

Fire Technology

Sr. No.	Course Code	Courses	L	T	P	Credits
1	EN3BS03	Engineering Mathematics-III	3	1	0	4
2	FT3CO08	Fluid Mechanics	3	1	2	5
3	FT3CO09	Building Planning and Machine Drawing	3	0	2	4
4	FT3CO10	Paramedics	3	0	0	3
5	FT3CO11	Electrical Technology & Safety in Electrical System	3	0	2	4
6	FT3CO12	Fire Fighting & Field Training II	0	0	2	1
7	EN3MC03	Technical Communication	2	0	0	0
8	EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3
		Total	20	2	8	24
		Total Contact Hours	30			

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3BS03	Engineering Mathematics-III	3	1	0	4

Unit I

Functions of Complex Variables: Functions of complex variables: Analytic functions, Harmonic Conjugate functions, Cauchy-Riemann Equations, Complex Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles and Residues, Residue Theorem, Application of Residue theorem for evaluation of real integrals.

Unit II

Numerical Analysis –I : Errors and Approximations, Solution of Algebraic & Trancendental Equations (Regula Falsi method , Newton-Raphson formula and Iterative method), Solution of Simultaneous linear equations by Gauss Elimination, Gauss Jordan, Crout's Triangularization method , Jacobi's and Gauss-Siedel Iterative method.

Unit III

Numerical Analysis –II: Difference Operators, Interpolation (Newton Forward and Backward Formulae), Central Interpolation Formulae (Gauss, Bessel's and Sterling's formula), Lagrange's and Divided difference formulae, Numerical Differentiation.

Unit IV

Numerical Analysis –III : Numerical Integration, Numerical Solution of Ordinary Differential Equations (Taylor's Series, Picard's Method, Euler's Modified Method, Runge-Kutta Method, Milne's Predictor and Corrector method) .

Unit V

Statistics : Correlation, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation Coefficient , Linear Regression, Regression coefficients ,Curve fitting (Method of Least Square),Testing of Hypothesis , Student's t-test, Fisher's z-test, Chi-Square test.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd.

References

1. J. Ravichandran, Probability and Statistics, Wiley India.
2. R. George, Mathematical Statistics, Springer.
3. M. K. Jain, Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publication.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
AU3CO08/FT3CO08	Fluid Mechanics	3	1	2	5

Unit-I

Fluid Properties and Hydrostatics: Density – Viscosity – Surface tension – compressibility – capillarity – Hydrostatic forces on plane – inclined and curved surfaces – buoyancy – centre of buoyancy – metacentre.

Unit-II

Kinematics of Flow: Types of flow-ideal & real, steady & unsteady, uniform & nonuniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow netstheir utility & method of drawing flow nets.

Unit-III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi-meter, weirs and notches).

Unit-IV

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.)

Unit-V

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles. Flow through pipes, Boundary Layer

Text Books:

1. P.N.Modi & S.M.Seth, Hydraulics and Fluid Mechanics, Standard Book House.
2. Russell C. Hibbeler, Fluid Mechanics, Pearson.
3. Yunus Cengel, Fluid Mechanics, TMH.

Reference Books:

1. Frank .M. White, Fluid Mechanics, TMH
2. S.C. Gupta, Fluid Mechanics and Hydraulic Machines, Pearson.
3. Jnik Dake, Essential of Engg Hyd., Afrikan Network & Sc Instt. (ANSTI)

Web Sources:

1. <https://lecturenotes.in/subject/240/fluid-mechanics-fm>
2. <https://arxiv.org/ftp/arxiv/papers/1407/1407.3162.pdf>

Suggested Practicals:

1. To determine the local point pressure with the help of pitot tube.
2. To Study terminal velocity of a spherical body in water.
3. Calibration of Orifice meter and Venturi meter
4. Determination of C_c , C_v , C_d of Orifices
5. Calibration of Nozzle meter and Mouth Piece
6. Reynolds experiment for demonstration of stream lines & turbulent flow
7. Determination of meta-centric height
8. Determination of Friction Factor of a pipe
9. Verification of Impulse momentum principle.

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
FT3CO09	Building Planning and Machine Drawing	3	0	2	4

Building Planning

Unit I

Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc. Building Planning: Provisions of National Building Code, Building bye - laws, open area, setbacks, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

Unit II

Building Services: Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

Unit III

Design and Drawing of Building: Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc. Perspective Drawing: Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings.

Machine Drawing:

Unit IV

Machine Drawing: Limits, fits & tolerances: IS 919 code, cylindrical fits, tolerance symbols, standard preferred sizes and fits, hole based dimensioning, symbology for form, location and runout, tolerancing for position, concentricity, location, roundness, perpendicularity and runout.

Unit V

Drawings of joints: Welded joints, types, welding symbols, drawing of welded machine parts with details of welding. Brackets, blocks, base plate and crankshaft. Pipe joints: Coupler joints, nipple joints, union, socket and spigot, integral flanged joints and hydraulic joints. Screwed fastenings: Screw thread forms, vee and square threads, conventional representation of threads, hexagonal headed bolt and nut, square headed bolt, nut locking arrangements, various types of machine screws and set screws, foundation bolts, lock bolt bolt with square plate, ray bolt and Lewis foundation bolt. Cotter and Pin joints: socket and spigot joints ,gib and cotter joint for rectangular rods, sleeve and cotter joints, knuckle joint.

Text Books:

1. N. K. Swamy & A. K. Rao, Building Planning and Drawing, 7/e Paperback
2. Gurcharan Singh, Building Planning Designing And Scheduling, Paperback

Reference Books:

1. Shah, Kale & Patki, Building Design and Drawing, TMH
2. Narayana and Reddy, Machine Drawing, New age, Delhi.
3. K.C. John , Text Book Of Machine Drawing, PHI Learning

Web Sources:

1. http://195.250.185.245:8080/MyWeb/get/Bentley_training/Building.pdf
2. <https://www.uts.edu.au/sites/default/files/CAD%20Drawing%20Standard%20P-ST01%2009.pdf>
3. <https://lecturenotes.in/subject/464/machine-drawing-md>
4. <http://www.fkm.utm.my/~arahim/Assembly%20Drawing.pdf>

Suggested Practical :

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all student)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. To draw machining conventions for Limits, Fits and Tolerances
7. Use of AutoCAD for preparation of drawings.
8. To draw hexagonal headed and square headed bolt with washer.
9. To draw knuckle joint
10. To draw Cotter Joint



Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
FT3CO10	Paramedics	3	0	0	3

Unit I

Aims and Objectives: First Aid principles-Role of the first aider-sequence of action on arrival at scene. Vital signs-breathing -pulse. Introduction to the body-basic anatomical terms-body cavities-head- cranium - thorax-abdomen and pelvis.

Unit II

The Nervous System: Functions-components -brain - cerebrum - cerebellum – medulla oblongata -cerebro - spinal fluid-spinal cord-autonomic nervous system. Unconsciousness-causes-level of consciousness-management of unconscious casualty problems of unconsciousness. Fainting-recognition-management-aftercare. Diabetes, hypoglycaemia, hyperglycaemia management. Seizures (epileptic fits, convulsions) features- management , stroke. Head injuries-fractures of the base-vault and sides of skull.

Unit III

The respiratory system: Respiratory failure - asphyxia-abdominal thrust in Heimlich manoeuvre. Chest injuries-types-fractured ribs -pneumothorax haemothorax. The circulatory system-heart attack-chest compression- CPR Shock -causes - signs and symptoms - management of shock.

Unit IV

Eye injuries: Foreign body in eye, eye-trauma, corrosive chemical in eye, arc eye. Wounds-bleeding-classification-types of wounds -bleeding from special sites. Broad and narrow fold bandages-hand bandages-slings.

Unit V

Fractures: Classification of fractures-principles of immobilisation-sprains & dislocation.The skin. Burns -rule of nines-pure thermal burns. Electric burns. Chemical burns. Radiation burns-cold burns. Poisoning. Occupational health dermatitis-noise.Radiation ionising. Physical fitness. Lifting - casualty handling. Use of stretchers.

Text Books:

1. Edward T Dickinson, Emergency Care, Pearson.
2. R.Watson Jones, Fractures and Joint Injuries, Churchill Livingstone.
3. Swapna Naskar, First aid and emergency care, Kumar Publishing House.

References Books:

1. Cindy L. Stanfield, Principles of Human Physiology, Kindle edition.
2. W.D. McDowell, Handbook of Physiology and Biochemistry, John Murray.
3. T.R.Parsons, Fundamentals of biochemistry in relation to human physiology, Cambridge: W. Heffer & Sons, Ltd.

Web Sources:

1. <https://www.uea.ac.uk/documents/6207125/9412652/paramedic-handbook-2014-15.pdf/5361834c-4d23-4f9b-a757-4549acfdb9dd>
2. <http://www.phecit.ie/Images/PHECC/Members%20and%20Students/20170505%20LD%20Asssment%20Sheets%20Paramedic%20Secondary%202017%20OSCEs.pdf>

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
FT3CO11	Electrical Technology & Safety in Electrical System	3	0	2	4

Unit I

Elementary ideas of electrical equipments: Transformers, DC Machines, Alternators, Induction machines- characteristics - construction - applications. Protective relays: Requirements of relay- types of protection-classification - Distance relay, differential relay , state relays - Definition - types.

Unit II

Circuit breakers: Function of switch gear - Arc phenomenon - Initialization of an arc – arc interruption - Recovery voltage and Restriking voltage - classification - working. MCB and ELCB Faults in power system - causes – types Fuses: Definition - types of fuses - selection of fuse - advantages and disadvantages. Grounding - Neutral grounding - Solid grounding Resistance grounding - Arc suppression coil grounding Equipment grounding for safety - Grounding substation - Grounding of line structure – Earthing.

Unit III

Effect of electric and magnetic fields: Human Safety aspects - Effect of Current and voltage on human being - distance from the source - Typical V-I characteristics of skin - Nervous system. Electrical shocks and their prevention Insulation - classes of insulation - FRLS insulation - Continuity test.

Unit IV

Safety during installation of equipment in the plant: Safe sequences in installation – risk during installation. Safety during testing and commissioning- steps. Test on relays- Protection and interlock system on safety.

Unit V

Hazardous zones: Classification of hazardous zones. Intrinsically safe and explosion proof electrical apparatus. Selection of equipment's in hazardous area. Electrical fires - hazards of static electricity - Safety procedures in electrical maintenance, statutory requirements from Electrical Inspectorate. Introduction to Indian Electricity Act & Rules.

Text Books:

1. John Cadick, P.E., Mary Capelli-Schellpfeffer, Dennis K. Neitzel, C.P.E Electrical Safety Handbook, Al Winfield,
2. Electric Safety: Practice and Standards Indian Standards

References Books :

1. G.S. Hodges, Electricity Fire Risks
2. J.P. Handbook.

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Web Sources:

1. <https://www.osha.gov/dte/library/electrical/electrical.pdf>
2. https://www.lanl.gov/safety/electrical/docs/elec_hazard_awareness_study_guide.pdf

Suggested Practical :

1. To study the various methods of earthing
2. To study the safety procedures in electrical maintenance work and also classify hazards
3. To study the static electricity
4. To study the salient features of Transformer oil
5. To study the various causes of electrical fire
6. To study the firefighting and rescue in the presence of radiation hazards
7. To study the radioactive waste management

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
FT3CO12	Fire Fighting & Field Training-II	0	0	2	1

Field training based on following

1. **Squad Drill** : Attention , Stand at easy, Quick March and Slow March , Right Turn, Left Turn , About Turn , Inclined Turn , Right Dressing , Left Dressing and Middle Dressing, Different types of Salute, Halt position , double up
2. **Ladder Drills** : Aluminium Extension Ladder (Four Men), Hook Ladder Drill, Hook Ladder Drill (One Men), Hook Ladder Drill (Two Men), Ladder Drill (Four Men), getting a Branch to work upon Escape Ladder, getting a Branch to work from an Escape Ladder.
3. **Hose Drill** : Hose pick up drill, remove the kink, Unrolling the delivery hose, connecting and disconnecting the Hose, connecting and disconnecting the branch pipe
4. **Ropes and Knots** : Different types of Knots, hitches and bends, Rope rescue
5. **Breathing Apparatus Set Drill** : Open Circuit Compressed Air, Donning , Doffing and Running
6. **Fire Extinguisher Drill** : Operation and its Maintenance

Web Sources:

1. <https://www.era.lib.ed.ac.uk/bitstream/handle/1842/5436/A12.CD.M2.P2%20Civil%20Defence%20Manual%20of%20Basic%20Training%20volume%20II%20Basic%20Fire%20Fighting.pdf?sequence=1>
2. <http://osfm.fire.ca.gov/training/pdf/sfproceduresmanual.pdf>
3. <http://www.iitk.ac.in/nicee/IITK-GSDMA/F05.pdf>

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3MC03	Technical Communication	2	0	0	0

Unit I Communication: Difference between general and Technical Communication, Barriers to Communication, Verbal/ Non Verbal Communication, Body language , flow, patterns, types of communication.

Unit II Confidence Building : Self evaluation and development, SWOT Analysis, overcoming hesitation and fear of facing public, exercises for confidence building, concepts and elements of emotional intelligence, significance.

Unit III Business Correspondence – Business letters, formats, parts and layouts of business letters. sales letters: job applications, resume writing, applications, calling quotations, sending quotation, placing orders, complaints, and aftermath. Email Etiquettes.

Unit IV Report Writing – Business letters, formats, parts and layouts of business letters. sales letters: job applications, resume writing, applications, calling quotations, sending quotation, placing orders, complaints, and aftermath. Email Etiquettes.

Unit V Formal Presentation- Organising data, assimilating, preparing slides, designing presentations, basic personality traits. Interviews, group discussion

Text Books:

1. R C Sharma, Krishna Mohan, Business Correspondance and Report Writing .
2. M Ashraf Rizvi, Effective Technical Communication

Reference Books:

1. P N Kharu Dr Varinder Gandhi Communication Skills IN English
2. Herta A Murphy, Effective Business Communication

Web Source:

<http://study.com/academy/lesson/communication-skills-definition-examples.html>
<https://books.google.co.in/books?>

Open Learning Source:

<https://onlinecourses.nptel.ac.in>

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3

Unit I: Concepts of Management

Definition, characteristics and importance of management; Management: Science or Art, Difference between Management and Administration, Levels of management, Functions of Management, Managerial Roles, Managerial skills and competencies; Decision Making: Definition, process and types; Decision making under certainty, uncertainty and risk; Cross cultural issues in management and challenges.

Unit II: Fundamentals of Marketing and Human Resource Management

Introduction to Marketing: Definition, importance, function and scope of marketing, Core concepts of marketing, Marketing concepts and orientations, Marketing environment, Marketing-mix, Holistic marketing concept, Customer Relationship Management (CRM).

Introduction to Human Resource Management (HRM): Nature, Scope, Objectives and Functions; Role of HR manager, Process and need for Human Resource Planning, Human resource policies, Changing role of Human Resource in India, Globalization and its impact on Human Resource.

Unit III: Fundamentals of Economics

Introduction to Economics: Definition, nature, scope and significance; Difference between micro and macro economics; Time value of money, Law of diminishing marginal utility; Theory of Demand and Supply, Price elasticity of demand; Meaning and types of costs, Law of variable proportions; Types of market structure; National income and related aggregates; Meaning and types of Inflation; Meaning and phases of business cycle.

Unit IV: Basic Accounting Principles

Accounting Principles and Procedure, Double entry system, Journal, Ledger, Trail Balance, Cash Book; Preparation of Trading, Profit and Loss Account; Balance sheet; Cost Accounting: Introduction, Classification of costs, Methods and Techniques of costing, Cost sheet and preparation of cost sheet; Breakeven Analysis: Meaning and its application.

Unit V: Fundamentals of Financial Management

Introduction of Business Finance: Meaning, Definition of Financial Management, Goals of Financial Management (Profit Maximization and Wealth Maximization), Modern approaches to Financial Management – (Investment Decision, Financing Decision and Dividend Policy Decisions).

Text Books

1. R. D. Agarwal, "Organization and Management", McGraw Hill Education.
2. P. C. Tripathy and P. N. Reddy, "Fundamentals of Management, Economics and Accountancy", Tata McGraw Hill
3. Kotler Philip and Keller Kevin Lane, "Marketing Management", Pearson

Reference Books

1. Peter F Drucker, "The Practice of Management", McGraw Hill
2. Harold Koontz, "Essentials for Management", Tata McGraw Hill
3. M Y Khan and P K Jain, "Management Accounting", Tata McGraw Hill

Website Link

1. <https://nptel.ac.in/courses/122108038/> (Management Concepts)
2. <https://nptel.ac.in/courses/110104068/> (Marketing)
3. www.hrnguide.net (Human Resource Management)
4. <http://economicsconcepts.com> (Economics)
5. <https://nptel.ac.in/courses/110101003/> (Accounting)
6. <https://nptel.ac.in/courses/105103023/39> (Financial Management)

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