UNIVERSITY POLYTECHNIC
B.I.T., MESRA, RANCHI

Syllabus of Diploma in Engineering Common for All Branches (Semester II)

COURSE STRUCTURE
(W.E.F. 2011 Batch Students)
(Total Unit 7.5)
Common to All Branches

Course Code	Theory	Unit	Course Code	Sessional	Unit
DMA 2001	Mathematics II	1.0	DME 2002	Engineering Graphics-II	0.5
DAS 2001	Applied Science II	1.0	DAS 2002	Applied Science Lab II	0.5
DBC 2003	Circuits & System	1.0	DEE 2002	Basic Electrical Engg. Lab.	0.5
DCH 2001	Environmental Sciences	1.0	DPE 2002	Workshop Practice II	0.5
DBM 2003	Engg. Measurements	1.0	DGA 2002	P.T. & Games/Creative Arts/ NSS	0.5
		5.0			**2.5**
			DHU 2002	Comm. Practice WS- I	0.5 (NC)

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Course Code : DMA 2001 **Subject : Mathematics II**

Module 1
Vectors : Notation, Types, Addition and Subtraction, linearly dependent and independent vectors, scalar product and vector product of two vectors and related problems. (5)

Module 2
Determinant: Properties and expansion. Solution of simultaneous linear equations in two and three variables by Cramer's Rules. (5)

Module 3
Matrix : Types, Addition, scalar multiplication, Transpose, Adjoint, Inverse, Product of two matrices, solution of equations by matrix method. (5)

Module 4 and Module 5
Differential Calculus : Notion of a function of one variable, Limit, Continuity, differentiation, Meaning of derivative, differentiation by first principles. Derivative of implicit functions, logarithmic, exponential, parametric and trigonometric functions, Approximations. (5)

Derivative of sum, product and quotient functions. Maxima and Minima of a function of one variable. Successive differentiation, Leibnitz's (without proof) and direct applications, Equations of tangent and normal, use of Taylor's and Maclaurin's theorem, L'Hospital's rule. (5)

Module 6 and Module 7
Integral Calculus : Integration as inverse process of differentiation. Standard formula of integration. Simple problems on integration. Integration of product of two functions. (5)

Integration by substitution. Definite integrals and their properties, simple problems on definite integrals. (5)

BOOKS :

Modern Approach to Intermediate Vector Analysis	- Das Gupta & Prasad
Higher Engineering Mathematics	- B. S. Grewal. Khanna Publishers
A Text Book of Calculus	- R. S. Agarwal
A Text Book of Calculus	- K. C. Sinha

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Course Code: DAS2001 **Subject: Applied Science – II**

Module I:
Basic concept of some organic compound & its applications **[4]**
Organic compounds, Functional group, homologous series
Polymers and its applications, Addition & condensation polymers
Thermosetting and thermoplastic with examples
Natural and artificial rubbers, vulcanization

Module II:
Waves and Sound **[6]**
Types of waves (Electromagnetic waves & Mechanical wave), Superposition of waves, Speed of sound in a gaseous medium (Newton's Formula and Laplace's correction, Doppler Effect. Acoustics of Buildings, Loudness, Beats, Echoes, Reverberation.

Module III:
Water Technology **[6]**
Various water resources and their characteristics
Hardness of water – temporary and permanent, action of soaps and detergents
Water treatment- Lime soda, Zeolite and Ion exchange methods
Boiler feed water, scale formation, priming and foaming as troubles and remedial measures

Module IV:
Light **[6]**
Reflection & Refraction of light, Laws of reflection and refraction, Refraction through prism, Prism formula, Dispersion with a prism, Interference of light (Path difference, Young's double slit experiment, Fringe width), Photometry (Intensity of illumination, Inverse square law), Speed of light in vacuum and media.

Module V:
Electrochemistry and Equilibrium **[8]**
Law of electrolysis (Faraday), Electrodeposition and electroplating,
Corrosion – Definition, types, prevention and protection (including organic coatings).
Law of chemical equilibrium, Ostwald's dilution law, common ion effect
Solubility and solubility product, pH value, buffer solutions

Module VI:
Magnetism **[4]**
Magnet and their properties, Magnetic moment, Magnetic field and lines of force, Magnetic force on a current carrying wire, Biot-Savart's law, Magnetic field due to infinitely long straight conductor, Earth's magnetic field and its three parameters.

Module VII:

Fuels **[6]**

Conventional and non-conventional source of energy, calorific value
Fossil fuels, Coal- classification, proximate and ultimate analysis, coal carbonization
Petroleum – classification, refining, fractional distillation, cracking
Gasoline and diesel fuels- their properties, knocking, octane number & cetane number.
Gaseous fuels – Producer gas, water gas, L.P.G., C.N.G. & biogas
Lubricants – Mechanism of lubrication, classification of lubricants, various tests for lubricants (flash point, pour point, cloud point & viscosity)

BOOKS RECOMMENDED:

1. Physics,Vol.II, Robert Resnick,David Halliday & Kenneth S.Kumar,John Wiley & Sons, Inc
2. Physics for Class XII, N.K.Bajaj, Tata McGraw Hill Publishing Co. Ltd.
3. Introductory Physics, Vol. II, N. N. Ghosh, Bharti Bhawan
4. Concept of Physics, Vol. II, H.C.Verma, Bharti Bhawan
5. Inter Physics, II, Durga Prasad Singh, Students' Friends
6. Comprehensive Chemistry. Vol. II.
7. Engineering Chemistry, Shashi Chawla

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Course Code : DBC 2003 **Subject : Circuits & Systems**

Module 1
Electrical Circuits **4**
Types of Networks, elements, their classification, Current source, Voltage source, Independent source transformation

Module 2
Network Theorems Applied to DC Circuits **6**
Mesh current analysis, Node voltage analysis, Superposition theorem, Thevenin's and Norton's theorems, Maximum power transfer theorem.

Module 3
Magnetic Circuits **6**
Self and mutual inductance, Inductors connected in series & Parallel, Faraday's law of electromagnetic induction, Definitions of magnetic flux, Magnetic flux density, Magnetic Field Intensity, Permeability, Energy stored in a magnetic field,.

Module 4
Electrostatics **6**
Capacitance, capacitors connected in series & parallel, dielectrics, capacitance of parallel – plate capacitors, Electric flux, Electric flux density, Electric field intensity, permittivity, Coulomb's law, Energy stored in a electric field.

Module5
AC Circuits **8**
Characteristics of AC Circuits and Phasor representation, Single – phase and, instantaneous value, RMS value, average value, maximum value form factor, Reactance, impedance, Power factor, power in single phase circuit, , line & phase quantities, , Active, reactive & Apparent Power.

Module 6
AC Circuits Three Phase **6**
Three – phase Voltage and Current , star and delta connection of 3-phase circuits, power relationship in 3 phase circuits

Module 7
Measuring Instruments : **4**
Moving iron, Moving coil types of instruments.

Books

1. Schaum's Series on Electric Circuits (Third Edition) - Edminister and Nahvi.
2. Basic Electrical Engineering – Nagrath
3. Basic Electrical engineering - G. K. Mittal
4. Basic Electrical Science and Technology – K Murgesh Kumar

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Course Code : DCH 2001 **Subject: Environmental Science**

Module I : Multidisciplinary nature of environmental Science **[2]**
Definition, scope, importance and need for public awareness.

Module II : Ecology and Environment: **[6]**
Ecosystem, basic structure of an ecosystem (abiotic and biotic components), nutrient and biogeochemical cycles (carbon cycle, oxygen cycle, nitrogen cycle, sulphur cycle phosphorus cycle and hydrological cycle), food chain, food web, ecological pyramid.

Module III : Segments of environment **[4]**
Atmosphere, hydrosphere , lithosphere, soil profile and composition of soil, biosphere.

Module IV : Environmental Pollution **[6]**
Sources, pathways and fate of environmental pollutants, causes of environmental pollution, population explosion, environment and human health, value education.

Module V : Water Pollution & Waste water treatment **[8]**
Water resources, sources of water pollution, various pollutants, their toxic effect, potability of water, rain water harvesting, Composition of waste water, primary and secondary waste water treatment (Trickling filter & Activated sludge process)

Module VI : Air Pollution **[8]**
Various segments of atmosphere and their significance, classification of air pollutants, toxic effects, sources and their control measure like ESP, catalytic converter and bag house filter, Green house effect, Global warming, Ozone depletion.

Module VII **[6]**
A brief introduction to Noise Pollution, Soil Pollution and radiation pollution.

Text books:

1. Environmental chemistry – A. K. Dey
2. A basic course in Environmental studies - Deswal & Deswal

Reference books:

1. Environmental pollution – B. K. Sharma
2. Environmental pollution and control - C. S. Rao
3. Essentials of ecology & environmental Sciences - S.V.S. Rana

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Course Code: DBM 2003 **Subject: Engg. Measurements**

Module 1:
Measurements & Measurement Systems
Measurement : Significance of Measurements, Methods of Measurements, Instrument & Measurement Systems, Mechanical, Electrical and Electronic Instruments, Classification of Instruments.

(4)

Module 2 :
Characteristics of Instruments and Measurement Systems : Noise, Accuracy & Precision, Repeatability, Sensitivity, Significant figures, Range of Doubt, Static Sensitivity, Linearity, Hystresis, Threshold, Dead Time, Dead Zone, Resolution or discrimination
Errors : Limiting Errors, Quantities with limiting errors, Types of errors, Gross errors, Instrument errors, Environmental Error, Random errors.

(8)

Module 3 :
Measurement of Weight & Surface : Description, Working principle & different ways of measuring weight & surfaces.

(5)

Module 4 :
Measurement of Force & Torque :
Measuring method, Description and working principle of different types of Force & torque measuring system.

(5)

Module 5 :
Measurement of Resistance, Inductance & Capacitance, Measurement of Current, Voltage, Power, Energy Construction and Operation of Galvanometer, Ammeter, Voltmeter, Wattmeter. Introduction of General purpose Analog and Digital Multimeter.

(7)

Module 6 :
Transducers, Primary & Secondary Strain Gauge, LVDT, Temperature Sensors and Thermistors, Piezo Electric Transducers.

(7)

Module 7 :
Linear Measurement :
Instruments, Used in chaining, Chain surveying, Ranging, Errors in chaining, Tape correction, Conventional symbols.

(4)

Books :

1. A course in Electrical & Electronics Measurement & Instrumentation – A. K. Sawhney – Dhanpat Rai & Co.
2. Measurements Principal & Practice – Harsh Vardhan – Macmillan India.

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Course Code : DME 2002 **Subject : Engineering Graphics- II (SESSIONAL)**

Development of Surfaces:
Development of surfaces of cubes, prisms cylinders, pyramids, cones and spheres.

Helics and screw threads
Helics, helical and screw threads

Isometric Projections
Isometric axis, lines and planes. Isometric scale, Isometric projection of planes, prisms, pyramids cylinders, cones and spheres.

Intersection of surfaces
Lines of intersection. Intersection of prisms. Cone & cylinder – in all cases only axes intersecting at right angle.

Machine Drawing

Screwed fasteners:
Screw thread nomenclature, forms of threads, thread designation, multistart threads, right and left hand thread, representation of threads, bolted joints, locking arrangements for nuts and foundation bolts.

Keys, Cotters and Pin Joints :

Shaft Couplings :
Rigid couplings, Flexible couplings.

Pipe Joints
Joints of system pipes, joints of hydraulic pipes.

Rivited and welded joint
Rivets and revetting, lap joints, butt joints welded joints and symbols, dimensions of welds.

Bearings
Sliding contact bearings, rolling contact bearings.

Text & Reference Books

1. Engineering Drawing by N. D. Bhatt
2. Machine Drawing by K. L. Narayana
3. Machine Drawing by P.S.Gill
4. Machine Drawing by N. Sidheshwar