

Course No.	CEL209	Open Course (Y/N)	HM Course (Y/N)	Discontinued (Y/N)
Course Title	<u>Construction Materials</u>			
Course Coordinator	Dr. A. D. Pofale			
Slot in which offered. If not offered write N	Odd		Even	
	N		E	
Structure	Lecture	Tutorial	Practical	Credits
	3	0	0	6
Prerequisite Course Codes As per proposed Course Numbers				
Prerequisite credits				
Equivalent Course Codes. As per proposed courses and old courses				
Overlap course codes As per proposed Course Numbers				
Text Book (Max. 2)	Title	Engineering Materials,		
	Author	Rangawala S.C.,		
	Publisher	Chortor Publications		
	Edition	1991		
	Title	Building Materials,		
	Author	S.K. Duggal		
	Publisher	New Age International Publications		
	Edition	2006		
Reference Books	Title	Engineering Materials,		
	Author	Rajput R.K		
	Publisher	S Chand & Co. New Delhi		
	Edition	2000		
	Title	Building Materials Technology Structural Performance & Environmental Impact		
	Author	Bruntley L.R		
	Publisher	McGraw Hill Inc		
	Edition	1995		
	Title	Construction Materials their nature & behaviour, E& FN span, -		
	Author	Illston J.M		
	Publisher	Chapman & Hall London		
	Edition	1996.		

	Title	Engineering Materials and applications,
	Author	Flinn R.A. Trojan
	Publisher	Jaico Publishing House
	Edition	1993
	Title	
	Author	
	Publisher	
	Edition	
Content	<ol style="list-style-type: none"> 1. Classifications of Construction Materials. Consideration of physical, Mechanical, thermo-physical Properties, characteristics behaviour under stress, selection criteria for construction materials, green building materials, waste products, reuse and recycling. 2. Structural Clay Products- Bricks- Classification, Characteristics, Ingredients, Manufacturing, Forms of Bricks burnt clay, perforated, paving, soling bricks, hallow blocks, Fire clay/refractory bricks, Terracotta, Porcelain, Stoneware, Earthenware, /refractory bricks etc. 3. Rocks and Stones – Classification, quarrying, dressing, uses, characteristics, selection, types Common building stones, artificial building stones. Uses and applications of stones. 4. Wood and wood Products: Classification and growth of trees, Timber: Classification, Structure, Characteristics, Seasoning, defects, Diseases, decay and preservation. 5. Materials for making Mortar and concrete: Lime manufacture, properties, hardening of lime, types of lime, lime concrete uses, cement, aggregates, water, characteristics, properties and uses of Pozzolana materials, Types of mortars, special mortars, properties and applications, admixtures 6 Ferrous metals: Structure, Iron: Pig Iron, Cast Iron, Wrought Iron, Steel, Reinforcing steel Bars, Alloy steel, Non Ferrous metals: Aluminum, Copper, Zinc, Lead tin, Nickel Stainless steel .high tensile steel ,corrosion resistant steel. 2. Ceramic Materials: Classification, Refractories, glass, glass wool, mechanical, thermal and electrical properties Uses and application. 3. Polymeric Materials: Polymerisation mechanism and depolymerisation. Rubber and plastics, properties, effect of temperature on mechanical properties. Uses and application. 4. Paints, Enamels and varnishes, Tar, bitumen and asphalt, Gypsum and gypsum plaster boards, , adhesives and sealants ,waterproofing materials. Heat and sound insulating materials , geosynthetics, Damp prevention materials. 10. Lightweight heavy weight materials, natural and artificial, special cements and concrete. 	
Course No.		

Course No.	CEL404	Open course (Y/N)	HM Course (Y/N)	Discontinued (Y/N)	
Course Title	Railways Airport and docks and harbour				
Course Coordinator	Dr. Vishrut Landge				
Slot in which offered. If not offered write N	Odd		Even		
			D		
Structure	Lecture	Tutorial	Practical	Credits	
	3	0	0	6	
Prerequisite Course Codes As per proposed Course Numbers	Transportation Engineering				
Prerequisite credits					
Equivalent Course Codes. As per proposed courses and old courses					
Overlap course codes As per proposed Course Numbers					
Text Book (Max. 2)	Title	Railway Engineering			
	Author	Saxena;			
	Publisher				
	Edition				
	Title	Airport System Planning, Design and Management			
	Author	Richard de Neufville & Amedeo Odoni			
	Publisher	McGraw Hill Book Company			
	Edition				
	Title	Dock and harbour Engineering			
	Author	Oza H.P., Oza G.H.			
	Publisher	Charotar			
	Edition				
	Reference Books	Title	Railroad Engineering, 2nd Edition		
Author		William W. Hay			
Publisher		John Willey & Sons			
Edition					
Title		Docks harbour and tunnels engineering			
Author		Srivastav R.			
Publisher		Charoter			
Title		Airport Planning & Design			
Author		Goyal & Praveen Kumar			
Publisher		Galgotia Publication			

	Title	
	Author	
	Publisher	
	Title	
	Author	
	Publisher	
	Title	
	Author	
	Publisher	
Content	<p>Railways</p> <ol style="list-style-type: none"> 1. Railway Transportation and its development, Long term operative plans for Indian Railways. Classification of Railway lines and their track standards, Railway terminology, Railway Administration and Management. Traction and tractive Resistance, Hauling capacity and tractive effort of locomotives, different Types of Tractions. Permanent Way: Alignment Surveys, Requirement, gauges, track section, Coning of wheels, Stresses in railway track, high speed track. 2. Rail types and functions, selection of rails, Test on rails wear & defects, corrugations and creep of rails. Rail joints short and long welded panels. Sleepers – functions, types, merits and demerits, sleeper density. Ballast cushion, Ballast section Rail fixtures and fasteners. Geometric design of railway track, Gauge, Gradient, speed, super elevation, cant deficiency, Negative super elevation, curves, length of transition curves, grade compensations. 3. Points & crossings : Left and right hand turnout, design calculation for turnout & Crossover, railway track Junctions. Stations and Yards : Types, functions facilities & equipment. Railway signaling and interlocking : Objects and principles of signaling classification and types of signals, control and movement of trains, track circuiting. Necessity of interlocking, methods and mechanical devices. Railway track construction, Inspection & modern, techniques of maintenance. RDSO standards. Modern Technology related to track & traction, Rolling Stock, Signaling and Controlling. <p>Airports</p> <ol style="list-style-type: none"> 4. Development of Air Transportation in India : Comparison with other transportation modes. Aircraft components and characteristics, Airport site election. Modern aircraft's. Airport obstructions: Zoning Laws, Imaginary surfaces, Approach and Turning zone, clear zone, vert. Clearance for Highway & Railway. 5. Runway and taxiway design : Windrose, cross wind component, Runway Orientation and configuration. Basic runway length and corrections, runway geometric design standards. Taxiway Layout and geometric design standards. Exit Taxiways. Airport layout Airport classification: Terminal Area, Aircraft parking and parking system. Unit terminal concept, Gates space standards, Aprons, Hangers, International Airports layouts, phase development Helipads, and Heliports. Visual Aids: Airport marking and 	

	<p>Lighting for runway, Taxiway and other areas. Air traffic control : Need, Network, control aids, Instrumental landing systems, Advances in Air-traffic control.</p> <p>Docks and Harbour: Importance, Sea and tides, tidal theories, tide table, wind waves and Cyclones, harbour layout, break waters, jetties and moorings,</p>
Course No.	

Department: Civil Engineering

Course No.:	CEL403	Open Course (Y/N)	HM Course (Y/N)		Discontinued (Y/N)
Course Title: Rural Water Supply and Sanitation					
Course Coordinator: Dr. Dilip H. Lataye					
Slot in which offered, if not offered write N	Odd		Even		
			G		
Structure	Lecture	Tutorial	Practical	Credits	
	3	0	0	6	
Prerequisite Course Codes As per proposed Course numbers					
Prerequisite Credits					
Equivalent Course Course Codes. As per proposed Courses & old courses					
Overlap Course Codes As per proposed Course numbers					
Text Book (Max. 2)	Title	Excreta Disposal for Rural Areas and Small Communities			
	Author	E.G. Wagner and J.N. Lanoix			
	Publisher				
	Edition				
	Title	Environmental Engineering – II			
	Author	B.C.Punmia			
	Publisher	Laxmi Publication			
	Edition	2002			
Reference Books	Title	Environmental Engineering – II			
	Author	Garg S.K. ;			
	Publisher	Standard Publication			
	Edition	2002			
	Title				
	Author				
	Publisher				
	Edition				
	Title				
	Author				
	Publisher				

	Edition	
Content	<p>National Water Policy, Status of Rural water supply in India, National and State level programmes of RWS, Planning and implementation of rural water supply, problem village Source development, springs, dug wells, infiltration wells etc. Package water treatment plants, appropriate technology for removal of excess iron and manganese, fluoride, arsenic for drinking water, surface water treatment, slow sand filtration, disinfection in RWS. Guidelines for Design of RWS, Types of RWS systems and their components, types of pipes, pumps used in RWS, Community participation in planning, design, O &M of RWS</p> <p>Low Cost Sanitation Methods, Centralised and Decentralised Methods of Rural Sanitation, Pit Privy, Aqua Privy, Water Seal Latrine, Bore-hole Latrine, bucket Latrine Feuill'ees or Trench Latrine, Overhung Latrine, Compost Privy, Chemical Toilet, Double Pit Latrine, Pour Flush Latrine, Improved Double Pit Pour Flush Latrine, Septic Tank, design of Septic Tank, disposal of Septic tank effluent. Water Carried Methods of Excreta Disposal for Rural Areas, Excreta Disposal Programmes for Rural Areas Composting, Methods of Composting, Indore Method, Bangalore Method, NADEP Method, Vermicomposting Method, biodung Vermicomposting, Gobar Gas Plant, Sulabh Sauchalaya. Role of NGO's and GO's in Rural Sanitation Community Participation in Rural Sanitation.</p>	
Course No.		

Course Content Proforma					
Department: Civil Engineering					
Course No.:	CEL(HM) 425	Open Course (Y/N)	HM Course (Y/N)	Discontinued (Y/N)	
Course Title: Finance and Business Management					
Course Coordinator: Prof A.G.Tawalare					
Slot in which offered, if not offered write N	Odd		Even		
			E		
Structure	Lecture	Tutorial	Practical	Credits	
	3	0	0	6	
Prerequisite Course Codes As per proposed Course numbers					
Prerequisite Credits					
Equivalent Course Course Codes. As per proposed Courses & old courses					
Overlap Course Codes As per proposed Course numbers					
Text Book (Max. 2)	Title	Essentials of Management			
	Author	Harold Koontz, Heinz Weihrich			
	Publisher	Tata McGraw Hill			
	Edition	Sixth Edition			
	Title	Cost Management			
	Author	Hilton, Maher, Selto			
	Publisher	Tata McGraw Hill			
Edition	Second Edition				
Reference Books	Title	Managerial Economics			
	Author	Yogesh Maheswari			
	Publisher	Prentice Hall India			
	Edition	Second Edition			
	Title	Management			
	Author	James A.F Stoner, R Edward Freeman, Daniel R Gilbert			
	Publisher	Prentice Hall India			
	Edition	Sixth Edition			
Title	Financial Management				

	Author	Khan, Jain
	Publisher	Tata McGraw Hill
	Edition	Fourth Edition
	Title	Human Resources and Personnel Management
	Author	Werther and Davis
	Publisher	Tata McGraw Hill
	Edition	1996
Content	<p>Principles of management and Personnel management: Economic environment of business, Introduction to managerial economics; Role of a Manager: Tasks and responsibilities of a professional manager, Human Resource development systems, organization structure, manpower planning, Managerial skills and Management Systems, SWOT Analysis.</p> <p>Business Policy and Strategic Management; Assessment of capital requirement and sources of capital, fixed and current assets, liquid resources, Forecasting of business, cash flow, sources of finance, cost of capital, capital structures.</p> <p>Quality assurance, marketing planning, marketing research & Marketing strategies, determinants & Models of consumer behavior, Pricing & promotion strategies, Business forecasting. Modern Control Systems, Total quality Management (TQM), DSS, ERP, Technological innovation & R &D.</p> <p>Financial Management; Meaning and Scope, Economics and Scope, Supply and Demand Mechanism, analysis and forecasting. Balance sheet, profit & loss account, financial statements; Production and Cost theory, Pricing; Financial analysis, Capital Budgeting, budgetary control, international finance.</p> <p>Accounting information and application, Financial versus economic evaluation, and project appraisal. Taxation and inflation, risk and uncertainty, bidding and awards, cost elements of contracts.</p>	
Course No.		

Course No.	CEL 405	Open Course (Y/N)	HM Course (Y/N)	Discontinued (Y/N)
Course Title	INDUSTRIAL WASTE WATER TREATMENT, RECYCLING AND REUSE			
Course Coordinator	Dr. A. R.Tembhurkar			
Slot in which offered. If not offered write N	Odd		Even	
	-		E	
Structure	Lecture	Tutorial	Practical	Credits
	3	0	0	6
Prerequisite Course Codes As per proposed Course Numbers	Environmental Engg - I			
Prerequisite credits				
Equivalent Course Codes. As per proposed courses and old courses	CEL454			
Overlap course codes As per proposed Course Numbers				
Text Book (Max. 2)	Title	Theories and Practices of Industrial Waste Treatment		
	Author	Nemerow N.L		
	Publisher	Addison Wesley Publishing CO. NY.		
	Edition	2 nd		
	Title	Industrial Water Pollution Control		
	Author	W.W.Ecenfelder		
	Publisher	Mc-Graw Hill Book Co.		
	Edition	2 nd		
Reference Books	Title	Industrial Pollution Prevention Handbook		
	Author	Freeman H. M.		
	Publisher	McGraw Hill		
	Edition	1 st		
	Title	Comprehensive Industry Document Series		
	Author	Central Pollution Control Board, India		
	Publisher			
	Edition			
	Title	The Treatment of Industrial Waste		
	Author	E.B. Besselievre		
	Publisher	Mc-Graw Hill Book Co.		

	Edition	1 st
Content	<p>Industrial pollution and its measurement; Generation of Industrial wastewater, Disposal standards; Quantification and characterization of wastewater and its variations; Environmental impacts due to discharge of wastewater on streams, land and sewerage system; Industrial waste survey; Stream sanitation, stream sampling, Stream survey; Principles and techniques for Industrial Pollution prevention and control; Waste minimization; recent trends in industrial waste management, Cleaner technologies; Reuse, Recycling and Resource recovery; Volume and strength reduction; Equalization and proportioning; Neutralization; Methods of Disposal and treatment for removal of organic, inorganic, solids, pathogens, heavy metals and other pollutants; Alternatives and Synthesizing industrial waste treatment system; Joint treatment of industrial waste; CETP; Pollution control measures and Treatment of wastes from various industries viz. Pulp and paper, tanning, Sugar, Dairy, Chemical, Cement, Petroleum, Fertilizers, Metal Finishing, Etc.</p>	
Course No.	CEL 405	

Course No.	CEL368			
Course Title	Advanced Hydraulics			
Course Coordinator	Dr A D Ghare			
Slot in which offered. If not offered write N	Odd		Even	
	N		F	
Structure	Lecture	Tutorial	Practical	Credits
	3	1	0	8
Prerequisite Course Codes As per proposed Course Numbers	CEL 202 Hydraulic Engineering			
Prerequisite credits				
Equivalent Course Codes. As per proposed courses and old courses				
Overlap course codes As per proposed Course Numbers				
Text Books (Max. 2)	Title	Flow through Open Channels		
	Author	Ranga Raju		
	Publisher	Tata McGraw Hill Publication		
	Edition	2004		
	Title	Fluid Mechanics		
	Author	Streeter V.L. and Wyle E.B		
	Publisher	Tata McGraw Hill Publication		
	Edition	2005		
Reference Books	Title	Open Channel Hydraulics		
	Author	Ven Te. Chow		
	Publisher	Tata McGraw Hill Publication (International Students Edition)		
	Edition	2003		
	Title	Engineering Fluid Mechanics		
	Author	Narsimhan S.		
	Publisher	Orient Longman Publication		
	Edition	1981		

<p>Contents</p>	<ol style="list-style-type: none"> 1. Equivalent roughness for channel surfaces, Computation of critical flow, Theory of gradually varied flow, Analysis of surface profiles of gradually varied flow, Channel transitions 2. Computation of gradually varied flow, Hydraulic exponents, Direct integration methods, Step methods, Graphical method, Numerical methods 3. Location of hydraulic jump, application of hydraulic jump in design of hydraulic jump type stilling basin with horizontal apron 4. Unsteady flow in a pipe line for incompressible fluid, Time of flow establishment, Rigid water column theory of water hammer and computation of water hammer pressures 5. Water hammer phenomena when compressibility of fluid and elasticity of pipe is considered, computation of water hammer pressure of frictionless flow in horizontal pipe - for sudden and slow closure of valve, Application of Allievi's method of charts for calculation of approximate pressures, Water hammer pressures in pumping systems, Method of characteristics 6. Computation of water hammer pressures in branched pipe system and in surge tank system, Devices used for protection from water hammer pressures, Function of surge tank and different type of surge tanks, Equations governing the flow in the simple surge tank system, Analysis of flow in a simple surge tank system, Computation of maximum surges in a simple surge tank, Case of hydraulic stability in a simple surge tank system
<p>Course No.</p>	<p>CEL368</p>

Course No.				
Course Title	Advanced Traffic Engineering			
Course Coordinator	Dr. V.S.Landge			
Slot in which offered. If not offered write N	Odd		Even	
Structure	Lecture	Tutorial	Practical	Credits
	3	0	2	8
Text Book (max. 2)	Title	Traffic Engineering – Theory & Practice		
	Author	Pignataro, L.J.,		
	Publisher	John Wiley, 1985		
	Edition			
	Title	Traffic Engineering and Transport Planning		
	Author	Kadiyali, L.R.,		
	Publisher	Khanna publishers, New Delhi, 2002		
	Edition			
Reference Books	Title	Highways- Traffic Planning & Engineering		
	Author	O’Flaherty C A		
	Publisher	Edward Arnold, UK		
	Edition	-		
Content	<p>Traffic Engineering & Studies: Scope, traffic elements, characteristics-vehicle, road user and road; traffic studies-volume, O & D, parking, safety , study methodology, data collection & presentation,</p> <p>Traffic Analysis: Speed, volume, parking & accident data analysis, statistical approach, conflict points, traffic stream characteristics- relationship between speed, flow and density, LOS & capacity analysis, traffic forecasting.</p> <p>Traffic Design: Channelisation of islands, design of rotaries, intersections, pedestrian & bicycle ways,</p> <p>Traffic Control Devices: Traffic signs, markings and signals;</p> <p>Traffic Regulation & Management: Speed, vehicle, parking, enforcement regulations, mixed traffic regulation, management various techniques</p> <p>Geometric design provisions for various transportation facilities as per AASHTO, IRC design</p> <p>Practical: Field studies minimum 6 of the following Speed studies , OD studies, Design of traffic signals, Design of intersection, design of rotaries, Road safety studies, traffic volume studies. Perking studies</p>			

Course No.	CEL 554				
Course Title	Project Appraisal & Construction Finance				
Course Coordinator	Prof S. P. Wanjari				
Slot in which offered. If not offered write N	Odd		Even		
Structure	Lecture	Tutorial	Practical	Credits	
	3	0	0	6	
Prerequisite Course Codes As per proposed Course Numbers	-	-	-	-	
Prerequisite credits	-Nil -				
Equivalent Course Codes. As per proposed courses and old courses					
Overlap course codes As per proposed Course Numbers	-	-	-	-	
Text Book (Max. 2)	Title	Modern Construction Management,			
	Author	Frank Harris & Ronald Mc Caffer			
	Publisher	Blackwell science, 4th Edition			
	Edition				
	Title	Principles of Construction Management			
	Author	Roy Pilcher			
	Publisher	Mc Graw Hill Landon			
	Edition				
	Reference Books	Title	Guidelines for project Evaluation		
		Author			
Publisher		Oxford & IBH Publishing Co.Pvt. Ltd			
Edition					
Title					
Author					
Publisher					
Edition					
Title					
Author					
Publisher					
Edition					
Title					
Author					
Publisher					
Edition					
Title					
Author					

	Publisher	
	Edition	
Content	<p>1. Project Appraisal : Project appraisal, government and private project evaluators, significance of social benefit – cost analysis, commercial profitability, national economic profitability, measurement of direct and indirect benefit and costs. Calculation of benefit cost ratio.</p> <p>2. Engineering economics - Time value of money, discounted cash flow, decision making among the alternatives, replacement analysis, break even analysis.</p> <p>3. Project capital: Cash flow of a project, estimation of minimum capital required, internal rate of return (IRR), Multiple IRR, estimation of annualized cost.</p> <p>4. Depreciation : importance, classification, types – straight line, sum of year method, double rate declining balance method</p> <p>5. Capital Budgeting: element of budgeting – men, materials, equipments, overhead, profits – preparation of capital budget.</p> <p>6. Performance statement: capital gearing ratio, shares, debentures, PBT, PAT, PBIT, Earning per share, preparation of company's performance statement, Inflation.</p>	
Course No.		

Course No.	AML 467	Open course (Y/N)	HM Course (Y/N)	Discontinued (Y/N)	
Course Title	Advance RCC				
Course Coordinator					
Slot in which offered. If not offered write N	Odd		Even		
			G		
Structure	Lecture	Tutorial	Practical	Credits	
Prerequisite Course Codes As per proposed Course Numbers					
Prerequisite credits					
Equivalent Course Codes. As per proposed courses and old courses					
Overlap course codes As per proposed Course Numbers					
Text Book (Max. 2)	Title				
	Author				
	Publisher				
	Edition				
	Title				
	Author				
	Publisher				
	Edition				
Reference Books	Title	“Plain and Reinforced Concrete (Vol-I&II)”			
	Author	Jain, O.P.; & Jaikrishna,			
	Publisher	Nem Chnand & Bros;			
	Edition				
	Title	“Advanced Reinforced Concrete Structures”			
	Author	Varghese, P. C.			
	Publisher	Prentice Hall of India			
	Edition	2000			
	Title	“Reinforced Concrete Design”			
	Author	Pillai, S.U.; & Menon, D.			
	Publisher	Tata McGraw Hill Publishing company ltd. India			
	Edition	1998			
	Title	“IS: 456; Code for Practice: Plain and Reinforced Concrete”, Bureau of Indian standards; New Delhi, 2000.			

	Author	
	Publisher	
	Edition	
	Title	
	Author	
	Publisher	
	Edition	
	Title	
	Author	
	Publisher	
	Edition	
Content	<p>Approximate analysis and design of building frames, Calculation of loads due to Dead load, Live load, Wind load, Earthquake loads (Codal co-efficient method only) on multistoried frames as per relevant IS codes, Design of elements of multistoried frames such as beams, columns, foundations etc., detailing of structures as per IS: 456 & IS: 13920.</p> <p>Analysis and design of rectangular and circular tanks (Underground, on-ground and elevated) using coefficients given in IS: 3370, Analysis and design of staging for static, wind and earthquake forces, Design of foundations for ESRs.</p> <p>Analysis and design of slab type bridges subjected to various types of IRC loads, Analysis and design of T-beam bridges (limited to two girders, simply supported ends) with load distribution as per Courbon's method.</p>	
Course No.		

Course No.	AML 425	Open course (Y/N)	HM Course (Y/N)	Discontinued (Y/N)	
Course Title	ADVANCED DESIGN OF STEEL STRUCTURES				
Course Coordinator					
Slot in which offered. If not offered write N	Odd		Even		
			C		
Structure	Lecture	Tutorial	Practical	Credits	
	3	1	0	8	
Prerequisite Course Codes As per proposed Course Numbers					
Prerequisite credits					
Equivalent Course Codes. As per proposed courses and old courses					
Overlap course codes As per proposed Course Numbers					
Text Book (Max. 2)	Title	“Steel Designers Manual”			
	Author	Owens, G.W. & Knowles,.			
	Publisher	P.R., Blackwell,			
	Edition	1994			
	Title	“Design of Steel Structures”			
	Author	Gaylords, E.H. & Gaylords, C. N.,			
	Publisher	McGraw Hill Publ,			
	Edition	1998.			
Reference Books	Title	“Steel Design Manual”			
	Author				
	Publisher	ELBS and Granada Publishers; London.			
	Edition				
	Title	“Composite Structures of Steel and Concrete; Vol-I”			
	Author	Johnson, R.P.			
	Publisher	Granado Publishing Ltd.; London			
	Edition	1975			
	Title	. “Steel Structures – Design and Behaviour”			
	Author	Salmon and Johnson,			
	Publisher	Harper and Collins Publishers.			
	Edition				
	Title				
Author					

	Publisher	
	Edition	

	Title	
	Author	
	Publisher	
	Edition	
	Title	
	Author	
	Publisher	
	Edition	

Content	<p>Introduction to Allowable Stress Design, Plastic design, Load and Resistance Factor Design (LFRD). Loadings as per IRC, IRS, IS (IS:800, IS:875 part 1-V, IS:1893) applicable to various steel structures. Design of Beams, Beam-column, Plate Girders, Open web structures and Space structures. Bridges, Industrial Buildings including crane girders. Welded and riveted connections. Composite structures.</p>
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Course No.	
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2. Properties of Engineering Materials. PHYSICAL PROPERTIES. Specific Gravity-defined as the weight of a given volume of a material as compared to the wt of an given volume of water it is measured at a temperature of 60 deg F(15.5 deg C). Specific Heat-heat required to raise the temperature of unit wt of material by one degree. Fusibility & Fluidity-the property of a material where it tends to melt and flows when heat is applied. Weldability-ability of uniting two pieces of metal by applying pressure or heat or both. Engineers have to know the best and most economical materials to use. Engineers must also understand the properties of these materials and how they can be worked. There are two kinds of materials used in engineering (1) "metals and non-metals. Metals are distinguished from non-metals by their high conductivity for heat and electricity, by metallic lustre (2) and by their resistance to electric current. Their properties, such as strength (3) and hardness (4), can be greatly improved by.