WEST BENGAL JOINT ENTRANCE EXAMINATIONS BOARD

INFORMATION BROCHURE : VERSION 2.1 : Dated 13.05.2015

INSTRUCTIONS TO CANDIDATES FOR THE JOINT ENTRANCE EXAMINATION- 2015 FOR LATERAL ENTRY TO 2ND YEAR (3RD SEMESTER LEVEL) OF THE FOUR YEAR COURSES OF BACHELOR DEGREE IN ENGINEERING / TECHNOLOGY AND PHARMACY (EXCEPT ARCHITECTURE)

The Board will conduct the Joint Entrance Examination called JELET-2015 as specified below:

Day & Date	Time	Subject	Type of Question	Duration of Examination & Total marks
SUNDAY 21st June, 2015	12 NOON TO 2 P.M.	**(A) For all branches of Engg./ Technology :** One common question paper for all candidates comprising of the following subjects for Engineering & Technology : (i) Engineering Mathematics (20 marks) (ii) Electrical Technology (15 marks) (iii) Computer Applications (20 marks) (iv) Environmental Engineering (15 marks) (v) Engineering Mechanics (15 marks) / Basic Engineering (for Printing) (15 marks) Soil & Water Engg. (for Agricultural Engg. only) (10 marks) (vi) Strength of Materials (15 marks)/ Printers' Materials Science. (for Printing) (15 marks) Farm Machinery and Power (for Agricultural Engg. only) (10 marks) (vii) Food process and post Harvest Engg. (for Agricultural Engg. only) (10 marks) **(B) For B.Sc. :** A separate question paper on Mathematics will be set based on B.Sc. Mathematics pass course syllabus of The Calcutta University. **(C) For Pharmacy course :** A separate question paper will be set from the diploma level syllabus on Pharmacy prescribed by The Pharmacy Council of India.	MCQ Type questions each carrying one mark. [For each wrong answer 1/4 mark would be deducted]	2 Hours and 100 marks

THE SCHEDULE AND PATTERN OF EXAMINATION :

The Joint Entrance Examination (Lateral Entry) - 2015 (JELET-2015) will be held **on 21st June, 2015**. The said examination will be of two-hour duration. All questions will be of Multiple Choice (MCQ) Objective type (four options including single correct answer). Candidate will be required to answer 100 (hundred) questions, each carrying 1 (one) mark. For each incorrect response (answer) 1/4 mark will be deducted. **All questions will have to be answered on specially designed machine gradable OMR answer sheets. Answers are to be marked using Black/ Blue Ball Pen.** There will be one common question paper for all branches of Engineering/ Technology and separate question papers for (i) Pharmacy branch (ii) Degree in Science (B.Sc) candidates. Overwriting on the OMR Sheet or more than one answers for a question will lead to cancellation of the particular answer of the question.

SYLLABUS :

(A) For Diploma holders in Engineering / Technology : The questions will be set based on the prescribed diploma syllabus of The West Bengal State Council of Technical

Education on the following six subjects

(1) Engineering Mathematics

(2) Electrical Technology

(3) Computer Applications

(4) Environmental Engineering

(5) Engineering Mechanics / Basic Engineering (for Printing)

(6) Strength of Materials / Printers' Materials Science (for printing). **The detailed syllabus of the above mentioned six subjects have been annexed in the Information Brochure.**

(B) For B.Sc. candidates : A separate question paper on Mathematics will be set, based on B.Sc Mathematics pass course syllabus of the University of Calcutta.

(C) For Diploma holders in Pharmacy : A separate question paper will be set based on the Diploma Level syllabus in Pharmacy as prescribed by the Pharmacy Council of India.

ELIGIBILITY AND OTHER CRITERIA :

The Applicant (both male and female) must be a citizen of India.

Engineering & Technology:

Diploma holders have to pass Diploma examination from an AICTE approved institution with at least 45% marks (40% in case of candidates belonging to reserved category) and B.Sc. Degree holders have to pass B.Sc. Degree from a recognized University as defined by UGC with at least 45% marks (40% in case of candidates belonging to reserved category) and pass XII standard with Mathematics as a subject.

The students belonging to B.Sc. stream shall have to clear the subjects of Engineering. Graphics / Engineering Drawing and Engineering Mechanics of the 1st year Engineering Programme along with the second year subjects.

The students belonging to B.Sc. stream shall be considered only after offering the supernumerary seats in this category to the students belonging to the Diploma Stream. Diploma holders and B.Sc. Degree holders having above mentioned eligibility criteria shall also be eligible for admission to the 1st year Engineering & Technology Degree Courses subject to vacancies in the 1st year class in case the vacancies at lateral entry are exhausted.

Pharmacy :

Students who have passed Diploma course in Pharmacy from an AICTE approved Institution, with at least 45% marks (40% in case of candidates belonging to reserved category) shall be eligible for admission to 2nd year Degree Course in Pharmacy.

Students who have completed Diploma course in Pharmacy having above mentioned eligibility criteria shall be eligible for admission to the 1st year Pharmacy Degree Course subject to vacancies in the 1st year class in case the vacancies at lateral entry are exhausted.

Candidates who have passed the Prefinal semesters/part and due to appear in the final semester (6th) / part examination 2015 of the Diploma Courses in Engineering / Technology / Pharmacy or due to appear in (he final examination of Degree in Science (B.Sc.) will also be allowed to appear in the JELET-2015 examination. Diploma and B.Sc. Degree holder as mentioned in para no. 2 & 3, have to qualify the Joint Entrance Lateral Entry (JELET-2015) conducted by West Bengal Joint Entrance Examinations Board to become eligible for admission under Lateral Entry Scheme.

The Lateral entry Scheme may be available for all the existing degree level Engg. & Technology Colleges of the State under the purview of the Higher Education Department, Govt. of West Bengal. **For Jadavpur University the same will be decided by the concerned University.**

Diploma in Fashion Technology Course of Govt. Polytechnic Institutions, Tripura will also be relevant for admission to Degree level Apparel Production & Management Course and Textile Technology Course in Govt. College of Engineering and Textile Technology, Serampore and Berhampore under Lateral Entry Scheme in relaxation of the domicile criteria as applicable only for admission to Govt. Engg. & Technology Colleges.

All relevant norms and guidelines of D. G. Shipping are to be adhered to for admission to Marine Engg. Degree Course.

Diploma holder teachers in Govt. Polytechnic Colleges, West Bengal are to be admitted in the academic session 2015 under Lateral Entry Scheme in vacant seats of Degree Level Engg. & Technology Colleges including Private Self-financing Colleges provided they qualify in JELET 2015.

Reservation of seats for SC/ST/PC candidates shall be made as per State Govt. norms for all the Govt. Engg. & Technology Colleges as well as for Self-financing Engg. & Technology Colleges who have received some grants from the Government.

It is to be noted that Lateral entry Scheme will be applicable for all the disciplines <u>except</u> Architecture as per the provisions laid down by the Council of Architecture.

RESIDENTIAL CRITERIA:

For admission to Govt. Engineering / Technology Colleges candidates must have been residing in the State of West Bengal for a minimum period of 10 (ten) years uninterruptedly as on **31.12.2014** or their parents must be permanent resident of West Bengal having their permanent home address in the State of West Bengal. However, candidates of states other than West Bengal may be considered for admission to non-Govt. Engineering / Technology Colleges/Institutions.

Residential certificate in this regard shall have to be produced during counseling in the proforma given in 'Annexure I' of the Application Form from any of the competent Authorities as mentioned below. No separate supporting documents or residential certificate in any other form will be accepted.

For candidates seeking admission to Govt. Colleges, submission of Residential Certificate in prescribed format from competent authority is **mandatory**.

SEATS AVAILABLE :

i) Diploma holders and B. Sc, Degree holders shall be eligible for admission to 2nd year Engineering & Technology Degree Courses up to a maximum of 20% sanctioned intake which will be over and above to the approved intake as supernumerary seats.

ii) The students who have completed Diploma course in Pharmacy shall be eligible for admission to 2nd year Pharmacy Degree Courses up to a maximum of 20% sanctioned intake which will be over and above the approved intake as supernumerary seats. **B.Sc. Degree holders are not eligible for admission in B. Pharm. course**.

AGE LIMIT :

There is no age restriction for diploma holders of Engineering/Technology/ Pharmacy. For B.Sc. candidates, upper age limit is 27 years as on 31.12.2015.

RESERVATION POLICY :

For Government and Government aided Engineering & Technology Colleges reservation policy of the State Government shall be followed. For University/ University Departments : Reservation rules of the concerned University shall be applicable.

APPLICATION:

Candidates intending to appear in **JELET-2015** shall have to apply through **ONLINE (www.wbjeeb.in)** form **14.05.2015 to 29.05.2015**. The candidates can also be download the **e-challan** from the same link, the official website of the Board, from **14-05-2015 to 30-05-2015.**

The duly filled-in e-challan needs to be submitted with **Rs. 506/- in cash** (Application fee: Rs. 500/-, Bank charges: Rs. 6/-) in any one of the branches of Allahabad Bank as notified in the website on all working days. The applicant may download the **Information Brochure** from the website.

SUBMISSION:

Candidates must have to choose any one of the options : **a) Engg. & Technology b) Pharmacy and c) B.Sc.** After that the candidate can proceed for online application. Application form should be submitted through **ONLINE** only. There is no need to send any hard copy of the Acknowledgement Receipt or any document to the board office.

ISSUE OF ADMIT CARD WITH EXAMINATION ROLL NUMBER:

Admit Card for each eligible applicant showing his/her Application Number, Examination Roll Number, Examination Centre along with necessary personal information will be available at www.wbjeeb.in from **11.06.2015 To 21.06.2015** till the day of examination. Applicant should download the Admit Card and carry it along with him/her to the Examination Centre.

Candidates must ensure that the photographs on the admit card are not mutilated / distorted/soiled even by accident. Candidates with such Admit Cards will not be allowed to appear in the Entrance Examination.

Under no circumstances refund of Application Fee is admissible if the candidate does not appear at the Test.

Engineering and Technology courses including Pharmacy available at Degree level and the relevant Diploma Programmes applicable for admission under Lateral Entry Scheme are given below :

	Course available for admission in U.G. level of Engineering &Technology Courses	**Relevant disciplines of Diploma holders in Engineering & Technology for admission through Lateral Entry Scheme**
	Applied Electronics & Instrumentation Engineering / Electronics & Instrumentation Engineering / Instrumentation & Control Engineering	Applied Electronics & Instrumentation Engineering / Electronics & Instrumentation Engineering / Instrumentation Technology / Instrumentation Engineering / Instrumentation & Control Engg.
	Mechanical Engineering /Automobile Engineering	Mechanical Engineering / Automobile Engineering
	Bio-Technology	Bio-Technology / Medical Lab. Technology
	Bio-Medical Engineering Bio-Technology	Bio-Medical Engineering / Medical Lab. Technology
	B. Pharmacy	D. Pharmacy
	Chemical Engineering	Chemical Engineering / Chemical Technology
	Civil Engineering	Civil Engineering / Survey Engineering / Technical (Civil)
	Ceramic Technology	Pottery & Ceramic Technology / Ceramic Technology
	Computer Science & Engineering	Computer Science Engineering / Computer Science & Technology / Information Technology /Computer Software Technology
	Construction Engineering	Civil Engineering / Construction Engineering / Construction Technology
	Electronics & Communication Engg. Electronics &Tele-communication Engg.	Electronics & Tele Communication Engineering / Electronics & Communication Engineering
	Electrical Engineering	Electrical Engineering
	Electrical & Electronics Engineering	Electrical Engineering / Electronics Engineering / Electrical & Electronics Engineering/ Electronics &Tele-communication Engg.
	Food Technology	Food Technology / Food Processing Technology
	Jute Technology / Jute and Fibre Technnology	Jute Technology / Jute & Fibre Technology / Textile Technology / Textile Technology (Handloom) / Fashion Technology
	Leather Technology	Leather Technology / Foot Wear Technology/ Leather goods Technology & Accessories
	Metallurgical Engineering	Metallurgical Engineering
	Mining Engineering	D. Pharmacy Mining Engineering / Mining Survey
	Power Engineering / Power Plant Engineering	Power Plant Engineering / Mechanical Engineering / Electrical Engineering
	Mechanical Engineering / Production Engg.	Mechanical Engineering / Tool & Die Making / Production Engg.
	Mechanical Engg. / Production Engg./Chemical Engg.	Plastic Technology / Plastic Mould Technology
	Printing Engineering / Technology	Printing Technology / Printing Engineering
	Textile Technology	Textile Technology (Handloom) / Fashion Technology
	Information Technology	Electronics & Communication Engineering / Computer Sc. &Engg. / Information Technology/ Electronics &Tele-communication Engg.
	Apparel Production and Management / Fashion Technology / Textile Technology	Apparel Production and Management / Fashion Technology
	Marine Engg.	Marine / Electrical / Mechanical Engg.
	Agricultural Engineering	Agricultural Engineering

ZONE OF EXAMINATION :

The examination will be held simultaneously at the following Zones/areas provided there are sufficient number of candidates at the Zones / areas.

Zone	Zone Code No.
BARDHAMAN	731
DURGAPUR	732
PASCHIM MEDINIPUR	831
PURBO MEDINIPUR	841
SILIGURI	751
MALDA	821
KOLKATA-NORTH	811
KOLKATA-SOUTH	812
HOWRAH	791
HOOGHLY	781
MURSHIDABAD	851
AGARTALA	901

The applicant should indicate a second choice of Zone of Examination. The allotment of zone and examination centre is fully at the discretion of the Board subject to availability of sufficient number of candidates in a centre. Any change made by the Board is final and no request for changing the zone/centre of examination will be entertained under any circumstances. **[Agartala centre will be opened only if sufficient number of Applicants are available].**

EVALUATION AND DECLARATION OF RESULTS OF JELET - 2015 :

Rules for scrutiny/review of Answer Sheet: The Board neither publishes nor communicates the result to any individual applicant. It does not have any provision for post publication, scrutiny and/or review arid hence will not entertain any such application after the examination.

Result: Result of JELET-2015 is likely to be declared by the 1st week of July, 2015. The Board will publish the merit list(s) at its website, viz. www.wbjeeb.in. The total number of candidates to be merit listed will be decided by appropriate authority. The Board neither publishes nor communicates result to any individual applicant. The result may be viewed on Website : www.wbjeeb.in. Compliance with requirements for making application for the Joint Entrance Examination does not make a candidate eligible for admission to any University / Institution.

For admission to Government institutes the candidates must have to fulfill the domicile requirements as indicated in "Information Brochure".

However, admission to Universities shall be governed by the University rules and regulations.

It should be noted that a diploma holder will be admitted to **Degree course in Engineering / Technology in respect of the discipline for which Diploma is awarded.** (As per list provided earlier)

Merit listed candidates will be allowed to download their **Rank Cards** from www.wbjeeb.in.

BRANCH CODE :

Candidates intending to apply for this examination must write the **BRANCH CODE (three digit)** as applicable:

Sl. No.	Name of the Branch	Branch code
1	Automobile Engineering	101
2	Applied Electronics & Instrumentation	102
3	Bio Medical Engineering	103
4	Civil Engineering	104
5	Chemical Engineering	105
6	Computer Software Technology	106
7	Computer SC. & Engineering / Tech.	107
8	Electronics & Communication Engg.	108
9	Electronics & Instrumentation Engg.	109
10	Electronics & Telecommunication Engg.	110
11	Electrical Engineering	111
12	Food Technology / Food Processing Tech.	112
13	Foot wear Technology	113
14	Instrumentation and Control Engineering	114
15	Instrumentation Engineering	115
16	Information Technology	116
17	Mechanical Engineering	117
18	Medical Lab. Technology	118
19	Metallurgical Engineering	119
20	Mining Engineering	120
21	Pottery and Ceramic Technology	121
22	Production Engineering	122
23	Printing Technology	123
24	Survey Engineering (Civil)	124
25	Survey Engineering (Mining)	125
26	Tool and Die Making	126
27	Textile Technology	127
28	Fashion Technology	128
29	Agricultural Engineering	129
30	Pharmacy	201

LEGAL JURISDICTION :

All disputes pertaining to the conduction of JELET-2015 shall fall within the jurisdiction of Kolkata only. The Board will not be a party pertaining to any dispute arising in the process of admission to any course of study through JELET-2015.

COUNSELLING & ADMISSION :

Counselling and admission will be held after getting permission from respective apex councils of the country. Securing a rank in the merit list in the said examination does not constitute a right/guarantee in favour of the candidate for his/her admission/counselling.

All applicants who appear to be prima-facie eligible are provisionally permitted to sit for the Entrance Examination. If after scrutiny at any stage, it is found that an applicant is otherwise ineligible, his/her candidature will automatically be cancelled even if he/she has appeared at the examination and secured a position in the merit list.

At the time of admission a candidate shall be required to produce the original mark sheets of all the examinations passed, a document certifying his/her date of birth. (Admit Card of Madhyamik or equivalent examination/), the Admit card of JELET-2015, Rank card of JELET-2015, Residential Certificate and other relevant documents (e.g. Caste certificate for reserved category candidate; PwD certificate for PwD category candidates) for the purpose of verification.

JELET-2015

IMPORTANT DATES

1	**Date of Examination**	**:**	**21.06.2015 (SUNDAY)**
2	**Availability of downloadable Information Brochure**	**:**	**13.05.2015 onwards**
3.	**Filling up of ONLINE Application Form at www.wbjeeb.in**	**:**	**14.05.2015 To 29.05.2015**
4.	**Fee payment through e-challan (DO NOT send any hard copy to our board office)**	**:**	**14.05.2015 To 30.05.2015**
5	**Availability of downloadable Admit Card at www.wbjeeb.in.**	**:**	**11.06.2015 To 21.06.2015**

SYLLABUS FOR ENGINEERING TECHNOLOGY BRANCHES ONLY

(JELET)

ENGINEERING MATHEMATICS

(FOR ALL BRANCHES)

MATRIX & VECTOR

Matrix - Definition - Order of a matrix - Leading element - Principal diagonal. Types of matrices - Null matrix - Square matrix - Identity matrix - Upper and lower triangular matrix - Symmetric matrix.

Determinant of a square matrix - Minors and cofactors - Procedures for evaluation -Properties of determinants (no deduction) - Evaluation of determinant by Ohio's method (4 th order) - Problems.

Concept of vector-Addition and subtraction of vectors- Multiplication of a vector by a scalar - Position vector of a point - Ratio formula - Rectangular resolution of a vector - Dot and cross product - Geometrical interpretation -Distributive law - Applications.

NUMERICAL METHODS

Meaning of interpolation - Difference table - Newton's forward interpolation formula (no deduction) - Problems.

Introduction to numerical integration - Formulae for composite trapezoidal and Simpson's 1/3 rule (no deduction) - Related problems.

Numerical solution of non-linear equations - Formula for Newton-Raphson method (no deduction) - Problems.

Numerical solution of system of linear equation - Gauss-Elimination Method (no deduction) - Problems.

DIFFERENTIAL EQUATIONS

Definition - Order and degree of a differential equation - Differential equations of 1st order and 1st degree - Separation of variables - Problems.

Homogeneous differential equations - Equations reducible to the homogeneous form - Problems.

Exact differential equations - equations reducible to the exact form - problems. Linear equations - Bernoulli's equations.

Differential equations of 2nd order with constant co-efficients - Complementary function and particular integral - Problems

PARTIAL DIFFERENTIATION

Function of two or more variables - Definition and meaning of partial derivatives (1st \ order). Homogeneous functions - Euler's theorerrTon homogeneous functions (no deduction) - Problems.

PROBABILITY AND STATISTICS

Introduction - Random experiment - Sample space - Events. Classical and axiomatic definition of probability. Addition and multiplication theorem - Related problems.

Statistics - Frequency distribution.

Measure of central tendency - Mean - Median - Mode - Standard deviation - Simple problems

ELECTRICAL TECHNOLOGY
(FOR ALL BRANCHES)

KIRCHOFF'S LAW

Kirchoff's voitage and current laws, Star-delta transformations - Simple problems on all topics.

A. C. FUNDAMENTALS

Concept & significance of R.M.S. value, peak value, average value, crest factor and form factor of sinusoidal voltage/current - Equation of instantaneous value of sinusoidaf voltage / current - Simple problems on all.

A. C. SERIES CIRCUIT

R-L & R-C A.C. series circuit (no deduction, only the expressions of voltage, current & power for sinusoidal sources), power factor, power triangle simple problems.

STORAGE CELL, TRANSFORMER, MOTORS ETC.

Basic Principle of: Storage cell, DC. motors, Transformer, A.C. generators & motors (No deduction & problems).

MAGNETIC CIRCUIT

Concept on magnetic circuit, Definitions and units of magnetic flux, m.m.t. and reluctance, analogy with electrical circuit, simple problems.

MOTOR STARTER

Need of motor starter mentioning some names useful for D.C. motors & A.C. motors.

MOTORS FOR INDUSTRIAL USES

Simple Electrical Circuit for motor installation, using block diagram of different components.

POWER GENERATION, TRANSMISSION & DISTRIBUTION

Brief idea about the power generation, transmission and distribution using block diagram of different stages.

VOLTAGE STABILISER & UPS SYSTEM

Brief idea about the operational principle of voltage stabilizer and UPS system
(no description of internal circuit)

HOUSE WIRING

Simple idea house wiring starting from commencement of supply, using necessary diagram, role of fuses / MCB, fault finding & earthing concept.

LIGHTING SCHEMES

Types of lighting scheme and factors considered for designing lighting schemes i.e. illumination level, uniformity of illumination, colour of light, glare, mounting height, spacing between luminaries, colour of surrounding walls etc.

WATTMETER & MEGGAR

Uses & connection diagram of Wattmeter - Use of Meggar with circuit diagram.

ELECTRICAL ENERGY MEASUREMENT

Electrical energy measurement (no mathematical deduction & description of apparatus) - circuit diagram for single phase energy-meter connection.

COMPUTER APPLICATIONS & PROGRAMMING
(FOR ALL DISCIPLINES)
DETAIL COURSE CONTENT

Group - A — FUNDAMENTALS OF COMPUTER

Module 1 — INTRODUCTION TO COMPUTER

1.1 Brief history of evolution of computers

1.2 Various components of computer (brief knowledge)

1.3 Hardware-CPU, inputs output system, primary memory, secondary memory.

1.4 Peripherals devices - Printers, plotter, scanners, digitals cameras, web cam. sound card & speaker systems, dicta phone

1.5 Software Operating system, system software like compilers and device drivers, and various application software (definitions only).

Module 2—INFORMATION REPRSESENTATION

2.1 NUMBER SYSTEM : Binary, Octal & Hexadecimal

2 2 Conversion of number systems, signed and unsigned representation

2.3 Binary arithmetic & compliments,

2.4 Character codes : ASCII. BCD & Gray codes

Group - B — SOFTWARE CONCEPTS Module 3 — BASIC OF SOFTWARE

3.1 Classification of Software systems-system software and application software.

3.2 Basic concepts of compilers, interpreters, assemblers and device drives

3.3 Operating system - Single user, multi user, graphical user interfaces and characters user interfaces.

3.4 Case studies :

MS - DOS, Windows

Group - C — INTRODUCTION TO PROGRAMMING Module 4 — INTRODUCTION TO PROGRAMMING

4.1 Algorithm and flowchart

4.2 Different types of programming languages - machine level, assembly level and high level languages (basic concepts only)

4.3 Brief introduction to different high level languages including C

4.4 Basics of C-Language ; i

4.5 Branching and loping statements

4.6 Arraays and user defined functions

Group - D — COMPUTER NETWORKING AND INTERNET Module 5 — COMPUTER NETWORKING AND INTERNET

5.1 Basics of Computer Networking - LAN, MAN, WAN (definitions only)

5.2 Client - Server architecture (elementary level)

5.3 Internetworking concepts of world wide web, domain name system emails

5.4 Web browsing, use of search engines, web site hosting (elementary level).

ENVIRONMENTAL ENGINEERING (FOR ALL BRANCHES)

AIR & ENVIRONMENT INTRODUCTION

Man & Environment. Overview {socio-economic structure & occupational expo- sures) - Scope of Environmental Engineering - pollution problem due to urbanisation & industrialisation

AIR POLLUTION

Causes of air pollution - ..types & sources of air pollutants - Climatic & Meteoro-logical effect on -air pollution concentration -formation of smog & fumigation

ANALYSIS OF AIR POLLUTANTS

Collection of Gaseous Air Pollutants - Collection of Participate Pollutants -Analy- sis of Air Pollutants fike: Sulphur dioxide - Nitrogen oxide - Carbon monoxide - Oxidants & Ozone - Hydrocarbons - Particuiate Matter

AIR POLLUTION CONTROL MEASURES & EQUIPMENT

Control of Particuiate Emission - Control of Gaseous Emission - Flue Gas Treatment Methods: Stacks Gravitational and Inertia! Separation. Settling Chambers, Dynamic Separators. Cyclones. Filtration, Liquid Scrubbing. Spray Chambers. Packed Towers. Orifice and Venturi Scrubbers, Electrostatic Precipitators. Gas/ solid Absorption, Thermal Decomposition.

METHODS & APPROACH OF AIR POLLUTION CONTROL

Controlling smoke nuisance — Develop air quality criteria and practical emission standards — creating zones suitable for industry based on micrometeorology of air area — Introducing artificial methods of removal of particulate and matters of waste before discharging to open atmosphere

WATER & ENVIRONMENT WATER SOURCES

Origin of waste water — Type of ‘water pollutants and their effects

DIFFERENT SOURCES OF WATER POLLUTION

Biological Pollution (point & non-point sources) - Chemical Pollutants: Toxic Or- ganic & Inorganic Chemicals - Oxygen demanding substances - Physical Pollut- ants: Thermal Waste - Radioactive waste - Physiological Pollutants: Taste affecting substances - other forming substances

WATER POLLUTION & ITS CONTROL

Adverse effects on : Human Health & Environment, Aquatic life, Animal life, Plant life — Water Pollution Measurement Techniques - Water Pollution Control Equip- ment & Instruments - Indian Standards for Water Pollution Control

SOIL & ENVIRONMENT

SOIL POLLUTING AGENCIES & EFFECT OF SOLUTION

Liquid & Solid Wastes - Domestic & industrial Wastes - Pesticides - Toxic: Inorganic & Organic Pollutants - Soil Deterioration - Poor Fertility, Septicity. Ground Water Pollution, Concentration of Infecting Agents in Soil

SOLID WASTE DISPOSAL

Dumping domestic & Industrial Solid Wastes: Advantages & Disadvantages -Incin-eration: Advantages & Disadvantages - Sanitary Land Field: Advantages & Disad-vantages - Management of Careful & Sanitary Disposal of Solid Wastes

NOISE & ENVIRONMENTAL MANAGEMENT SYSTEM NOISE POLLUTION & CONTROL

Noise Pollution: Intensity, Duration - Types of Industrial Noise - III effects of Noise -Noise Measuring & Control - Permissible Noise Limits

ENVIRONMENTAL LEGISLATIONS, AUTHORITIES & SYSTEMS

Air & Water Pollution Control Acts & Rules (Salient Features only) - Functions of State / Central Pollution Control Boards - Environmental Management System ISO 14000 (Salient Features only).

ENGINEERING MECHANICS
(FOR ALL BRANCHES EXCEPT PRINTING AND AGRICULTURAL ENGINEERING)

GROUP - A

Module 1 INTRODUCTION

Concept of Engineering Mechanics - Statics & Dynamics - Scalar Quality –Vector Quality-Addition & Subtraction of Vectors- Basic units- Derived Units-Si units-Prin-ciples of dimensional homogeneity.

Module 2 SYSTEM OF FORCES

Definition of a force with explanation - Linear representation of force - System of co-planar forces - Parallelogram Law of Forces - Composition and Resolution-Transmissibility of forces - Action and Reaction - Triangle Law & Polygon Law of forces - Determination of Resultant by Analytical and graphical method with equali-train space diagram – Vector diagram.

Module 3 MOMENTS & COUPLES

Definition of moment of a force about a point - Physical significance of moment -Moment of a system of parallel and inclined forces - Varignon's Theorem -Defini-tion of moment of a couple - Physical significance of Couples Equivalent couples -Resultant of any number of coplanar couples - Replacement of a force about a point by an equal like parallel force together with a couple -Properties of couples.

Module 4 CONDITION OF EQUILIBRIUM

Lami's Theorem - Triangle Law & Polygon Law of equilibrium - Conditions of equi-librium of co-planer system of concurrent forces - Conditions of equilibrium of co-planar system of non-concurrent parallel forces (like & unlike) -Conditions of equi-librium of co-planar system of non-concurrent non-parallel forces (simple problems excluding statically indeterminant).

GROUP - B Module 5 FRICTION

Definition - Useful and harmful effects of friction - Laws of Static friction - Coeffi-cient of friction -Angle of friction -Angle of repose - Equilibrium of a body on a rough inclined surface with and without external force.

Module 6 CENTRE OF GRAVITY

6.1 Concept & definition - Centre of mass - Centroid

6.2 Methods of finding out centroids of simple area by :

(i) Geometrical consideration and (ii) Method of Moments.

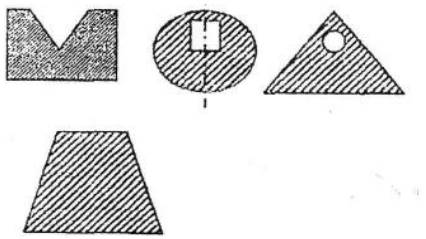
[**Method of integration should be learnt in Strength of materials on 2nd Semester]

Finding the centroid of the following areas by any method :

(i) uniform triangular lamina, (ii) uniform rectangular lamina, (iii) uniform circular lamina,

6.3 Finding the centriod of the following sections using the method of moment :

(i) T-section, (ii) equal and unequal angle-sections, (iii) equal and



unequal l-sections, iv) different cut-out sections as shown in the following figures.

Module 7 MOMENT OF INERTIA

7.1 Introduction - definition and unit

7.2 M I of a lamina

7.3 Theorems of finding out M I by :

(i) Parallel axis theorem, and, (It) Perpendicular axis theorem.

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7.5 Finding out M I of the following sections using formula only.

(i) Rectangular section, (ii) Square section , (iii) circular section, (iv) triangular section.

7.6 M I of irregular areas such as l-sections, T-sections, - Related simple prob lems.

Module 8 SIMPLE MACHINES

Definition of Machine - Difference between Machine & Lever - Mechanical Advantage, Velocity Ratio and Efficiency with their relationship - Frictional Effort Load -Condition of reversibility / irreversibility - Law of Lifting Machines -Maximum mechanical advantage - Maximum efficiency - Effort vs. load curve -Efficiency vs. load curve -Different types of lifting machine with their mechanical advantage, velocity ratio & efficiency such as wheel and axle (simple & differential), Crab winch (single & double purchase), Weston pulley block, worm & worm wheel, simple screw jack.

GROUP-C

Module 9 RECTILINEAR MOTION

Motion equations (with deduction $S=V \times t$: $V=u \pm ft$; $S=u.\ t \pm 1/2\ f\ t^2$; $V^2=U^2 \pm 2\ f\ S$) Newton's Second Law of linear motion $P = mf$ (deduction) -Conservation of momentum of a body -No Numerical problems.

Module 10 CURVILINEAR MOTION

Angular displacement -Angular speed -Angular velocity- Relation between angular speed & angular velocity -Angular acceleration - Relation between linear & angular velocity - Relation between linear & angular acceleration -Centripetal and centrifugal force (numerical problems)

Module - 11 WORK POWER ENERGY

2 Definitions. Units, Potential Energy (mgh). : Kinetic Energy ($1/2\ m\ v^2$), Laws of

conservation of Energy. Change of Kinetic energy=Work done by acting force. Simple numerical problems.

STRENGTH OF MATERIALS

(FOR ALL BRANCHES EXCEPT PRINTING AND AGRICULTURAL ENGINEERING)

GROUP — A

Module 1 SIMPLE STRESSES & STRAINS

1.1 Scope of subjects Use of structure, importance of knowledge of stress, strain and deformation in structure, safety and economy. Engineering materials: Definitions and examples Mechanical properties of engineering materials : Elasticity, Plasticity, Ductility, Hardness. Fatigue, Creep Brittleness (definition, examples and applications).

1.2 Stress and strain: Tensile, Compressive, Shear

1.3 Stress-strain diagram: Principles of tensile testing in universal testing machines showing salient points such as elastic limit, proportional limit, yield points, breaking points etc., ultimate stress, working stress and factor of safety.

1.4 Stress - Strain relations: Hooke's law, Young's Modulus, Modulus of rigidity, Poission's ratio.

GROUP — B

Module 2 SHEAR FORCE & BENDING MOMENT

2.1 Definition and Types of beams, supports and loads.

2.2 Shear force and bending moment in beams: Definitions, sign conventions and inter-relationships 2.3 Shear force and bending moment diagrams (with simple problems) :

(i) Cantilever beams with point loads and Uniformly Distributed Loads (DDL),

(ii) Simply supported beams with point loads and UDL.

(iii) Simply supported overhanging beam with point load.

Module 3 BENDING STRESSES IN BEAMS

3.1 Pure bending of beam: Assumptions, deduction of bending equation with usual notations, moment of resistance, section modulus.

3.2 Problems on bending stress about axis parallel to the plane of bending: For rectangular circular & I-section.

GROUP — C

Module 4 DEFLECTION OF BEAMS

4.1 Differential equation of elastic curve — Relation among deflection, slope, shear force, bending moment and rate of loading — Sign convention of slope and deflection.

4.2 Standard formula (no proof, only simple problems) for maximum slope of deflection of

(a) cantilever beam subjected to point load at free end, uniformly distributed load on entire span;

(b) simply supported beam carrying a point load at mid span, uniformly distributed toad on entire span.

Modules COLUMNS & STRUTS

5.1 Definitions of Columns & Struts — Long, Medium & Short columns — Effective Length — Slenderness Ratio — Critical load — Safe load — Different kinds of end conditions — Euler's formula for critical load (no deduction and no problem).

BASIC ENGINEERING FOR PRINTING (FOR PRINTING TECHNOLOGY ONLY)

SIMPLE STRESSES & STRAIN

Introduction — Elasticity — Stress and Strain.

Types of Stresses : Tensile Stress and Compressive Stress.

Elastic Limit— Hook's' Law— Modulus of Elasticity (Young's Modulus) Deformation of a body due to Force acting on it — Simple problems. Principle of Superposition — Simple problems on uniform cross-section.

MECHANICAL DRIVE

Different types of Mechanical drive and their uses only.

Belt & pulley drive: Different types belt and pulley drive — Open belt drive and cross belt drive.

Types of belt and types of pulley — Velocity ratio. Simple problems.

GEAR DRIVE

Types or gear and then uses. Definition of different parts of Spur gear. Velocity ratio

of spur gear. Simple problems.

MEASURING INSTRUMENTS

Types of measuring instruments and their uses.

Description, working principle, care & maintenance of Vernier Callipers and outside micrometer.

Reading of Vernier callipers and outside micrometer.

FASTENING METHOD

Different types of fastening method with examples. Types of nuts, bolts and their uses.

Welding, Soldering & Brazing and their uses. Different types of rivet and riveted joints.

PRINTERS' MATERIAL SCIENCE (FOR PRINTING TECHNOLOGY ONLY)

Colloids - Definition of colloid, properties of lyophilic and lyophobic colloids, stability of colloids, protective action of lyophilic colloids, gold number, definition of gel and emulsion, application of colloids, gels and emulsions in printing.

Polymers - Uses of natural polymers (casein, cellulose, dextrin, egg albumen, gelatine, fish giue, gum Arabic and starch) and synthetic polymers (polyethylene, polypropylene, Teflon, polyvinyl acetate, polyvinyl alcohol, polyvinyl chloride, phenolic resin, amino resin and polyester resin) in printing.

Chemistry of photography - Constituents of a photographic emulsion, uses of gelatine, preparation of the emulsion, lattice structure of silver chloride and silver bromide, lattice defects, latent image formation by Gurney-Mott Theory, chemistry of photographic development, fixing, photographic reduction and chemical intensification, chemical reversal, elementary idea of silverless films.

Chemicals required for Image carriers - a) letterpress and flexography –photo polymeric stereo making, b) lithography - (graining, coating, developing, etching, lacquering, stencil removing, gumming, desensitising) (i) negative working plates- albumen plate, P.S. diazo and photopoiymer plates, driographic (waterless) plate (ii) positive working plates - gum deep etch plate, P.S. plate, diffusion transfer plate c) gravure - cylinder making (sensitising, developing, etching, finishing) d) silk screen - (coating, developing, hardening, stencil removing) direct, indirect, direct- indirect and capillary method.

Surface tension - Definition, contact angle, choice of metals for image carriers on the basis of contact angle, role of surface tension in wetting of the non-image areas of a lithographic plate by water and the image areas by ink.

Fountain solution - Constituents, use of each constituent, PH and conductivity.

Printing ink - Differences between liquid ink and paste ink, Raw materials of ink -colourant (pigment and dyestuff), solvent, plasticiser, resin, oil, drier and additives (wax antioxidant, surfactant), ink strength, ink drying - penetration, oxidation, quickset, evaporation, radiation polymerisation (UV and electron beam), IR radiation, rheology of paste inks in terms of viscosity, thixotropy, visco-elasticity, tack, length and flow. Different types of inks - quick set, heat set, moisture set inks, sheet fed, web fed inks, water-based inks. Characteristics of letterpress, offset, gravure, flexographic and screen inks.

Paper - Paper manufacture - sulphate process of chemical pulp preparation, bleaching, beating, internal and external sizing, coating. Paper characteristics - paper grain, dimensional strength, paper acidity, runnability & printability. Requirements of letterpress, lithographic, gravure, flexographic and screen-printing papers.

Adhesives - Characteristics of class-1,2 & 3 adhesives, adhesives used in lamination & book binding, requirement of an adhesive pH of ink, paper and adhesives.

SOIL AND WATER ENGINEERING
(FOR AGRICULTURAL ENGINEERING ONLY)

Module 1 : Watershed Hydrology

Hydrologic cycle, Precipitation-forms, rainfall measurement, mass curve, point rainfall, frequency analysis of point rainfall, plotting position, Interception, infiltration, evapotranspiration- estimation and measurement, Stream number, stream length, stream area, stream slope, Runoff-factors affecting, measurement of runoff, Hydrograph -Components, base flow separation, Unit hydrograph theory, Synthetic unit hydrograph, Flood routing - graphical methods of reservoir flood routing, Drought and its classification.

Module 2 : Surveying and Leveling

Introduction-classification and basic principles, Principle and method of Chain surveying, Plane table surveying, Compass surveying. Errors in measurements-their elimination and correction. Leveling, Contouring. Computation of area and volume, Theodolite surveying, traversing and adjustment of errors.

Module 3 : Fluid Mechanics

Definition and Properties of fluids, Unit measurement, Fluid statics, Dynamics of fluid flow, Bernoulli's theorem, venturi-meter, orifice-meter and nozzle, siphon; Laminar flow: Stress-strain relationships, General equation for head loss in pipes, energy losses through pipe fittings, Darcy Equation, flow through network of pipes, hydraulic gradient and energy gradient, Measurement of discharge through pipes and open channel.

Module4: Soil Mechanics

Classification of soil, Index properties of soil- void ratio, porosity, density, water content, particle size distribution, consistency limits and permeability, seepage flow-net and drain-age, compaction, consolidation, earth pressure and retaining structure, shear strength, soil stabilization, soil exploration, stability of slope, Foundation Engineering.

Module 5: Soil and Water Conservation

Mechanics and types of erosion and their causes, Estimation of Soil loss, Biological con-trol measures, Stream bank erosion, Wind erosion control, Design of permanent soil con-servation structure: chute, drop and drop inlet spillways, Design of Contour bunds, contour trenches, contour stone walls, contour ditches, Terraces.

Module 6 : Ground Water, Pump and Well Technology

Introduction: geologic formations, Types of aquifer and wells, Ground water exploration technique, Aquifer properties, aquifer properties, Various types of tube wells, hydraulics of well and well performance, installation of well screen, Joining of pipes, Completion and development of well, Water lifting devices, Pump Characteristics and Pump selection, installation and troubleshooting.

Module 7: Irrigation and Drainage

Soil-water-plant relationship, irrigation and drainage for sustainable crop production, Land grading and land preparation for Irrigation and Drainage, Design of Irrigation channel, Water conveyance and Control Structures, Irrigation water requirement, Methods of Irrigation-Flood, boarder, furrow, check basin, Sprinkler and drip irrigation systems. Types of drain-age systems and drainage materials.

Module 8 : Building materials and Structures

Simple Stress-strain, Stress-Strain-Tension, Compressive, shear, Stress-Strain relation-ship, Elasticity, Hooke's law, Young's modulus, Modulus of rigidity, Poisson's ration, Mohr's circle, Shear force and bending moments diagram, moment of inertia, middle third rule, Column and struts.

Modules 9 : Remote Sensing and GIS

Definition: History of Remote Sensing: Abroad \ India, Concepts of scale, Resolution, Elec-tromagnetic Spectrum: Optical \ Microwave, Visible region: Blue, Green and Red wave-length portion, Wavelength and frequency: their relation and units of measurement, Polar-ization; Coherent & Incoherent radiation; Doppler Effect, Energy transmission, atmospheric characteristics, Map - Definitions - Representations - Point line polygon common coordi-nate systems.

FARM MACHINERY AND POWER
(FOR AGRICULTURAL ENGINEERING ONLY)

Modulel 1 : Crop Production Technology

Climatic zones of West Bengal and its characteristics, Classification of crop, Effect of different weather parameters on crop growth and development, Principles of tillage, Tilth and its characteristics, Tillage implements, Conservational Tillage, Conventional Tillage, Soil-water-plant relationship, Crop rotation, cropping systems, mono, double and multiple cropping, Sowing, Intercultural operation, harvesting, processing, storage and protection of crops, Soil forming rocks and minerals-origin, classification and composition, Weather-ing of rocks and minerals, Soil forming process and the factors, Soil profile, Soil Proper-ties- Physical - soil texture, structure, densities, pore spaces, Chemical properties - pH, Soil water composition and classification, Soil moisture constants and function, Soil air, Soil temperature.

Module 2 : Farm Machinery

Status and scope of farm mechanization, Classification and constructional details and principles of operation of manually operated, animal drawn and power operated imple-ments and machinery for primary and secondary tillage, puddling, Sowing and planting equipments, fertilizer application, Description, operation and calibration, Inter-cultivation tools, plant protection equipment, Principle of crop harvesting and threshing, Chaff cutters and silage filling equipment, Land development machinery, Human engineering and safely in farm machinery, Selection.

Module 3 : Farm Engine and Tractors

Power availability on the farms from animate and inanimate sources of energy, their ca-pacities and efficiencies, Tractor engine components and their principle of working, Engine valve and valve mechanism and valve timing diagram, Fuel and Air supply system, Cooling and Lubrication System, Ignition and starting and electrical system, Engine Governing, Transmission systems of wheel and track type tractors, Clutch and brake, gearbox, differ-ential, PTO, Belt pulley and draw-bars and final drive mechanisms, Power tiller and small farm engines for farm operation, Performance and cost analysis of farm tractors and power tillers.

Module 4 : Renewable Energy Sources

Introduction to conventional and non-conventional energy sources, Patterns of fuel con-sumption, Potential of solar, wind, biogas, biomass, geothermai and other renewable en-ergy sources, Solar Cooker, Water Heater, Drier, solar still, solar pond, PV system etc. Aerobic and anaerobic bio-conversion process, Pyrolysis, gasification and their econom-ics, selection of size of biogas plants, Wind energy potential, Installed capacity, Study of various types of wind mills.

Module 5 : Thermodynamics and Heat Engines

Thermodynamics properties, closed and open system, flow and non-flow processes, gas laws, laws of thermodynamics, internal energy, Thermodynamic process of perfect gases, P-V, P-T and T-S diagrams of pure substances, Second law of thermodynamics, Differ-ence between heat and work, cyclic heat engines, Kelvin-Planck and Clausius statements, refrigeration and heat pumps, reversibility and irreversibility of process, Boiler performance; boiler efficiency, Thermodynamic cycles of I.C. engines.

FOOD PROCESS AND POST HARVEST ENGINEERING

(For Agricultural Engineering only)

Food constituents, micro-organism in deterioration and Preservation of food, Modes of heat transfer, one dimensional steady-state and unsteady-state heat transfer in simple geometries, Newton's law of cooling, Free and forced convection, correlations, heat trans-fer coefficient, Introductory radiation heat transfer, Types of heat exchanger, log mean temperature difference, heat exchanger performance, Introduction to mass transfer pro-cess, Fick's law, Molecular diffusion in fluids and solids, Convective mass transfer coeffi-cients, Mass transfer correlations, Processing equipment and machinery, Utilization of agricultural by product, Unit operation of various dairy and food processing systems; Pro-cess flow charts for product manufacture, Manufacture of flavoured milk - cream - butter-condensed milk - Ghee, ice cream etc, Beverages -"alcoholic and non alcoholic - carbon-ated and non carbonated, Working principles of equipment for receiving, pasteurization, sterilization, homogenization, filling and packaging, butter manufacture, evaporation, dry-ing, freezing, juice extraction, filtration, Process parameters and equipment for various operations- Cleaning, sorting and grading, Washing, Handling, Peeling and slicing. Blanch-ing, Mixing, Packaging and storage, Cooling and Cold storage, drying and dehydration-Pre-drying techniques, Theory of drying, Various types of dryers and their operation, Qual-ity changes in dried products, quality control techniques and application.

PAYMENT OPTION:

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