TMH)
3. Y. Kanetkar – Let us C, 4th Edition, BPB Publication, New Delhi; 2002
4. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
5. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press

JHARKHAND Rai University

Program: B.Tech
Semester: First
Course: Computer Programming Lab
Course Code: 9P.102

L	T	P	C
0	0	2	1

List of Experiments:

1. Write a program in C to print "Hello".
2. Write a program in C to add 3 integer numbers.
3. Write a program in C to print your name 10 times.
4. Write a program in C to find factorial of the given number.
5. Write a program in C to find greatest of two numbers using conditional operator.
6. Write a program in C to check whether the given number is even or odd.
7. Write a program in C to swap two numbers using a temporary variable.
8. Write a program in C to swap two numbers without using a temporary variable.
9. Write a program in C to find the greatest of three numbers.
10. Write a program in C to check whether the given number is a prime.
11. Write a program to print the following pattern:

```
        1
1       2

1       2       3

1       2       3       4

1       2       3       4       5
```

12. Write a program to print the following pattern:

```
1
2       2
3       3       3
4       4       4       4
5       5       5       5       5
```

13. Write a program in C to enter a three digit number and find the reverse of it.
14. Write a program in C to enter a three digit number and find the sum of its digits.
15. Write a program in C to enter 10 numbers in an array and print them.
16. Write a program in C to compare two strings using strcmp() function.
17. Write a program in C to concatenate two strings using strcat() function.
18. Write a program in C to find the length of a string using strlen() function.
19. Write a program in C that returns 3 numbers from a function.
20. Write a program in C to enter a number and print its value and address with the help of pointer.
21 Write a program in C to enter two numbers and find summation using pointer.
22. Write a program in C to enter a 3x2 matrix and print it.
23. Write a program in C to enter a 2x3 matrix and print its transpose.
24. Write a program in C to define a structure book bank that would contain title, author, pages and price. Using this structure read this information for one book from keyboard and prints the same on the screen.
25. Write a program in C to define a union student detail that would contain name, course, roll and age. Using this union, read this information for one student from keyboard and print the same on the screen.

Program: B.Tech
Semester: First
Course: Mathematics I
Course Code: 9.103

L	T	P	C
3	0	0	3

Course Objective:

> To familiarize the student with functions of several variables. This is needed in many branches of engineering.
> To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications?
> To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
> Students will simplify and evaluate algebraic expressions.
> Students will form and solve linear equations in one variable.
> Students will form and graph linear equations in two variables.
> Students will solve nonlinear equations using analytic methods

Unit I

Differential Calculus: Successive Differentiation. Leibnitz's Theorem Rolle's Theorem. Lagrange's and Cauchy's mean value Theorem. Generalized Mean value Theorem. Taylor's and Maclaurin's infinite series Tangents and Normal Curvature.

Unit II

Functions of two variables .Partial derivatives. Euler's Theorem on Homogeneous functions. Its generalization and extension. Total differential and derivatives. Taylor's series in case of two variables. Maxima and Minima of two variables. Lagrange's method of Un-determined multipliers in case of two and three variables. Jacobian.

Unit III

Integral Calculus: Integration of rational and irrational functions. Integration of special trigonometric function, Reduction Formula for trigonometric functions. Beta and gamma functions. Area, length, volume and surface area.

Unit IV

Infinite series: Convergency and Divergency of infinite series. Tests for Convergence. Comparison Test, Auxiliary series, Cauchy's root test. D' Alembert's ratio test, Raabe's Test, De-Morgan and Bertrand's test. Alternating Series, Leibnitz's rule for Alternating series, Absolute Convergence.

Suggested Reading:

1. H.K. Dass, "Advance Engineering Mathematics"; S.Chand &Co., 9th Revised Ed., 2001.
2. B.S. Grewal, "Higher Engineering Mathematics".
3. E. Kreyszig, "Advance Engin

Program: B.Tech
Semester: First
Course: Applied Chemistry
Course Code: 9.104

L	T	P	C
3	0	0	3

Course Objective:

- ➢ Chemistry is the base of all the scientific and technical courses.
- ➢ The knowledge gained on polymer chemistry, thermodynamics, spectroscopy, phase rule and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.
- ➢ The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameter.

Unit I

Chemical bonding: Brief study of periodic table. (Ionization energy, electron affinity, & electro negativity). Valence bond theory, vesper theory, mot for diatomic molecules, coordination complexes & ligands, Crystal field theory, colour & magnetic properties of coordination complexes. Spectro chemical series KINETICS AND CATALYSIS: Kinetics of chain reactions, parallel reactions, side reactions, fast reactions in solutions flash photolysis, study of catalyst, application of catalyst in industrial importance (Haber's process).

Unit II

Thermo chemistry and fuels: Hess's law , entropy, enthalpy and combustion calculations, characterization and application of fossil fuels, solid fuels[1], liquid fuels[2] [1](carbonization and gasification), [2](refining, reforming, petrol and diesel, knocking and anti knocking properties, octane and cetane numbers), gaseous fuels (water gas, producer gas, coal gas and biogas), lubricants and its properties.

Unit III

Electrochemistry and corrosion sciences: Redox process cell, potential and free energy, galvanic cell, electrolysis and Nernst's equation .electrochemical corrosion, general method of corrosion prevention, fundamentals of spectrometric techniques.

Unit IV

Micro molecules (polymers): Basic concepts of organic chemistry, study of different functional groups, isomerism, addition and condensation polymerization reaction, molecular weights of polymers (m_n, m_w, m_v), glass transition temperature(t_g), synthesis of commercially important polymers and their uses(nylon 6, nylon 6,6, pe , pet, ps, pvc), an introduction to green chemistry.

Suggested Reading:

1. *Engineering Chemistry By Jain & Jain(Dhanpat Rai Publication)*
2. *Engineering Chemistry By O P Agarwal (Khanna Publication)*

Program: B.Tech
Semester: First
Course: Applied Chemistry I Lab
Course Code: 9P.104

L	T	P	C
0	0	2	1

List of Experiments:

A. volumetric experiments

  (1) Study of indicators.
  (2) Estimation of hcl solution supplied titrating it against n/10 hcl solution.
  (3) Estimation of naoh solution titrating it against n/10 oxalic acid solution.
  (4) To determine the strength of given kmno4 solution supplied.

B. Content based analysis preparation of potash alum.

C. Salt analysis.

  (1) Wet test for acid radicals confirmatory test
  (2) Dry test for acid radicals
  (3) Wet test for acid radicals.

Program: B.Tech
Semester: First
Course: Applied Physics I
Course Code: 9.105

L	T	P	C
3	0	0	3

Course Objective:

➢ An ability to apply Knowledge of mathematics, science and engineering.
➢ An ability to design and conduct experiments, as well as to analyze and interpret data.
➢ An ability to function on multidisciplinary teams.
➢ An ability to identify, formulate and solve engineering problems.

Unit I

Waves and Oscillations: (SS*: Wave motion: longitudinal and transverse waves, plane waves phase velocity). Wave packets and group velocity, wave equation, superposition of wave equation of motion of simple harmonic oscillator and solutions, damped harmonic motion and forced oscillations.

Unit II

Fields: Vector and scalar fields, physical and mathematical concepts of gradient divergence and curl (Cartesian coordinates only), Gauss's theorem and Stokes' theorem.

Unit III

Electromagnetic Theory: Gauss's law in integral and differential form, electric potential and relation with E, (SS*- capacitance and electrostatic energy density) dielectrics ,three electric vectors, dielectric susceptibility boundary conditions on E and D. Amperes law in integral and differential form, applications. Hall effect, three magnetic vectors, magnetic permeability and susceptibility, boundary conditions on B and H .Faraday's law in integral and differential form, SS -Inductance, magnetic energy density, continuity equation for charge, displacement current ,Maxwell's equations in free space , electromagnetic wave equation for plane waves in dielectric medium and free space, Relation between E,B and K Poyinting vector . Plasma Physics: Plasma state, types of plasma, applications of plasma.

Unit IV

Physical Optics: Interference: Two-Beam Interference, interference in thin films and wedge- shaped layers, reflection and anti-reflection coatings applications of interferometry: Newton's rings, Michelson' Interferometer Diffraction: Fraunhofer diffraction by single slit, double slit and grating ,limit of resolution, Rayleigh criterion, Fresnel diffraction. Polarization: (SS-Polarization of light, Malus's law, polarization by reflection, Brewster's law, Double refraction) Analysis of linearly and circularly polarized light, Fresnel's equations and their applications.

Suggested Reading:

1. *Engineering Physics : R.K.Gaur & S.L. Gupta*
2. *Engineering Physics : G.S. Raghuvanshi*
3. *Modern Engineering Physics: A.S.Vasudeva*
4. *A Textbook of Optics : Brij Lal & Subramanyam*
5. *Optics : Ajoy Ghatak*
6. *Mathematical Physics : Gupta & Kumar*
7. *Principles of Electromagnetic : Matthew N.O.Sadiku*

Program: B.Tech
Semester: First
Course: Applied Physics I Lab
Course Code: 9P.105

L	T	P	C
0	0	2	1

List of Experiments:

1. Find the acceleration due to gravity using Kater's pendulum.
2. Find the resistance of a given wire using Meter Bridge.
3. To establish the current voltage relationship for a metallic conductor and find its resistance.
4. To determine the unknown resistance of given wire using Potentiometer.
5. Find the acceleration due to gravity using Simple pendulum.

Program: B.Tech
Semester: First
Course: Life Skills I
Course Code: 40B.101

L	T	P	C
2	0	0	2

Course Objective: *To impart basic skills of Professional Communication in English through intensive practice to the Students, so as to enable them to function confidently & effectively in that Language in the Professional Sphere of their life*

The student must have some basic command of English so that the Student must be able to:
  ➢ Write reasonably & grammatically
  ➢ Understand (if not use) at least some 2500 general purpose words of English
  ➢ Use some 2000 (at least 1500) general-purpose words of English to express himself/herself in writing & 1500 such words to talk about day-to-day events & experiences of life.
  ➢ Understand slowly-delivered spoken material in Standard Indian English, and
  ➢ Speak reasonably clearly (if not fluently) on routine matters with his fellow Students, with proper word stress, intonation pattern, accent and perfect articulation

LANGUAGE INITIATORS

Unit I
Basic Grammar
  ➢ Noun, Verb, Adverb, Adjective & Preposition
  ➢ Sentence
  ➢ Tense: Present ,Past & Future
  ➢ Voice
  ➢ Narration
  ➢ Concord
  ➢ English Modals
  ➢ Connectives
  ➢ Degree of Comparison
  ➢ Nominalization

Unit II
Practice Exercise
  ➢ Re-Writing Sentences
  ➢ Gap Filling
  ➢ Common Errors
  ➢ Phrases & Idioms
  ➢ Homophones (Commonly Confused Words)
  ➢ Vocabulary Building
  ➢ Word Quiz

Unit III
Written Communication Skills
  ➢ Requisites of good sentence writing
  ➢ Effective sentence structure
  ➢ Sentence Building/ Sentence coherence

- ➢ Sentence Emphasis/theme
- ➢ Development of a paragraph
- ➢ Paragraph structure
- ➢ Principles of paragraph Writing
- ➢ Paragraph length/ coherence/ Division

Unit IV
Etiquettes & Manners
- ➢ Dinning etiquettes
- ➢ Workplace etiquettes
- ➢ Professional Manners
- ➢ Social Etiquettes
- ➢ Group Behavior
- ➢ Tour & Travel Etiquettes
- ➢

Suggested Readings:

1. *Monippally, Matthukutty. M. 2001. Business Communication Strategies. 11th Reprint. Tata McGraw-Hill. New Delhi*
2. *Swets, Paul. W. 1983. The Art of Talking So That People Will Listen: Getting Through to Family, Friends and Business Associates. Prentice Hall Press. New York*
3. *Lewis, Norman. 1991. Word Power Made Easy. Pocket Books*
4. *Sen , Leena .Communication Skills ; Eastern Economy Edition*
5. *Ghanekar , Dr. Anjali . Essentials of Business Communication Skills ; Everest Publishing House*
6. *David Green . Contemporary English Grammar, Structure & Composition ; MacMillan*
7. *Dictionary; Oxford*
8. *Dictionary ; Longman*

Program: B.Tech
Semester: First
Course: Engineering Graphics I
Course Code: 9P.106

L	T	P	C
0	0	4	2

Course Objective:

- ➢ Student's ability to perform basic sketching techniques will improve.
- ➢ Students will be able to draw orthographic projections and sections.
- ➢ Student`s ability to use architectural and engineering scales will increase.
- ➢ Students will become familiar with auto cad two dimensional drawings.

Unit I

General: Importance, significance and scope of engineering drawing, lettering dimensioning, scales, Senses of proportioning, different type of projection, Orthographic projections, B.I.S. Specifications.
Projections of point and lines: Introduction of plane of projection ,Reference and auxiliary planes, projection of point and lines in different quadrants, traces , inclination , and true lengths of the lines, projections on auxiliary planes. Shortest distance, intersecting and non-intersecting lines.

Unit II

Planes other than the Reference planes : Introduction of other plane (perpendicular and oblique) their traces, inclinations etc ,projections of point and line lying in the planes, convection of oblique plane into auxiliary plane and solutions of related problems.

UNIT III

Projections of plane figures : Different cases of plane figure (of different shapes)making different angle with one or both reference planes and lines lying in the plane figure making different given angles(with one or both reference planes) obtaining true shape of the plane figure by projection . Projection of solids: Simple cases when solid are placed in different positions axis faces and lying in the faces of solid making given angles.

Unit IV

Development of Surface: Development of simple objects with and without sectioning Isometric Projection, Nomography: Basic concepts and uses.

Suggested Reading:

1. *Engineering Drawing textbook Intro By : N D Bhatt*
2. *A Textbook of Engineering Drawing By: R K Dhavan*
3. *A Textbook on Engineering Drawing By P S Gill*

Program: B.Tech
Semester: First
Course: Work Shop Practice I
Course Code: 9P.107

L	T	P	C
0	0	4	2

Course Objective:
- ➢ Students will be able to use their skills during their project work.
- ➢ Students will be able to understand the practical difficulties encountered in industries during assembly work.
- ➢ Students will be able to do simple electronic and electrical work throughout their career.
- ➢ Students will be able to rectify simple problems connected with fittings.

Unit I

Carpentry: Timber definition, engineering Applications, seasoning and preservation, Plywood and ply Boards' .Foundry: Molding sands, constituents and characteristics, Pattern, materials, type .core prints Role of gate. Runner riser core and chaplets causes and remedies of some common casting defects like blow holes cavities inclusions.

Unit II

Metal joining: Definitions of welding ,brazing and soldering processes and their applications .oxy-acetylene gas welding process ,equipment and techniques ,type of flames and their applications .Manual metal are welding technique and equipment, AC and DC welding ,electrodes , constituents and functions of electrode coating .welding positions. Type of welding defects such as cracks, undercutting slag inclusions porosity.

Unit III

Metal cutting: Introduction to machining and common machining operations, cutting tool materials. Definition of machine tools, specification and block diagram of lathe , shaper drilling machine and grinder ,common Lathe operation such as turning, parting , chamfering and facing .Quick return mechanism of shaper .Difference between drilling and boring .Filler-material and classification.

Unit IV

Forging: Forging principle, material, operation like drawing, upsetting, bending and forge welding. Use of forged parts.

Suggested Reading:
1. *Workshop Practice By R K Rajput*
2. *Workshop technology by Hajara Chaudhary*
3. *Workshop Technology by Raghuvanshi*
4. *Comprehensive Workshop Technology By S K Garg*