KANNUR UNIVERSITY

FACULTY OF ENGINEERING

Curricula, Scheme of Examinations & Syllabus for Semesters VII & VIII of B. Tech Degree Programme in Civil Engineering with effect from 2007 Admissions.

SEVENTH SEMESTER

Code	Subject	Hrs / week			Sessional Marks	University Exam	
		L	T	P		Hrs	Marks
2K6 CE 701	Design of steel structures	3	1		50	3	100
2K6 CE 702	Quantity surveying and Valuation	3	1		50	3	100
2K6 CE 703	Environmental Engineering II	3	1		50	3	100
2K6 CE 704	Transportation Engineering I	3	1		50	3	100
2K6 CE 705	Elective II	3	1		50	3	100
2K6 CE 706 (P)	CAD Lab			3	50	3	100
2K6 CE 707(P)	Environmental Engineering Lab/ Transportation Engineering Lab	-		3	50	3	100
2K6 CE 708(P)	Mini Project	-		4	50	-	-
2K6 CE 709(P)	Physical Education, Health & Fitness	-	-	-	50	-	-
	Total	**15**	**5**	**10**	**450**	**-**	**700**

Elective II

1. 2K6 CE 705 (A) -Prestressed concrete
2. 2K6 CE 705 (B) -Traffic Engineering
3. 2K6 CE 705 (C) -Reinforced earth and Geotextiles
4. 2K6 CE 705 (D) -Computational Methods and Operational Research

EIGHTTH SEMESTER

Code	Subject	Hrs / week			Sessional Marks	University Exam	
		L	T	P		Hrs	Marks
2K6 CE 801	Advanced Structural Design	3	1		50	3	100
2K6 CE 802	Construction Management	3	1		50	3	100
2K6 CE 803	Transportation Engineering II	3	1		50	3	100
2K6 CE 804	Design of Hydraulic Structures	3	1		50	3	100
2K6 CE 805	Elective III	3	1		50	3	100
2K6 CE 806 (P)	Seminar	-	-	4	50	-	-
*2K6 CE 807 (P)	Project &Industrial Training	-		6	100	-	-
2K6 CE 808 (P)	Viva-Voice	-	-	-	-	3	100
	Total	**15**	**5**	**10**	**400**	**-**	**600**
Aggregate marks for Eighth semester-8400					3000		5400

* 25marks allocated for Project& Industrial training

Elective III

1. 2K6 CE 805 (A)Industrial Water Pollution Control.
2. 2K6 CE 805 (B)Highways & Airport Pavement Design.
3. 2K6 CE 805 (C)Optimization Techniques in Engineering.
4. 2K6 CE 805 (D)Finite Element Method.

2K6 CE 701 DESIGN OF STEEL STRUCTURES

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)
Loading standards – I.S structural sections – I.S specifications – design of tension members – Bolted and welded connections – design of simple and compound beams – laterally supported and unsupported.

Module II (13 hours)
Compression members – design of columns – short and long columns – axial and eccentric loading – built up columns – moment resisting connections – lacing and battening – column bases, slab base and gusseted base .

Module III (13 hours)
Water tanks – Rectangular steel tanks, Cylindrical tanks with hemispherical bottom – connections – Design of supporting towers.

Module IV (13 hours)
Roof elements – design of roof purlins and trusses for D.L, L.L and W.L – angular and tubular sections.
Gantry girders – loading considerations – maximum load effects – fatigue effects – design of gantry girder.

Reference Books

1. Relevant IS Codes
2. N. Subramanian – Design of Steel Structures, OXFORD.
3. Ramchandra & Gehlot– Limit state Design of Steel Structures
4. Gaylord & Gaylord – Design of Steel Structures, Tata McGraw-Hill.
5. B.C.Punmia – Design of Steel Structures, Laxmi Publications.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 702 QUANTITY SURVEYING AND VALUATION

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)
Quantity surveying: – Preparation of detailed estimate for :buildings – reinforced concrete structures, roads-sanitary and water supply works.

Module II (12 hours)
Preparation of specification for common materials of construction and items of work as per IS-analysis of rates and preparation of abstract of estimate for buildings and other engineering structures.

Module III (13 hours)
Valuation: – Cost price and value –purpose of valuation–deferent forms of value-factors affecting changes in market values-Role of the valuer-nature of real property –factors affecting real property market-value of real property.

Module IV (13 hours)
Methods of valuation for open lands-lands with buildings-Depreciation-valuation of licensed premises – valuation of agricultural lands.

Reference Books
1.Dutta B.N, Estimation and costing in civil engineering, UBSPD,1992.
2.IS 1200(1968) Methods of measurements of building &civil engineering works .
3.Rangavala, Valuation of real Properties, Charotar publishers.
4.Shah N A, Quantity surveying& specification in civil engineering.
5.B.S Patil, Civil engineering contracts and estimates, University press.

University Examination Pattern
Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 703 ENVIRONMENTAL ENGINEERING – II

3 hours lecture and 1 hour tutorial per week

Objective : To give the students an insight to the areas of waste treatment with emphasis on domestic liquid wastes - its characterization, collection, treatment and disposal at individual household level to community level – rural and urban – Elements of solid waste management and air pollution have also been included.

Module I (15 hours)

Waste water Engineering – Sanitary plumbing – sanitary fixtures, traps, soil pipe, anti-siphonage pipes – systems of piping – pipe joints and pipe fittings – public lavatories in factories, railway stations, bus stations and airports.

House drainage – principles of house drainage - inspection chambers- ventilation – testing of drains – connection of house drains and street sewers – systems of sewerage – quantity of storm sewage – source of sewage – relation to water consumption – ground water infiltration – fluctuations of sewage flow – factors affecting storm water sewage – determination of storm water flow – time of concentration.

Quantity of sanitary sewage (Domestic waste water) – sources, factors affecting. Fluctuations in sewage flow – peak factor.

Sewer and sewer appurtenances – materials of sewers - shape, hydraulics and the design of sewers – sewer joints – construction, testing, cleaning and maintenance, ventilation of sewers – sewer appurtenances – manholes, inlets, catch basins, grease traps – regulators – leaping weirs – side weirs – siphon spillway – inverted siphons – sewage pumps – pumping stations.

Module II (13 hours)

Objectives of waste water treatment – Effluent standards, KSPCB standards and BIS. Characteristics of sewage – Physical, chemical and biological characteristics – physical and chemical analysis – sampling – population equivalent characteristics of industrial wastes –treatment of waste water - Layout of conventional treatment plant – screens – grit chambers – detritus tank – skimming tanks – sedimentation tanks.

Biological process – principle and theory of biological treatment - design, construction and operation of trickling filters, activated sludge treatment units – oxidation ponds – disinfection of sewage.

Module III (12 hours)

Sewage disposal – disposal into water – assimilation capacity of streams – disposal into land – surface and subsurface irrigation.

Sludge treatment and disposal – quality and characteristics of sludge – sludge elutriation – sludge conditioning – vacuum filtration – sludge digestion – disposal of sludge.

Rural sanitation – Septic tanks – Design (as per Ministry of Urban development), construction, disposal of effluents, cleaning of tanks – Imhoff tanks.

Sewage treatment by high rate anaerobic methods – anaerobic digestion suspended growth – contact process – UASB, attached growth filters – expanded bed (basics only)

Module IV (12 hours)

Solid waste management –Types and sources of solid waste-characteristics – collection – transportation and processing – disposal – composting – sanitary land fill – incineration- prevention of malaria.

Air pollution - types of pollutants and their sources – health effects – air pollution control strategy – basic approaches – areas of legal responsibility – source identification – particulate control and control of gases and vapour.

Text book

1. Garg S.K. Environmental Engg. Vol. II,Khanna Publishers
2. Birdie G.S. and Birdie J.S. Water Supply and Sanitary Engg. Dhanpat Rai & Sons.
3. Duggal K.N. Elements of Environmental Engg. S. Chand and Co. Ltd.

Reference Books

1. B.C. Punmia, Waste Water Engg. Arihant Publications,Jodpur.
2. Mark.J. Hammer and Mark J. Hammer Jr., Water and Waste Water Technology , Prentice Hall of India Pvt. Ltd.
3. Metcalf and Eddy, Waste water Engg., treatment, disposal and Reuse, Tata McGraw Hill.
4. Ethers and Steel, Muncipal and Rural Sanitation.
5. M.N. Rao & H.V.N. Rao, Air Pollution, Tata McGraw Hill Pvt. Ltd. New Delhi.
6. Ministry of Urban Development, Govt. of India, Manual of waste water and treatment 1986

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 704 TRANSPORTATION ENGINEERING I

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Highway classification and geometrical design: introduction - historical development of road construction - highway development in India - classification of roads - road patterns - typical cross sections of roads in urban and rural area - requirements and factors controlling alignment of roads - engineering surveys for highway location - pavement surface characteristics - camber and width requirements - sight distances - stopping and overtaking sight distances - overtaking zone requirements - design of horizontal alignment - speed - radius - super elevation - methods of providing super elevation - extra widening of pavements - transition curves - design of vertical alignment - gradient - grade compensation - summit curves and valley curves - worked out problems on all the above topics

Module II (12 hours)

Highway materials, design, construction and maintenance: desirable properties and testing of highway materials - road aggregates, bituminous materials and subgrade soil factors influencing the design of pavements - CBR method and IRC guidelines for flexible pavements - design of rigid pavements using IRC charts - worked out problems - construction of earth roads - WBM roads - cement stabilized roads - bituminous pavements - cement concrete roads and joints in cement concrete roads - brief study of types and causes of failures in flexible and rigid pavements and maintenance

Module III (13 hours)

Airport planning and design: introduction - aircraft characteristics and their influence on planning of airports - airport obstructions and zoning - component parts of airport and site selection - runway design - orientation - basic runway length - corrections and geometric design; design of taxiways and aprons - terminal area planning - facilities in terminal area and their planning concepts - aircraft parking configurations - design of drainage system - surface and subsurface drainage systems and their design

Module IV (13 hours)

Traffic engineering: introduction - road user, vehicle and traffic characteristics - speed and delay - volume - origin and destination - parking and accident studies - simple worked out problems - principles of design of at grade intersections - simple layouts - objectives, classification and uses of traffic signs and markings - design of isolated signals by Webster's method

Text book

1.Khanna S.K. & Justo E.G., *Highway Engineering*, Nem Chand & Bros
2. Kadiyali. L. R., Principles of Highway Engineering, Khanna Publishers
3. Khanna S. K. and Arora. M. G., Airport Planning and Design, Nemchand & Bros
4. Rao. G. K. transportation Engineering, Tata McGraw Hill Co
5. S. C. Rangwala, Airport Engg. Charotar Publishng Co

Reference Books

1. O' Flaherty C.A., *Highway-Traffic Planning and Engineering*, Edward Arnold.

2. Horonjeff R. & Francise McKeivy, *Planning and Design of Airports*, McGraw Hill.

3. Yoder and Witezak, Principles of Pavement Design, John Wiley & Sons, 1975,New York.

4. IRC: 37-2001, Guidelines for the Design of Flexible Pavements, IRC 2001, New Delhi.

5. IRC: 58-2002, Guidelines for the Design of Rigid Pavements, IRC 2002, New Delhi.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 705 (A) PRESTRESSED CONCRETE

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Basic concept of prestressing, advantages, materials and their characteristics – Systems and methods of prestressing, pretensioning systems, post tensioning systems, thermo elastic prestressing, chemical prestressing.

Module II (13 hours)

Loss of prestress - purpose of assessing losses, counteracting elastic loss, loss of prestress in case of nonuniform prestress, creep, shrinkage, relaxation and anchorage, friction

Behaviour of prestressed concrete beams in flexure, load – deflection curves for prestressed concrete beams.

Module III (13 hours)

Elastic design of sections for flexure – design of a simply supported beam with symmetrical sections of post tensioned and pretensioned type – tension members.

Module IV (13 hours)

Bearing and anchorage zone – statically indeterminate structure – continuous beams – primary moment – resultant moment – concordant cable profile – Gyons theorem.

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Reference Books

1.Krishnaraju N – Prestressed Concrete, Tata McGraw-Hill Co.
2.Lin T Y– Design of Prestressed Concrete Structures, Asia Publishing House.
3.Mallick S K and Gupta A P – Prestressed Concrete, Oxford and IBI series.
4.Pandit and Gupta – Prestressed Concrete, CBS Publishers.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 705 (B) TRAFFIC ENGINEERING

3 hours lecture and 1 hour tutorial per week

Module I (10 hours)

Scope of traffic engineering & study of its elements - introduction - objectives and scope of traffic engineering - components of road traffic - vehicle, driver and road - road user and vehicle characteristics and their effect on road traffic - traffic maneuvers - traffic stream characteristics - relationship between speed, flow and density - sampling in traffic studies - adequacy of sample size

Module II (14 hours)

Traffic engineering studies and analysis - objectives - methods of study - equipment - data collection - analysis and interpretation (including case studies) of (a) speed, (b) speed and delay, (c) volume, (d) origin and destination, (e) parking, (f) accident & other studies

Module III (14 hours)

Design, regulation and management of traffic engineering facilities - control of traffic movements through time sharing and space sharing concepts - design of channelising islands, T, Y, skewed, staggered, roundabout, mini-roundabout and other forms of at-grade crossings including provision for safe crossing of pedestrians and cyclists - grade separated intersections - their warrants and design features - bus stop location and bus bay design - road lighting - regulations on vehicles, drivers and traffic - planning and design of one-way streets - reversible lanes and roadways - turn regulation - transit and carpool lanes - pedestrian facilities.

Module IV (14 hours)

Traffic control devices & environmental control - traffic signs - markings and signals - different methods of signal design - redesign of existing signals including case studies - signal system and coordination - air & noise pollution of different transport modes - visual impacts - impacts on land development - technological approaches to improving environment

Text book

1. Kadiyali l. R., Traffic and Transport Planning, Khanna Publishers

Reference Books

1.Pignatyaro L., Traffic Engineering - Theory & Practice, John Wiley.
2.TheInstitute of Transportation Engineers, Transportation and Traffic Engineering Hand Book, Prentice Hall, Chapters 8,17,21,23 and 24, Third Edition, 1965.
3.O'Flaherty C.A., Highways-Traffic Planning & Engineering, Edward Arnold.
4.McShane W.R. & Roess R.P., Traffic Engineering, Prentice Hall.
5. Salter R.J., Highway Traffic Analysis and Design, ELBS.
6. Matson,Smith & Hurd, Traffic Engineering, McGraw Hill Book Co.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 705 (C) REINFORCED EARTH AND GEOTEXTILES

3 hours lecture and 1 hour tutorial per week

MODULE I (13 hours)
Necessity of soil improvement – selection of improvement method, Earth reinforcement - mechanism and concept, stress- strain relationship of reinforced soil, Design theories and stability analysis of retaining wall – tie back analysis – coherent gravity analysis.

MODULE II (13 hours)
Concepts of soil reinforcement principles, materials of reinforcement, type of metals, geotextiles, synthetics, natural fibres, type and positioning of reinforcement facing, Application of reinforced earth, construction methods, Estimation of pressure on reinforcement, Design of reinforced earth retaining wall using metallic reinforcement.

MODULE III (13 hours)
Development of geotextiles, types of geotextiles and related products, geosynthetics, woven and nonwoven geocomposites, properties, functions – relations between functions and properties, Tests and specifications – influence of soil properties on test results, Application of geotextiles for erosion control, filter, foundation, retaining walls.

MODULE IV (13 hours)
Simple examples of uses and application of geotextiles for soil stabilization, use of geotextiles and geocomposites for retaining walls, embankment, slopes, foundation pavements, filters – construction details are to be indicated with examples – field application in India, Design of only geotextile or geogrid retaing walls are to be expected.

Reference Books

1.C.J.P.P.Jones – Earth Reinforcement and Soil Structures
2.R.A.Jewell – Soil Reinforcement with Geotextiles
3.Hansmann – Engineering principles and Ground modifications
4.Korner – Construction and Geotechnical methods in Foundation engineering
5.Donald P. Coduto – Geotechnical Engineering – Principles and Practices

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 705 (D) COMPUTATIONAL METHODS AND OPERATIONAL RESEARCH

3 hours lecture and 1 hour tutorial per week

A. Computational methods in civil engineering

MODULE I (13 Hours)

Eigen value problems Examples of Eigen value problems in civil engineering- principal stress and strain- free vibration of multi degree of freedom systems- determination of Eigen values and Eigen vectors by power method and Jacobi's method.

MODULE II (13 Hours)

Numerical differentiation and integration Numerical differentiation and integration using Newton's and Gauss' formula- maximum and minimum values of tabulated functions- Newton Cote's integration formula- numerical integration using trapezoidal formula, Simpson's formula - Gauss quadrature- development of computer algorithms for numerical integration.

Numerical solution of partial differential equations solutions of elliptic, parabolic and hyperbolic equations

B. Operational research techniques

MODULE IV (13 Hours)

Introduction to operational research History of operational research- nature and scope of operational research- - mathematical formulation of the problem- graphical solution methods- allocation assignment and transportation problems

MODULE V (13 Hours)

Linear programming mathematical solution of L-P problems- matrix formulation of general linear programming problems-Simplex method- algorithm and computational procedures- Karmarkar's method - two phase simplex method- problems of degeneracy- principles of duality in simplex method- sensitivity analysis.

Reference Books

1.Hildebrand F.B, Introduction to Numerical Analysis, T.M.H
2. Gerald C. F, Applied Numerical Analysis, Addison Wesley
3. S.S. Sastry, Introductory methods of numerical analysis, P.H.I
4. Singiresu. S. Rao, Engineering optimization theory and practice, New age international.
5. R.L. Fox. Optimization methods for engineering design.
6. Taha.H A, Operational Research An Introduction, P.H.I

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 706(P) COMPUTER AIDED DESIGN LAB

3 hours practical per week

To familiarise and give hands-on training to students in the following areas of civil engineering application software:

1. Drafting and documentation
2. Surveying – Terrain mapping, computation of areas and volumes
3. Structural analysis and design
4. Water resources
5. Geotechnical engineering
6. Road/railway systems
7. Environmental engineering
8. Estimation and costing
9. Project management

Recommended Packages:

- AutoCAD, Microstation, MS-Office, Matlab, Grapher/Sigmaplot
- Moss, Autocivil, Intergraph
- StaadPro, STRAP, SAP, ETABS
- WaterCAD, FlowMaster
- Winlog, Geoslope, Bearcap
- Inroads
- MS-Project/Primavera

The software may be demonstrated to the students. Students are encouraged to take up a min-project on any of the above listed areas and complete it within the semester.

Sessional work assessment	
Laboratory practical and record	35 marks
Tests	15 marks
Total	50 marks

2K6 CE 707 (P) ENVIRONMENTAL & TRANSPORTATION ENGINEERING LABORATORY

3 hours practical per week

List of Experiments

A. Environmental Engineering lab

1. Determination of solids (total, dissolved, suspended, organic, inorganic, settleable) in water
2. Determination of turbidity of water
3. Determination of alkalinity of water
4. Determination of hardness of water by EDTA titrimetric method
5. Determination of pH of water
6. Determination of chlorides in water
7. Determination of iron and manganese in water
8. Determination of sulphates and sulphides in water
9. Jar test for determining coagulant dosage
10. Determination of dissolved oxygen (DO) in water and BOD of wastewater
11. Determination of available chlorine in bleaching powder and test for residual chlorine
12. Test of coliforms in water

B Transportation Engineering Lab

I.Tests on aggregates

1. Grain Size Analysis.
2. Shape Test.
3. Determination of Angularity Number.
4. Determination of Aggregate Crushing Value.
5. Determination of Aggregate Impacty Value
6. Determination of Los Angeles Abrasion Value.
7. Determination of specific gravity and water absorption.
8. Detemination of stripping value of Road aggregates.

II. Test on Soil.

1. Determination of California Bearing Ratio.

III. Tests on Bitumen

1. Determination of penetration value .
2. Determination of Softening point.
3. Determination of Ductility.
4. Determination of Flash and Fire point.
5. Determination of viscosity.

IV.Bituminous mix Design

1. Determination of Marshal stability value.

Reference Books

1. Standard methods for examination of water and waste water, 1985, ALPHA, AWWA, WPCF publication
2. Water supply and sanitary engineering: including environmental engineering, water and air pollution laws and ecology, G. S. Birdie, J. S. Birdie, Edition 5, Dhanpat Rai and Sons, 1996

Sessional work assessment

Laboratory practical and record	35 marks
Test(s)	15 marks
Total	50 marks

2K6 CE 708 (P) MINI PROJECT

4 hours per week

The project work can be a design project, experimental project or field surveying on any of the topics of civil engineering interest - it can be allotted as a group project with groups consisting of three to five students

The assessment of all the mini projects should be done by a committee consisting of three or four faculty members specialised in the various fields of civil engineering - the students will present their project work before the committee - the relative gradings and group average marks for the various projects will be fixed by the committee - the guides will award the marks for the individual students in a project maintaining the group average - each group will prepare the project report and submit to the department through the guide - the head of the department will certify the copies and shall retain one copy in the departmental library

Sessional work assessment		
Presentation		30 marks
Report		20 marks
Total		50 marks
Total	50 marks	

2K6 CE 709(P): PHYSICAL EDUCATION, HEALTH & FITNESS

Introductory Lectures:

Unit 1: Health and fitness: Modern concept of health and fitness, meaning, scope, need and importance of health, fitness and wellness.

Unit II: Exercise and fitness: Means and methods of developing fitness. Importance of physical activities and exercises in developing and maintaining good health, Physical fitness and well being.

Unit III : Sports and Physical education: Meaning and scope, role and importance of sports and games in the development of physical fitness and personality. Social values of sports. Rules of major games.

Practical Sessions:

(All classes will be conducted after the normal working hours of the college)

50 sessions of minimum 1 hour duration each are envisaged (including Theory and Practical). The student can opt for one of the following activities in line with the specific programme / schedule announced by the faculty.

Athletics, Badminton, Basketball, Cricket, Football, General fitness, Hockey, Kabadi, Table Tennis, Ball Badminton, Archery, Volley ball, Yoga (not all activities may be offered in a particular semester. More disciplines will be offered based on the availability of infrastructure and expertise).

In addition, health and fitness assessment such as height, Weight, Resting Pulse rate and blood Pressure will be carried out.

Objective :

Basically to inculcate awareness of health, general fitness and attitude to voluntary physical involvement.

To promote learning of basic skills in sports activities and secondarily to pave the way for mastering some of the skills through continued future involvement.

Scheme of assessment:

The student will be continuously assessed on his performance on the field of play. There will not be minimum mark for pass or fail. Total 50 marks will be given assessing their attendance, regularity, punctuality and performance for 50 hours of activity from 1st semester to 7th semester.

Sessional work assessment	
Presentation	30 marks
Report	20 marks
Total	50 marks

2K6 CE 801 ADVANCED STRUCTURAL DESIGN

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)
Retaining walls – types, earth pressure diagrams, modes of failure, design of cantilever and counterfort retaining walls ('L' not included).

Module II (14 hours)
Water tanks – types, design of ground supported and overhead water tanks –rectangular and circular with flat bottom, flexible and rigid joints, design of staging – columns and bracings.

. **Module III (12 hours)**
Road bridges – Class A and Class AA loading, Design of slab bridges, T-beam and slab bridges, Box culvert, Bearings.

Module IV (12 hours)
Steel chimneys – IS Specifications – Design of self supporting chimneys.
Light gauge steel structures – Design of tension members, compression members and beams.

Reference Books

1. Relevant IS Codes
2. S.N.Sinha – Rienforced Concrete Design
3. Krishnaraju N – Advanced Design of Concrete Structures, Oxford & IBH Publishing Company, NewDelhi
4. Pillai & Devdas – Reinforced Concrete Design, Tata McGrawHill
5. V.Johnson – Essentials of Bridge Engineering
6. B.C.Punmia – Design of Concrete Structures, Laxmi Publications
7. N. Subramanian – Design of Steel Structures, Oxford University Press
8. Ramchandra – Design of Steel Structures, Standard Book House, Delhi.
9. B.C.Punmia – Design of Steel Structures, Laxmi Publications
10. Raghupathy - Design of Steel Structures
11. Pandit and Gupta – Prestressed Concrete, CBS Publishers

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10)	20 marks
Total	50 marks

2K6 CE 802 CONSTRUCTION MANAGEMENT

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)
Construction methods: –Tenders-earnest money deposit-security deposit-Contract-Contract documents-measurements-standardisation- organisation at national and international level (BIS &ISO)-role of certification.

Module II (13hours)
Construction Equipment: Factors for selection of equipment - equipment for excavation and transportation of earth-hauling equipment-hoisting equipment-pile foundation and pile driving equipment-concrete mixing plant.

Module III (13 hours)
Project planning – scheduling –controlling-bar chart-milestone chart-PERT network-elements of net work-assumptions –errors.

Module IV (13 hours)
PERT-Time estimates-Time computation-Net work analysis
CPM-Process- networks-activity time estimate –float- critical activityes and critical path.

Reference Books

1.Peurifoy R L,Ledbelter W B, Construction equipement&Methods,MGM Publishers.
2.B.C.Punmia,K.K KHANDELWAL,Project planning and control with PERT and CPM,Laxmi Publications
3.IS1200(1968),Methods of measurements of building and civil engineering works.
4.Verma L.C,Standardisation-A new Discipline.
5.VaziraniV.N & Chandola S P,Heavy constructions

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10) –	20 marks
Total	50 marks

2K6 CE 803 TRANSPORTATION ENGINEERING II

3 hours lecture and 1 hour tutorial per week

Module I (15 hours)

Geometric design of railways: introduction - typical cross - section - various gauges - coning of wheels and tilting of rails - functions and requirements of component parts of a railway track - creep of rails - geometrical design of railway track - horizontal curves - radius - superelevation - cant deficiency - transition curves - safe speed on curves - different types of gradients - grade compensation - worked out problems

Railway operation and control: points and crossings and their design - track junctions and simple track layouts - details of different types of stations and yards - signaling and interlocking - control of train movements - absolute block system - automatic block system and CTC system

Module II (14 hours)

Railway construction and maintenance: construction of railway track-earthwork - plate laying and packing - maintenance of track-alignment - gauge - renewal of component parts and drainage - modern methods of track maintenance

Tunneling: tunnel alignment and grade - size and shape of a tunnel - methods of tunneling in hard rocks - full face method - heading and bench method - drift method - different methods of tunneling in soft soils including compressed air and shield tunneling - shafts in tunnels - ventilation of tunnel and various methods - lining of tunnels - drainage and lighting of tunnels- Micro Tunneling – Trenchless technology.

Module III (11 hours)

Principles of transportation economics: classification of transportation technology - inter-modal coordination - salient features of first, second and third road development plans in India - worked out problems - planning surveys and master plan preparation

Transport economics: principles of economic evaluation - road user costs - vehicle operation costs-fixed and variable - road user benefits - methods of economic evaluation - annual cost - rate of return and benefit-cost ratio methods - worked out problems

Module 1V (12 hours)

Docks and harbours: classification of harbours - effect of tides, waves and wind in the location and design of harbour - component parts of harbours - site selection - principles of design - construction and maintenance of wet and dry docks - breakwaters - brief study of harbour appurtenances such as lock and lock gates - quays - jetties - landing piers - fenders - dolphins - slip ways - aprons - transit sheds - ware houses - navigational aids such as light-house - buoys - beacons - study of some important Indian harbours.

Text Books

1. S. C. Rangwala, Railway Engineering, Charter Publishing House.
2. Saxena, Arora, Railway Engineering, Dhanpat Rai & Sons.
3. R. Srinivasan, Harbour, Dock & Tunnel Engineering, Charter Publishing House.
4. S. P. Bindra, A course in Docks and Harbour Engineering, Dhanpat Rai & sons.
5. Khanna S. K. & Justo C. E. G, Highway Engineering, Nem Chand Publishing House, Roorkee.

Reference Books

1. Anita K.F., Railway Track, New Book Company Pvt. Ltd.1960
2. Agarwal M.M., Railway Engineering, Prabha and Co.
3. Quinn A.D., Design & Construction of Ports & Marine Structures, McGraw Hill

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10) –	20 marks
Total	50 marks

2K6 CE 804 DESIGN OF HYDRAULIC STRUCTURES

3 hours lecture and 1 hour tutorial per week

Module I (13 Hours)
Tank structures surplus and outlet works- surplus weir- surplus escape- flush escape- tank sluice – design of surplus weir, tank sluice and direct sluice – canal outlets- types-

Module I (13 Hours)
Canal structures canal falls- necessity and selection criteria- design of syphon well drop, trapezoidal notch drop and glacis type drop

Module III (13 Hours)
Diversion head works site selection and design of weirs and barrages- design of cross and head regulators

Module IV (13 Hours)
Cross drainage works types of cross drainage works- selection criteria- design of aqueduct- siphon aqueduct(type II and type III) - super passage and canal syphon

Reference Books

1. Satya Narayana murty Challa, Water resources engineering principles and practice, New age international
2. Varshney.R.S, Theory and design of irrigation structures, Laxmi publishers
3. Punmia.B.C, Irrigation and water power engineering, Laxmi publishers
4. Modi.P .N Irrigation water resources and water power, Standard publishers
5. S. K. Garg, Irrigation engineering and hydraulic structures, Standard publishers

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 60 marks each from any two separate module with choice to answer any one (includes design and drawing).

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10) –	20 marks
Total	50 marks

2K6 CE 805 (A) INDUSTRIAL WATER POLLUTION

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)
Effect on discharge of industrial waste water on streams and environment - importance and scope. Problems involved in treatment- variation in quality and quantity of industrial waste water- Indian standard for discharge of treated waste water in to municipal sewer and natural water course- Sampling of waste water, representative sample, grab and composite sample.

Module II (13 hours)
Approaches to minimization – good house keeping, equalization and neutralization by mixing of different schemes- Recycling of waste water streams- Process modification in terms of raw materials and chemical used- Treatment of Industrial waste- removal of dissolved and suspended solids, organic waste treatment processes - sludge treatment and handling.

Module III (13 hours)
General approaches for handling the treatment of specific characteristics of industrial waste water- shock loads, colours, toxic metal ions- refractory substances- growth inhibiting substances such as insecticides- higher concentration nutrients oil and gases- suspended solids- BOD- hot waste and wastes with acidity , alkalinity.

Module IV(13 hours)
Process flow diagrams, characteristics and treatment of various industrial wastes of major industries- Textile industry- Industrial waste of pulp and paper - sugar mills- distillery- dairy, pharmaceutical- electroplating etc.

Reference Books

1. Besselieure, E.B. and Schwartz, M., "The Treatment of Industrial Wastes", McGraw Hill Kogakusha Ltd., New Delhi.
2. Nemerow, N.L., "Industrial water Pollution, Ann Arbour", New York, 1978.
3. Nemerow, Theory and Practices of Industrial Waste Treatment, Addison Wiley
4. Guruham C.B., "Principles of Industrial Waste Engineering"

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10) –	20 marks
Total	50 marks

2K6 CE 805 (B) HIGHWAYS & AIRPORT PAVEMENT DESIGN

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Introduction: types and component parts of pavements - factors effecting design and performance of pavements - comparison between highway and airport pavements - functions and significance of sub grade properties - various methods of assessment of sub grade soil strength for pavement design - cause and effects of variations in moisture content and temperature - depth of frost penetration - mix design procedures in mechanical stabilization of soils - design of bituminous mixes by Marshall, Hubbard - field and Hveem's methods

Module II (13 hours)

Stress analyses and methods of flexible pavement design: stresses and deflections in homogeneous masses - burmister 2 layer and 3 layer theories - wheel load stresses - ESWL of multiple wheels - repeated loads and EWL factors - empirical, semi - empirical and theoretical approaches for flexible pavement design - group index, CBR, triaxial, mcleod and burmister layered system methods

Module III (13 hours)

Stresses analyses and methods of rigid pavement design: types of stresses and causes - factors influencing stresses, general conditions in rigid pavement analysis – ESWL- wheel load stresses - warping stresses - friction stresses - combined stresses - functions of various types of joints in cement concrete pavements –joint spacings - design of slab thickness - design and detailing of longitudinal, contraction and expansion joints - IRC methods of Design.

Module IV (13 hours)

Construction techniques, Specifications &Pavement evaluation: structural and functional requirements of flexible and rigid pavements – Quality control tests for highway pavements – construction equipments and specifications for stabilized and bituminous roads –types of bituminous surface treatment – construction equipments and specifications for cement concrete roads - pavement distress - evaluation of pavement structural condition by Benkelman beam rebound deflection and plate load tests - introduction to design of pavement overlays and the use of geosynthetics.

Text Books

1.Yoder and Witezak, Principles of Pavement design, John Wiley and sons, second edition,1975.
2.Yang, Design of functional pavements, McGraw- Hill.
3.Khanna S. K. & Justo C. E. G., Highway Engineering, Nemchand & Bros.
4.Bindra B. S., Highway Engineering, Danpat rai and Sons.

Reference Books

1. Yang, 'Design of Functional Pavements', McGraw Hill
2.IRC: 37 - 2001, 'Guidelines for the Design of Flexible Pavements'
3.IRC: 58 – 2002, 'Guidelines for the Design of Rigid Pavements'
4.David Croney, 'The Design & Performance of Road pavements', HMSO publications
5.Hass & Hudson, 'Pavement Management System', McGraw Hill Book Co.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10) –	20 marks
Total	50 marks

2K6 CE 805(C) OPTIMIZATION TECHNIQUES IN ENGINEERING

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Introduction to optimization Historical development- engineering applications of optimization- formulation of design problems as mathematical programming problems- classification of optimization problems- classical optimization techniques-multivariable optimization with no, equality and inequality constraints- solution by the method of Lagrange multipliers- Kuhn Tucker conditions.

Module II (13 hours)

Linear programming and advanced topics basic concepts of simplex method, simplex algorithm- two phases of simplex method- revised simplex method- duality in linear programming-decomposition principle- post optimality analysis - quadratic programming- - parametric programming- bounded variable problems

Module III (13 hours)

Nonlinear programming gradient and Hessian of function- unimodal function- convex and concave functions- unconstrained optimization techniques- steepest descent methods- conjugate gradient method- Newton's method- Marquardt method- constrained optimization- random search methods- sequential linear programming method.

Module IV (13 hours)

Dynamic programming introduction- multistage design processes – suboptimization and principle of optimality- computational procedures.

Further topics in optimization genetic algorithms-simulated annealing- neural network based optimization-fuzzy optimization

Reference Books

1. Singiresu. S. Rao, Engineering optimization theory and practice, New age international
2. Jasbir. S. Arora, Introduction to optimum design, Academic press Elsevier
3. Bazarra. M. S, Jarvis. J. J & Sherali. H. D, Linear programming and network problems, John Wiley
4. Bazarra. M. S, Sherali. H. D. & Shetty. M. M, Nonlinear programming Theory and algorithms, John Wiley
5. R.L. Fox. Optimization methods for engineering design. Addison – Wesley Pub
6. Taha. H.A, Operational research an introduction
7. T. Ross, Fuzzy logic with engineering applications, McGraw Hill

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests (2 × 15)	30 marks
Assignment (2 × 10) –	20 marks
Total	50 marks

2K6 CE 805 (D) FINITE ELEMENT METHOD

3 hours lecture and 1 hour tutorial per week

Module 1 (13 hours)

Historical background – Matrix approach – Application to the continuum – Discretisation – Matrix algebra – Gaussian elimination – Governing equations for continuum – Classical Techniques in FEM – Weighted residual method – Ritz method

ONE DIMENSIONAL PROBLEMS

Finite element modeling – Coordinates and shape functions- Potential energy approach – Galerkin approach – Assembly of stiffness matrix and load vector – Finite element equations – Quadratic shape functions – Applications to plane trusses

Module 2 (13 hours)

TWO DIMENSIONAL CONTINUUM

Introduction – Finite element modelling – Scalar valued problem – Poisson equation –Laplace equation – Triangular elements – Element stiffness matrix – Force vector – Galerkin approach - Stress calculation – Temperature effects

Module 3 (13 hours)

AXISYMMETRIC CONTINUUM

Axisymmetric formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces and temperature effects – Stress calculations – Boundary conditions – Applications to cylinders under internal or external pressures – Rotating discs

Module 4 (13 hours)

ISOPARAMETRIC ELEMENTS FOR TWO DIMENSIONAL CONTINUUM

The four node quadrilateral – Shape functions – Element stiffness matrix and force vector – Numerical integration - Stiffness integration – Stress calculations – Four node quadrilateral for axisymmetric problems.

Text Books

1. Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, "Concepts and Applications of Finite Element Analysis", Fourth Edition, 2007.
2. David V Hutton "Fundamentals of Finite Element Analysis"2004. McGraw-Hill Int. Ed.

Reference Books

1. Rao S.S., The Finite Element Method in Engineering, Elsevier Science, 2008
2. Logan D.L., A First course in the Finite Element Method, Third Edition, Cengage Learning, 2008.
3. Chandrupatla T.R., and Belegundu A.D., Introduction to Finite Elements in Engineering, Pearson Education 2002, 3rd Edition.
4. Reddy J.N., An Introduction to Finite Element Method, Tata McGraw Hill, 2008.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II- 2 questions of 15 marks each from module I with choice to answer any one.
Q III- 2 questions of 15 marks each from module II with choice to answer any one.
Q IV- 2 questions of 15 marks each from module III with choice to answer any one.
Q V- 2 questions of 15 marks each from module IV with choice to answer any one.

Sessional work assessment

Tests	(2 × 15)	– 30 marks
Assignment	(2 × 10)	– 20 marks
Total		– 50 marks

2K6 CE 806 (P) SEMINAR

4 hours per week

Individual students should be asked to choose a topic in any field of civil engineering, preferably from outside the B.Tech syllabus and give a seminar on that topic for about thirty minutes - a committee consisting of at least three faculty members (preferably specialised in different fields of civil engineering) should assess the presentation of the seminars and award the marks to the students - each student should be asked to submit two copies of a write up of his seminar talk - one copy should be returned to the student after duly certifying it by the chairman of the assessing committee and the other kept in the departmental library.

Sessional work assessment

Presentation	–	30 marks
Report	–	20 marks
Total	–	50 marks

2K6 CE 807(P) PROJECT & INDUSTRIAL TRAINING

6 hours per week

The project work can be a design project - experimental project - field surveying or computer oriented on any of the topics of civil engineering interest - it can be allotted us a group project consisting of a maximum number of three to five students.

All students shall undergo an industrial training programme either by attending training program for a minimum of five days in a registered construction industry/ construction site/Govt. establishment/Research institute or by visiting at least five reputed construction industries/Engineering establishments. They have to submit a report of the industrial training program.

The assessment of all the projects should be done at the end of the semester by a committee consisting of three or four faculty members specialised in the various fields of civil engineering - the students will present their project work before the committee - the project guides will award the marks for the individual students in a project maintaining the group average. Each group will submit the copies of the completed project report signed by the guide to the department - the head of the department will certify the copies and return them to the students - one copy will be kept in the departmental library.

Sessional work assessment

Project work	–	75 marks
Industrial Training	–	25 marks
Total	–	100 marks

2K6 CE 808(P) VIVA VOCE

There is only university examination for Viva voce. Examiners will be appointed by the university for conducting the viva voce. The viva voce examiners will ask questions from subjects studied for the B.Tech course, mini project, project and seminar reports of the student - the relative weightages should be as follows.

Sessional work assessment		
Subjects	_	30 marks
Mini project	–	20 marks
Project &Industrial training	–	30 marks
Seminar	_	20 marks
Total	–	100 marks