

GOVERNMENT OF BIHAR
DEPARTMENT OF SCIENCE AND TECHNOLOGY

NOTIFICATION

No. 2149...../ Patna, Date 08-09-2015

In exercise of powers conferred by proviso to Article 309 of the Constitution of India, the Governor of Bihar hereby makes the following Rules for recruitment, promotion and constitution of other service conditions of Instructor and other senior posts in Govt. Engineering Colleges/Institutes and Govt. Polytechnics/Govt. Women's Polytechnics under the Department of Science and Technology:-

1. **Short title, extent and commencement** – (1) These Rules may be called the **“(Engineering College and Polytechnic) Workshop Service Rules, 2015 (Science & Technology Department)”**.
(2) It shall extend to all the Government Engineering Colleges/Institutes and Govt. Polytechnics/Government Women's Polytechnics under the Department of Science and Technology, Government of Bihar, in the whole state of Bihar.
(3) It shall come into force from the date of issue of the Notification.
2. **Definitions - In these Rules, unless the context otherwise requires in the context-**
 - (i) **“Cadre”** means The Engineering and Polytechnic Workshop Service Cadre as described in Rule 3;
 - (ii) **“Government”** means the **‘Government of Bihar’**;
 - (iii) **“Commission”** means **‘Bihar Staff Selection Commission’** or any other Organization authorized by the Government’;
 - (iv) **“Directorate”** means the **‘Directorate of Science and Technology’**;
 - (v) **“Department”** means the **‘Department of Science and Technology’**;
 - (vi) **“Committee”** means the **‘Departmental Promotion Committee’** constituted by the Department.

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- (vii) **“Service”** means ‘The Engineering College and Polytechnic Workshop Service’;
- (viii) **“Direct Appointment”** means appointment to be made on the recommendation of Bihar Staff Selection Commission or any other Organization authorized by the Government;
- (ix) **“Cadre-Member”** means the person appointed and included in the Engineering College/Institute and Polytechnic Workshop Service under provisions contained in these Rules for Bihar Engineering Colleges/Institutes and Govt. Polytechnics/Govt. Women’s Polytechnics;
- (x) **“Appointing Authority”** means the Director, Department of Science and Technology;
- (xi) **“Vacancies of the year”** means the vacancies occurring in a particular year by virtue of creation of new posts, superannuation, death and dismissal;
- (xii) **“Year”** means Financial Year, i.e., the period from April 01 to March 31 of the next year;

3. Cadre Structure for The Bihar Engineering and Polytechnic Workshop Service

Cadre -

- (1) The Cadre Posts and educational and other essential qualifications for them shall be as follows:

Sl. No.	Designation	Educational Qualifications	Other Essential Qualifications
1.	Workshop Instructor	Two Year ITI in concerned trade, with one year Apprenticeship/One year work experience OR Three year Diploma in concerned Branch.	_____
2.	Senior Workshop Instructor	_____	08 years work experience in concern trade as Instructor with minimum of 04 weeks training conducted by National

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			Institute of Technical Teachers Training and Research (NITTTR).
3.	Foreman	_____	08 years work experience in concern trade as Senior Instructor with minimum of 04 weeks training conducted by National Institute of Technical Teachers Training and Research (NITTTR).

Explanation – (1) The persons working on Contract will not be members of this cadre.

(2) The Cadre shall be state level.

(3) The pay scales and service conditions for the members of this service shall be fixed by the Department.

4. Calculation of Vacancies and its intimation to the Commission - Every year, the Government shall calculate trade-wise vacancies for direct appointment to the posts of Workshop Instructor in Government Engineering Colleges/Institutes and Government Polytechnics/Government Women's Polytechnics and shall accordingly send intimation to the Commission regarding the vacancies for direct recruitment.

5. Direct Appointment - (1) Direct appointment to the basic post, i.e., Workshop Instructor shall be made in the light of recommendation of the Commission.

(2) A Written Examination (carrying maximum of 100 marks) shall be held as per the syllabus contained in the scheme of Direct Appointment (**Annexure-1**). Amendments may be made in the syllabus by the Government, from time to time.

6. Probation Period/Departmental Examination/Training- (1) There shall be a Probation Period of two years after appointment. Service of a member of the service shall be confirmed on successful completion of probation and satisfactory service during the said period.

(2) The appointed person shall have to compulsorily complete the training fixed by Department for the probation period.

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7. **Reservation** – In case of Direct Appointments in this service, provisions of Reservation/Roster notified by Government from time to time will be applicable. The reservation roster shall be maintained subject-wise/branch-wise.
8. **Age-limit-** For appointment to this cadre, minimum age will be 18 years and maximum age limit will be as follow-
 - (a) Unreserved class (Male) - 37 Years
 - (b) Backward class / Extremely Backward class (Male – Female)- 40 Years.
 - (c) Unreserved class (Woman) - 40 Years.
 - (d) Scheduled castes/ Scheduled Tribes (Male-Female) -42 Years.
9. **Seniority-** The Directorate shall publish, in the month of April, every year a seniority–list trade-wise of all legally appointed and working employees for each post of the cadre.
10. **Promotion-** Promotion will be admissible to a member of this cadre under provisions in Rule 3 on recommendation of the Departmental Promotion Committee.
11. **Control of matters relating to Establishment–** Appointment, promotion, posting, transfer, confirmation of service, maintenance of seniority–list and all matters related to establishment shall be under control of Appointing Authority.
12. **Disciplinary Action-** The provisions of The Bihar Government Servant (Classification, Control and Appeal) Rules, 2005 (as amended from time to time), shall apply for the purpose of disciplinary action against members of the service.
13. **Miscellaneous-** For such subjects or points for which provisions are not made in

15. **Removal of Difficulty** – The final removal of any difficulty related to these Rules, shall be made by the State Government after consultation with the General Administration Department and Law Department.

16. **Repeal** - (1) All concerned notification/circulars issued before commencement of these Rules are hereby repealed.

(2) Notwithstanding such repeal, the appointments made, or orders issued, in pursuance of the aforesaid earlier issued Notification/ circulars shall remain prevalent and legally valid as if they were issued under the provisions of these Rules. Annexure-1 is enclosed herewith the service rule.

By the Order of the Governor of Bihar


Additional Secretary,

Deptt. of Science & Technology,

Govt. of Bihar, Patna

Memo No.Vi Pra (I) Astha- 02/2014- 2149 Patna, Dated :- 08-09-2015

Copy to : Accountant General, Bihar, Patna/Superintendent, Govt. Press, Gulzarbagh, Bihar, Patna-7/Officer in charge, E-Gazette, Finance Department for information and publish in the forthcoming issue of the Gazette/Secretary, Hon'ble Governor, Bihar, Patna/Principal Secretary, Hon'ble Chief Minister, Bihar/O.S.D., Chief Secretary, Bihar/Principal Secretary/Secretary, General Administration Department/Finance Department/Cabinet Secretary/ Secretary, Bihar Public Service Commission/ Secretary, Bihar Staff Service Selection Commission/All Principal, Govt. Engineering Colleges/Govt. Polytechnic Institutions/ Govt. Women's Polytechnic Institutions/Secretary, State Board of Technical Education, Patna/All Officer, Science & Technology Department/Principal Private Secretary of Principal Secretary/I.T. Manager (For upload), Science & Technology for information and necessary action.


Additional Secretary,

Deptt. of Science & Technology,

Govt. of Bihar, Patna



परिशिष्ट- 1

अभियंत्रण एवं पोलिटेकनिक कर्मशाला सेवा के अधीन अनुदेशक के पद पर सीधी नियुक्ति के लिए
आयोजित की जाने वाली लिखित परीक्षा का पाठ्यक्रम

FUNDAMENTAL PRINCIPLE OF ELEMENTARY MECHANICAL ENGINEERING AND ENGINEERING MATERIAL

(MECHANICAL ENGINEERING)

SIMPLE MACHINES

Introduction to simple machines, M.A, U.R, & η of simple wheel & Axle, Compound wheel & Axle, Screw jack, worm & worm wheel, Rack & pinion (simple numericals only)

Introduction to ferrous & non ferrous metals Physical & mechanical properties & uses of ferrous metals & Alloys & non ferrous metals like, Al, Cu, Zn, & their alloys Properties & uses.

GENERAL PROCESS

Introduction to Soldering, brazing & welding.

Application of soldering, brazing & welding.

Flame Cutting and Welding.

Different types of flames used

Safety precautions in Welding.

HEAT ENGINES & FLUID MACHINES

Introduction to External & Internal Combustion engines.

Difference between External & Internal Combustion engines.

Concept of Heat work and Energy. Thermodynamic system and their properties. (Introduction only)

Introduction of Two-stroke and four-stroke I.C. engine, their working principles. water wheel, Introduction to Impulse & reaction turbine, (Pelton, Francis & Kaplan Turbine, working Principle only.)

POWER TRANSMISSION

Power transmission by belt

Rope chain & gear drive

Open & cross belt drive

Relation between tight side & slack side tension

Centrifugal tension, simple & compound

Gear drive, gear train.

BOILERS (Steam Generators)

Classification of boilers - Fire tube & water tube boiler. Working principle of classification boilers, working principle of Cochran boiler.

Boiler accessories & Mounting, their functions.

(ENGINEERING MATERIAL)

STONES:

Introduction of stones as engineering materials

Classification of Rocks, qualities, selection and uses of different types of stones in various engineering construction works.

List of tests on stones,

- Dressing of stones & quarrying of stones.

CLAY PRODUCTS:

Common Clay products, (Vitrified, Porcelain) their manufacture and application.

Uses of brick and characteristics of good bricks.

CEMENT & THEIR PRODUCTS

Lime:

- Introduction, Manufacturing Process

- Different types of limes & its applications,

Cement:

- Introduction, Manufacturing process

- Different types of cements, their ingredients and applications, grade of cements, storage of cement.

TIMBER

Classification of Timber

Characteristics of good timber

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Introduction of seasoning of timber
Preservation of timber and its uses

FUNDAMENTAL PRINCIPLE OF MISCELLANEOUS MATERIALS

Plastics:

- Introduction, important commercial products of plastics used in engineering works
- Types of plastics - Thermoplastic & Thermosetting, Epoxy Resins

Glass:

- Types of glass
- Composition of glass
- Uses of glass as industrial material

Adhesive:

- Types of Adhesive
- Its ingredients and uses sealant & joints fillers

Rubber:

- Characteristics of Rubber
- Types and uses of Rubber

Available forms of Aluminum as structural cladding & partition

Different type of bar section & their uses.

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BASIC OF COMPUTER & INFORMATION TECHNOLOGY

INTRODUCTION TO COMPUTER:

History and evolution of Computers. Classification, application and limitations of different types of computers.

Basics of Computer

Computer Organisation, Block diagram of a Computer, C.P.U. Booting Process, Concepts of program & program implementation.

Concepts of Hardware & Software; Operating System, System Software, Applications Software.

Binary and other number systems and their conversion from one to other.

Memory, bit, byte & word.

ASCII and EBCDIC Codes - Machine Language, Assembly Language & High Level Language.

Compilers, Assemblers, Loaders and Linkers.

Input & Output Devices

Working of various Input Devices such as:

- Key Board
- Mouse
- Joystick
- Light Pen
- Digitizers

Working of various Output devices such as:

- Monitor/ V.D.U. (C.G.A., E.G.A., V.G.A., S.V.G.A.)
- Different types of Printers and Plotters

Scanners

Memory

Primary & Secondary Memory, Primary Storage Media: RAM, ROM, PROM, EPROM, Cache, extended and expanded memory.

Removable & non-removable secondary memory, Magnetic Tapes & Disks, CD ROM, DVD.

Comparison of these devices based on technology (technical characteristics) & speed.

Organisation of data on disks, tracks, sectors, cylinders.

Heads, access time, seek time, latency time., Device controllers: serial port, parallel port, system bus.

Basics of Data & Information

Introduction, Definition and application of data, difference between data and information.

Data types, entities, attributes and relationship - Introduction only.

Elements of Electronic Data Processing - different stages involved - processing methodologies.

Transaction and Online Data Processing, Real Time Processing and their uses. Introductory Concepts of Text Processing and its applications.

POWER SUPPLY:

N-E. Voltage, Earthings.

Working of Constant Voltage Transformer (C.V.T.) - KVA & KW ratings.

Working of Uninterrupted Power Supply (U.P.S.).

Connections & Cables.

INTRODUCTION TO OPERATING SYSTEM:

Concepts of Operating System, A brief history of operating system, definition.

Operating System classification, single user, multi-user, batch processing, time-sharing, real time and multi-operating system.

DOS

Introduction, Definition & Application of Operating System and types of OS, Introduction to DOS, Booting, File and Directory.

Commands: Internal & External commands, Using various commands such as Directory commands, File Management commands, General commands, DISK Management commands, Edit commands.

Batch file commands, Introduction to simple batch files.

DOS Utility commands

Security & Recovery of Data

Windows Operating System

Concept of windows, overview of Graphic User Interface, Mouse, ICONS.

Using the mouse & manipulation of ICONS, Menus and opening different applications simultaneously.

Basic commands of windows: CREATE, MOVE, COPY, DELETE, RENAME a file or folder. Copy a

Handwritten signatures and marks at the bottom of the page.

file to floppy disk.

Difference in Windows 95, 98 and 2000.

Working with documents: changing, moving, deleting and saving information.

Brief introduction of Windows Accessories like Notepad, Calculator etc.

Printing: Setting up a printer and printing a document.

Basic concepts of installing Windows and based packages.

UNIX

Overview of UNIX, Comparison of DOS with UNIX.

Log on and Log off, user passwords.

Basic files/ directory manipulation commands.

Concept of Shell and Kernel, Elements of V-I editor.

Windows NT

Overview of Windows NT

Concept of client server and Windows NT server

Log on and Log off Control Panel

Administrative tools, File Manager.

COMPUTER & COMMUNICATION:

Introduction to Networking, Need and advantages.

Introduction to Internet & Web Browser.

Concept of LAN and WAN, Internet Protocol and TCP/IP.

Applications of Internet like e-mail & browsing, PPP, SMTP, Terminal types.

Down loading information from internet.

Sending and receiving e-mail through standard e-mail clients.

BASIC ENGINEERING DRAWING

Introduction:

Importance of Engineering Drawing as graphic communication. Link between engineering drawing and other subjects of study in diploma course.

I. S. specification for preparation of drawings.

Use of drawing instruments and materials. Basic Tools- classification and brief description.

Special tools- Mini-drafter. Drafting Machine.

Scales, Recommended, reduced & enlarged scale.

Lines, Types of lines, Selection of line thickness.

Selection of Pencils.

Drawing sheets, different sheet sizes and standard layouts. Title block as per I. S. specification.

Care and maintenance of drawing material

LETTERING, NUMBERING & DIMENSIONING:

Importance of lettering. Different types of lettering as per B.I. S. code. Capital and small letters of vertical & slanting type as per B.I. S. code.

Numerical figures of vertical and slanting type as per B.I. S. code. Single stroke and double stroke, advantages.

Necessity of dimensioning. Principles and method of dimensioning and dimensioning practice as per I. S. I. code.

Making of centre line, Section line, dimensioning lines etc.

Drawing of plain and diagonal scales and dimensioning practice.

Tutorial & test

CONIC SECTION:

Concept of Drawing and concept of conic section and its simple properties.

Concept of ellipse and its construction by various methods. Drawing of tangent & normal on ellipse.

Concept of parabola and its construction by various methods. Drawing of tangent & normal to parabola.

Concept of hyperbola and its construction by various methods. Drawing of tangent & normal to hyperbola.

Tutorial & Test

ORTHOGRAPHIC PROJECTIONS :

Principles of orthographic projection. Concept of horizontal, vertical and auxiliary planes. 1st angle and 3rd angle projection.

Projection of points on horizontal, vertical and auxiliary planes and its implication.

Projection of lines on different planes, Length of line and its true inclination with different planes and its traces.

Concept of orthographic projection of planes.

Projection of solids (Prism, Cone, Pyramids, Cylinder, Cube and tetrahedron etc.).

SECTION VIEWS & AUXILIARY VIEWS :

Concept of sectioning and drawing section lines, Need for drawing sectional views.

Section of simple geometrical solids-cases involving different types of cutting planes, single plane only

ISOMETRIC, PICTORIAL

Introduction to pictorial drawing. Brief description of different types of pictorial drawing viz Isometric, and their applications.

Concept of Isometric views. Isometric Projection and Isometric Scale.

Isometric Projection of simple solids, frustum of solids, truncated solids and sets of simple solids.

DEVELOPMENT OF SURFACE:

Development of surfaces of Cylinders, Prisms, Pyramids, cones and their frustum only.

FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING

PART-A

Electrical Engineering

Electro-Magnetism

Magnetic field due to current carrying straight conductor. Circuit loop and solenoid, Magnetic flux, Flux density

Force between two current carrying parallel conductors. Magnetic circuit, series and parallel, Reluctance. Analog between magnetic and electric circuits. Faraday's Laws of Electromagnetic induction. Lenz's law. Fleming Right hand rule. Eddy current, its concept. Eddy current loss. Induce e.m.f. dynamically and statically induced e.m.f.

Self and mutual inductance. Energy stored in a magnetic field. Related problems.

D. C. Circuits

Ohm's law and Laws of resistance. Concept of resistivity and conductivity, their units and dependence on temperature in a conductor. Kirchhoff's Voltage and current laws and their application in simple circuits. (Simple idea only).

Star-delta transformation. Thevenin's theorem, Norton's theorem, Super position theorem, Maximum power transfer theorem. (Simple idea only).

D. C. Machines

D.C. Generator construction, principle, types. D.C. Motors- working principle, Type Starter- necessity and types.

A.C. Fundamentals

Concept of Alternating current and voltage. Difference between A.C. and D.C. concept of cycle, Frequency, period, amplitude, instantaneous value. Average value, I.M.S. value and peak value. Form factor, (Definition only) Power in A.C. circuits and power factors. (Basic idea only) Alternating voltage applied to pure resistance, pure inductance and pure capacitance. (Simple idea only) Poly phase and 3 phase circuits. Concept of line voltage and current in 3 phase star and delta system.

A.C Machines

Transformer- principle construction. Transformer Ratio, efficiency and rating. Induction Motor- Principle, construction and types. (Simple idea) Alternators- working principle. Brief idea.

Storage Batteries

Cell - Primary and Secondary Cell. Construction of Lead Acid battery (Brief idea only) Methods of charging circuits on D.C. and A.C. Application. Maintenance of Battery. Study of Battery charges.

Measuring Instruments

Classification of Instruments. Watt Meter, Ammeter, Voltmeter, Frequency Meter and energy meter (Simple idea only).

Electrical House Wiring

Switches, Socket and other items used in House wiring. Types of House wiring (Brief idea only).

Safety devices

Fuse- Introduction, Use of fuse, Idea about relay and circuit breakers.

Safety Procedure

Effects of shocks and burns. Procedures to be adopted in case of electrical shocks.

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PART-B

Electronics

Resistor & Colour Code

Definition, Introduction, connection of Resistors, Condenser, Colour Code, Value calculation of resistors through colour code.

Semiconductor and Diodes

Conductors, Semiconductors, insulators, differences between them.

Conduction in intrinsic and extrinsic semiconductors. Concept of electrons and holes, Donor and acceptor impurities. P and N type semiconductors and their conductivity, drift and diffusion currents.

P-N Junction diode, Forward and Reverse bias, characteristics of P-N Junction and effect of Temperature, breakdown voltage.

Introduction - Zener Diode (Simple idea only)

Photo diodes.

Light Emitting diode.

Transistors

Concept of Bipolar Transistor, PNP and NPN Transistors, Transistor action, Transistor configurations

Transistor as an amplifier. Classification of Amplifiers, CB, CC and CE amplifiers.

Field Effect Transistor

Introduction, Classification, its application (Simple idea only)

Digital Electronics

Number System, Binary number, Decimal number and Hexadecimal number, Conversion of each other.

Basic idea about Gates.

Introductory Concept of Memories.

BASIC SURVEYING & MEASUREMENT

GENERAL INTRODUCTION:

Definition, Classification, Principle of Surveying.

Vernier scales, GPS & GIS, Fundamental and its application.

CHAIN SURVEYING:

Measurement of distance, different types of chain & tapes, testing of chain & its adjustment. Instruments used in chain survey, Ranging, Direct & Indirect Ranging, line ranger, error in length due to incorrect chain, chaining of sloping ground, error in chaining, Tape corrections.

Chain Surveying, principle of chain surveying, surveying stations, base line, check line, tie line offsets, oblique offsets, booking field notes, field works. Instruments for setting-out right angles staffs and optical square, right angle with chain & tape, obstacles in chaining, cross staff survey plotting of chain survey.

COMPASS SURVEYING

Purpose, use & comparison with chain surveying traversing.

Compass - prismatic & survey's compass, its description.

Bearing, meridians, type of bearing, Fore bearing & Back bearing, computation of included angles.

Local attraction causes, errors corrections, Dip, Declination.

Traversing with chain & compass, plotting of traverse survey. Closing error and its adjustment.

PLANE TABLE SURVEYING

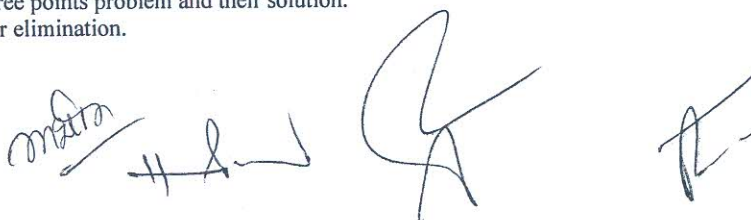
Object & comparison with chain & compass surveying instruments used in plane table surveying.

Setting up of plane table, centering, orientation & levelling.

Method of plane table surveying - (i) Radiation (ii) Intersection (iii) Traversing (iv) Resection.

Statement of two points & three points problem and their solution.

Errors in plane tabling & their elimination.



LEVELLING

Definition of terms used in levelling, instruments used in levelling and their description.
Adjustment of the level, temporary adjustments. Bench marks, different types of B.M., change points, steps in levelling, Principle of levelling, reduction of levels, H.I. method, rise & fall method, booking of staff reading, examples on levelling.
Classification of levelling, fly levelling, longitudinal & cross-sectional levelling.
Curvature & refraction.
Elementary knowledge of contours, use & characteristic of contour lines.

THEODOLITE & LAYOUT OF STRUCTURES

Introduction, different parts of the theodolite.
Temporary adjustments of the theodolite.
Measurements of horizontal and vertical angles.
Prolonging a line, bearing of a line. Ranging of a line.

BASIC ENGINEERING MECHANICS

INTRODUCTION:

Idealisation of mechanics; Concept of rigid body; External forces (Body forces & surface forces) Law of Mechanics.

VECTOR METHODS:

Equality and equivalence of vectors; Free and Bound vector; Moment of a force about a point and a line; Couple and moment of a couple.

INTRODUCTION TO SYSTEM OF FORCES AND EQUILIBRIUM:

Statically equivalent force system; simplest equivalent of a system of forces; force analysis, free body diagram, equation of equilibrium.

FRICTION:

Basic Concept of different Friction (Static, Dynamic, Sliding, Rolling, Fluid).

KINEMATICS AND KINETICS OF A PARTICLE:

Rectilinear and curvilinear translations; normal and tangential component of acceleration.

KINEMATICS AND KINETICS OF RIGID BODY:

Simple concept of Angular Velocity and angular acceleration. Effective forces on a rigid body. D' Alembert's principle.

IMPULSE AND MOMENTUM:

Linear impulse and linear momentum, angular impulse and angular momentum, definitions only;

WORK, ENERGY AND POWER:

Work done by forces and couples, potential and kinetic energy, work-energy; conservation of energy; concept of power and efficiency.

SIMPLE STRESSES & STRAIN:

Definition of various terms and their units (S.I. Units)
Stress and strain due to axial load and transverse load relation between stress and strain. Hook's law. Studies of stress strain curve.
Factor of safety & working stress. Concepts of isotropic materials.
Stress & strain in simple section & composite bar. Stress & strain due to temperature variation. Shrinking on hoop's stresses.

ELASTIC STRESS & STRAIN:

Linear strain and lateral strain, poisson's ratio, volumetric strain
Change in volume due to axial, biaxial & triaxial loading. Bulk modulus.
Shear stress and strain, modulus of rigidity. Simple shear. Complementary shear stress.
Various Relations among modulus of elasticity, modulus of rigidity & bulk modulus.

CENTER OF GRAVITY (CENTROID):

Definition of center of gravity & centroid. Determination of C.G of various sections symmetrical and unsymmetrical sections.
Determination of C.G. of perforated sections.

MOMENT OF INERTIA:

Definition of M.I.; radius of gyration, second moment of area. Parallel axis theorem & perpendicular axis theorem.
Derivation of M.I. of regular area-rectangular, triangular circular about centroidal axis.
M.I. of built up section, symmetrical and unsymmetrical about centroidal axis, modulus of sections.

SHEARING FORCE & BENDING MOMENT:

Types of beams and types of supports, types of loading.
Concept and definitions of shear force and bending moment, sign convention.
Shear force and bending moment diagrams for cantilever, simply supported beam, over hanging beam for various types of loading & couples, point of contraflexure.
Relation between B.M, S.F. and rate of loading.