

**KANNUR UNIVERSITY**  
**FACULTY OF ENGINEERING**

**Curricula, Scheme of Examinations & Syllabi for**  
**B.Tech Degree Programme (III-IV Semesters) in**  
**CIVIL ENGINEERING**  
**With effect from 2007 Admissions**

**THIRD SEMESTER**

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6CE 301	Engineering Mathematics II	3	1	-	50	3	100
2K6CE 302	Computer Programming	3	1	-	50	3	100
2K6CE 303	Mechanics of Structures	3	1	-	50	3	100
2K6CE 304	Surveying I	3	1	-	50	3	100
2K6CE 305	Building Materials and construction Techniques	3	1	-	50	3	100
2K6CE 306	Fluid Mechanics I	3	1	-	50	3	100
2K6CE 307(P)	<b>Civil Engineering Drawing I</b>	-	-	3	50	3	100
2K6CE 308(P)	<b>Surveying Practical I</b>	-	-	3	50	3	100
<b>TOTAL</b>		<b>18</b>	<b>6</b>	<b>6</b>	<b>400</b>	<b>-</b>	<b>800</b>

**FOURTH SEMSTER**

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6CE 401	Engineering Mathematics III	3	1	-	50	3	100
2K6CE 402	Humanities	3	1	-	50	3	100
2K6CE 403	Structural Analysis I	3	1	-	50	3	100
2K6CE 404	Fluid Mechanics II	3	1	-	50	3	100
2K6CE 405	Surveying II	3	1	-	50	3	100
2K6CE 406	Engineering Geology	3	1	-	50	3	100
2K6CE 407(P)	<b>Strength of Materials Lab</b>	-	-	3	50	3	100
2K6CE 408(P)	<b>Surveying Practical II</b>	-	-	3	50	3	100
<b>TOTAL</b>		<b>18</b>	<b>6</b>	<b>6</b>	<b>400</b>	<b>-</b>	<b>800</b>

## 2K6 CE 301 ENGINEERING MATHEMATICS II

3 hours lecture and 1 hour tutorial per week

### MODULE I

**Infinite Series:** Convergence and divergence of infinite series – Ratio test – Comparison test – Raabe's test – Root test – Series of positive and negative terms- absolute convergence – Test for alternating series.

**Power Series:** Interval of convergence – Taylors and Maclaurins series representation of functions – Leibnitz formula for the derivative of the product of two functions – use of Leibnitz formula in the Taylor and Maclaurin expansions.

### MODULE II

**Matrices:** Concept of rank of a matrix –echelon and normal forms – System of linearequation - consistency – Gauss elimination – Homogeneous liner equations-Fundamental system of solutions- Inverse of a matrix – solution of a system of equationsusing matrix inversion – eigen values and eigen vectors - Cayley- Hamilton Theorem.

### MODULE III

**Vector Integral Calculus:** Evaluation of line integral, surface integral and volumeintegrals – Line integrals independent of the path, conservative force fields, scalarpotential- Green's theorem- Gauss' divergence theorem- Stoke's theorem (proof of these not required).

### MODULE IV

**Vector Spaces:** subspaces – linear dependence and independence – bases and dimension-linear transformations - sums, products and inverse of linear transformations.

### References:

1. Kreyszing E. Advanced Engineering Mathematics, Wiley Eastern
2. Sastri. S. S. Engineering Mathematics, Prentice Hall of India.
3. Wylie .C. R. Advanced Engineering Mathematics, Mc Grawhill.
4. B .S. Grewal. Higher Engineering Mathematics, Khanna Publishers.
5. Greenberg. M.D. Advanced Engineering Mathematics, Pearson Education Asia.
6. Narayanan .S. Manickavachagom Pella and Ramaiah. Advanced Mathematics for Engineering Students, S. Viswanathan Publishers

### Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

### University examination pattern

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

## **2K6 CE 302 : COMPUTER PROGRAMMING**

3 hours lecture and 1 hour tutorial per week

### **Module I (15 hours)**

*Overview of C* – Variables, Expressions and assignments, Lexical Elements, Fundamental Data Types, Operators *Control Statements* – if, switch-case, for, while, do, goto, break, switch *Functions*-Parameter passing, scope rules, recursion

### **Module II (12 hours)**

*Arrays* – One dimensional and Multi Dimensional, *Pointer-Linked List*, Arrays of Pointers, Dynamic Memory Allocations, *Strings* – Operations and functions, *Bitwise Operators and Enumeration Types*, *Structures and Unions*, *Files and File Operations*

### **Module III (13 hours)**

*Overview of Java Language*- Constants, Variables and Data Types, Operators and Expressions *Control Structures* – Decision Making, Branching and Looping, *Object Oriented Programming* – Concept of Classes, Objects and Methods, Benefits Java and OOP- Polymorphism and Overriding of methods, Inheritance

### **Module IV (12 hours)**

Arrays and Strings, Interfaces, Multiple Inheritance, Packages – Putting Classes together – Managing Errors and Exceptions – Applet Programming and Graphics Programming (Basics only) – Managing Input/Output Files in Java

#### **Text books**

1. Kelley, Al & Pohl, Ira..., *A Book on C- Programming in C*, 4<sup>th</sup> Ed., Pearson Education (Modules I &II)
2. Balagurusamy E., *Programming with Java: A Primer*, 3<sup>rd</sup> Ed., Tata McGraw-Hill (Module III &IV)

#### **Reference books**

Balagurusamy E., *Programming in ANSI C*, Tata McGraw Hill  
Eckel, Bruce., *Thinking in Java*, 2<sup>nd</sup> Ed, Pearson Education

#### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

#### **University examination pattern**

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

## 2K6 CE 303 MECHANICS OF STRUCTURES

3 hours lecture and 1 hour tutorial per week

### MODULE I (14Hrs)

#### **Stress and strain:**

Concept of stress – Types of stress – Normal stress and strain under uniaxial loading – Modulus of Elasticity and Poisson's ratio – Members of varying cross sections – Temperature stresses – Volume change and Bulk modulus – Shear stress and strain – Relation among elastic constants – Analysis of plane stress and plane strain – Principal stress and principal strain – Mohr circle representation of plane stress – Principal planes and principal stresses

### MODULE II (14Hrs)

#### **Bending moment and Shear force:**

Bending moment and shear force – Review for cantilever and simply supported beams – for various types of statically determinate beams with various loading combinations – Relation between load, shear force and bending moment

Three hinged arches:

Linear arch – Eddy's theorem – axial force, shear and moment in circular and parabolic three hinged arches – Temperature effect

### MODULE III (12Hrs)

#### **Stress in beams:**

Theory of simple bending – Assumptions – Stresses in symmetrical sections – Bending stress distribution – Modulus of section – Stress in composite beams – Transformed section method – Beams of uniform strength – Shear stress distribution in beams of various cross sections

### MODULE IV (12Hrs)

#### **Theory of columns:**

Axial loading of short strut – Long columns – Euler's formula – Rankine formula – Secant formula

Torsion: Torsion of solid and hollow circular shafts – Power transmission – Closed coil and open coiled helical springs. Thin and thick cylinders: Thin walled pressure vessels – Lamé's equation – Stresses in thick cylinders due to internal and external pressure – Compound cylinders

#### **References:**

1. Mechanics of Structures Vol I & II Junnarkar S.B. Charotar Publishing House
2. Engineering Mechanics of Solids Popov E. P. Prentice Hall of India
3. Strength of Materials and Mechanics of Structures Punmia B. C. Laxmi Publications
4. Strength of Materials William A. Nash Tata McGraw Hill
5. Strength of Materials Chakraborty. M., S. K. Kataria & sons
6. Mechanics of Materials, James M. Gere, Thomson Brooks/ Cole.
7. Strength of Materials, Bhavikatti S. S. Vikas Publishing House Pvt. Ltd.

#### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

#### **University examination pattern**

Q I - 8 short type questions of 5 marks, 2 from each module

Q II - 2 questions A and B of 15 marks from module I with choice to answer any one

Q III - 2 questions A and B of 15 marks from module II with choice to answer any one

Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one

Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

## **2K6 CE 304 SURVEYING I**

3 hours lecture and 1 hour tutorial per week

### **MODULE I (13 hours)**

Introduction - classification of surveys - reconnaissance - principle of working from whole to part - provision of control - conventional signs - **Chain survey** - instruments - principles - field book - plotting - tie line and check line - obstacles - uses of cross staff and optical square. **Levelling** - permanent adjustments - fly leveling - reduction of levels - corrections for refraction and curvature - reciprocal leveling - longitudinal levelling and cross sectioning - contour survey - uses of contour - methods of contouring - direct and indirect interpolation - plotting - Areas and volumes - trapezoidal rule - Simpson's rule - area from latitude and departure - uses of planimeter - volumes - trapezoidal and prismatic formula.

### **MODULE II (13 hours)**

**Compass survey** - prismatic compass - surveyor's compass - whole circle and reduced bearing - true and magnetic bearing - dip and declination - local attraction - traversing - plotting - error of closure - graphical and analytical adjustments - **Plane table survey** - instruments and accessories - different methods - orientation - advantages and disadvantages of plane tabling - two point problem - three point problem - errors in plane tabling - **Minor instruments** - hand levels - Clinometer - Ceylon ghat tracer - hypsometer - pantagraph -Ediograph - box sextant - telescopic alidade

### **MODULE III (13 hours)**

**Curves**- Types of curves- Elements of curve- Simple curves- Different methods of setting out-Compound curves- Reverse curves- Transition curves- Vertical curves- **Hydrographic survey**- Scope-shoreline survey- River survey- soundings- Sounding equipment- Methods- ranges- Locating soundings- plotting- Three point problem.

### **MODULE IV (13 hours)**

**Theodolite surveying** - Study of theodolite - temporary and permanent adjustments - measurement of horizontal angles - method of repetition and reiteration - measurement of vertical angles - theodolite traverse - calculation of coordinates - corrections - traverse table - omitted measurements - tachometric surveying - stadia system - fixed and movable hair methods - staff held vertical and normal - instrument constants - analytic lens - tangential system - direct reading tachometer - subtense bar - Trigonometric leveling- **E.D.M - Total Station.**

### **References**

1. Kanetkar T.P.& Kulkarni S.V., Surveying Vol I &II, Vidyarthigriha Prakashan
2. Punmia B.C., Surveying Vol I &II, Laxmi Pub
3. Arora K.R., Surveying Vol I &II, Standard Book House
4. S.K Duggal, Surveying Vol 1, Tata - McGraw Hill, 2004.

### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

### **University examination pattern**

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

## **2K6 CE 305 BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES**

3 hours lecture and 1 hour tutorial per week

### **MODULE I (12hrs)**

Building stones-properties and uses of common types of stones- Timber-seasoning-preservation- Manufacture and properties and uses of ply wood, particleboards, fibre board-Bricks-types- IS: classifications -properties and testing- Floors-different types of floor coverings-Plastics-Glass-Steel

### **MODULE II (12hrs)**

Fire safety: - Fire proof construction-fire load-fire resisting properties of building materials-fire extinguishing methods-fire proof construction methods. Lighting: - Lighting requirements of various buildings, day lighting, day light factor, need for artificial lighting. Acoustics: - Introductions- Criteria for acoustics environment-sound control- insulation and isolation-acoustics materials and methods of fixing- acoustic requirement of auditorium

### **MODULE III (12hrs)**

Introduction to prefabrication- Slip form and Lift slab constructions. Vertical Transportation: - Elevators- types-terminology-passenger service and goods elevators-design consideration for passengers elevators- handling capacity- arrangement and positioning of lifts- Escalators:- features-operation and arrangement- use of ramps- Building repairs:- shoring- underpinning- scaffolding.

### **MODULE IV (16 hrs)**

Functional design- Features of tropical climate- thermal comfort- human body's thermal balance and heat lose in thermal environments- thermal comfort indices- comfort zone- heat exchange of buildings- conduction- convection- radiation and evaporation-thermal transmittance of structural elements- orientation- effects on thermal comfort of interiors- sol-air temperature- solar gain factor-heat gain calculation- thermal control- insulation by orientation and shading- ventilation- functions- provisions of ventilations- orientation- external features- cross ventilations- openings- mechanical ventilation systems- mechanical cooling- summer and winter a/c- introduction to different air conditioning system

### **References:**

1. Indian Standard Institution, National Building Code of India-1983
2. Rangwala. S.C, Engineering Materials, Charotar Book stall.
3. Koenigsberger; Manual of tropical Housing and building, part-1-climate design, Orient Longman.
4. Smith & Julian W, Building services, Applied science pub.
5. Narasimhan V, Introduction to building physics.
6. Code of practice for earthquake resistant design and construction of buildings, IS: 4326-1993
7. Hand book on building construction practices-BIS, SP:62 (S&T)- 1997
8. Patil, SM. Building services, Sachin printers, Mumbai.
9. Punmia B.C.: Building construction- Lakshmi Publications.
10. Adler R. Vertical Transportation for Buildings, American Elsevier Pub.

### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

### **University examination pattern**

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

## 2K6 CE 306 FLUID MECHANICS -I

3 hours lecture and 1 hour tutorial per week

### MODULE I (13 Hrs)

**Classification of fluids** – Properties of fluids – Control volume concept. **Fluid States:** Fluid pressure – measurement of pressure – forces on immersed plane and curved surfaces – Buoyant force – Stability of floating and submerged bodies. **Kinematics of fluids:** Methods of describing fluid motion – Steady and unsteady flow – Uniform and non-uniform flow – One, two and three dimensional flow – Streamlines, path lines and streak lines – conservation of mass – equation of continuity – convective and local acceleration – translation, rotation, and rate of deformation – Irrotational flow – vorticity – velocity potential and stream function – Laplace equation – flow net – Solution of flow net by graphical method.

### MODULE II (13 Hrs)

**Fluid Dynamics:** Forces influencing motion – Body force and Surface force – Energy and Head – Euler equation – Integration of Euler equation – Bernoulli's equation – Momentum equation – Energy and momentum correction factors – Fluids subjected to uniform, horizontal and vertical acceleration – Motion of fluid with uniform rotation – Vortex motion – Free and forced vortex.

Application of Bernoulli's Equation – Stagnation pressure – Pitot tube – Prandtl pitot tube – Venturimeter – Orifice plate – Flow nozzles – Orifices – Hydraulic coefficients of orifices – Mouth pieces – Sharp crested weirs – Rectangular, triangular and trapezoidal – Contracted weirs – Proportional weir – Broad crested weirs.

### MODULE III (13 Hrs)

**Flow of Viscous Incompressible Fluids:** Dependence of shear on pressure – Laminar flow through circular pipe – Hagen-Poiseuille equation – Darcy's law for flow through porous media – Stokes law – Transition from laminar to turbulent flow – Reynolds's experiments. **Turbulent flow through pipes:** Classification of turbulence – Velocity distribution in turbulent flow – Smooth and rough pipes. **Problems in Pipe Flow:** Energy losses in transitions – Major losses and minor losses – Equivalent length – Pipe open to atmosphere – Pipe connecting reservoirs – Pipes in series – Pipes in parallel – Siphons – Branching pipes – Pipe networks.

### MODULE IV (13 Hrs)

**Dimensional Analysis:** Scope of dimensional analysis – Physical dimensions – Dimensional homogeneity – Complete set of dimensionless products – Raleigh's theorem – Buckingham  $\pi$  theorem (Proof not required) – Calculation of dimensionless parameters – Examples of drag on a ship, pressure drop in pipe flow, flow over weirs and orifices. **Principle of similitude:** Geometric, kinematic and dynamic similarities – Special model laws – Froude and Reynold's laws – Weber, Cauchy and Mach numbers – Applications involving only Froude's and Reynold's laws. **Boundary layer theory:** Boundary layer growth in flow over a plate, flow past immersed bodies.

### References

1. Sreeter, V. L. and Wylie, E. B., Fluid Mechanics, McGraw Hill
2. Shames, I. H., Mechanics of Fluids, McGraw Hill
3. Modi, P. N. and Seth, S. M., Hydraulics and Fluid Mechanics including Fluid Machines, Standard Book House
4. Subramanya, K., Theory and Applications of Fluid Mechanics, Tata McGraw Hill Publishing Co.

### Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

### University examination pattern

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

## **2K6 CE 307 (P) CIVIL ENGINEERING DRAWING I**

3 hours Drawing per week

### **MODULE I**

**General** – Study of IS codes of practice on building drawing – Scales – Methods of dimensioning – Symbols for various materials and various types of doors, Windows, Shutters.

**Elements of Computer Aided Drawing** – Lines – Curves – Geometric shapes – Text – Dimensioning

**Brick Bond** – Plan, Sections and Elevations of 1, 1 1/2 and 2 brick thick walls in English bond and Flemish bond – Computer Aided drawing.

**Doors, Windows and Ventilators** – Sectional plan, Sectional elevation, Front view and joint details of doors – Panelled, Glazed – Steel and Aluminium windows, Panelled wooden window, Ventilators.

### **MODULE II**

**Roofing** – Elevation and joint details of lean-to roof, King post, Queen post trusses with A.C and tile roofing – Steel (French) roof truss with A.C sheet roofing.

**Stairs** – Plan and sectional elevation of RCC and wooden stairs – Quarter turn – Dog legged stairs.

### **Reference**

1. Building Drawing – Shaw and Kale, Tata McGraw Hill
2. Building Drawing and Detailing – Balagopal T. S. Prabhu, Spades
3. Manual of AutoCAD

Note: Minimum 10 sheets must be drawn and at least 2 computer print outs on brick bonds required.

### **SESSIONAL WORK ASSIGNMENT**

Drawing Sheets	10 x 3	= 30
Tests	2 x 10	= 20
Total marks		= 50

### **University exam pattern**

Duration – 3 hrs. Maximum marks : 100

The question paper shall consist of two parts. Part A – compulsory 4 short answer questions covering the entire syllabus for 20 marks. (Each question carries 5 marks) Part B – Two questions from each module, carrying 40 marks each. Students should answer one question in full from each module.

**Note:** No charts, tables, codes are permitted in the Examination hall. If necessary relevant data shall be given along with the question paper by the question paper setter.

## 2K6 CE 308(P) SURVEYING PRACTICAL I

3 hours practical per week

### List of exercises

- |     |                    |  |
|-----|--------------------|--|
| 1.  | Chain Survey       | Traversing and plotting of details                             |
| 2.  | Compass survey     | Traversing with compass and plotting                           |
| 3.  | Plane table Survey | Method of radiation and intersection                           |
| 4.  | Plane table Survey | Solving three point problem                                    |
| 5.  | Plane table Survey | Solving two point problem                                      |
| 6.  | Plane table Survey | Traverse   |
| 7.  | Levelling          | Fly levelling- plane of collimation method                     |
| 8.  | Levelling          | Fly levelling- rise and fall method                            |
| 9.  | Levelling          | Longitudinal and cross section                                 |
| 10. | Levelling          | Contour surveying  |
| 11. | Theodolite Survey  | Measurement of horizontal angle by the method<br>of repetition |

### Sessional work assessment

Lab Practicals and Record	= 30
Test	= 20
Total marks	= 50

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.

Note: Duly certified lab record must be submitted at the time of examination

## 2K6 CE 401 : ENGINEERING MATHEMATICS III

3 hours lecture and 1 hour tutorial per week

### Module I: (13 hours)

Complex analytic functions and conformal mapping: Complex functions – limits, derivative, analytic function- Cauchy-Riemann equations- elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions- Conformal mapping – Linear fractional transformations- mapping by elementary functions

### Module II: (13 hours)

Complex integration: Line integral, Cauchy's integral theorem - Cauchy's integral formula – Taylor's series, Laurent series – residue theorem – evaluation of real integrals using integration around unit circle, around semicircle, integrating contours having poles on the real axis

### Module III: (13 hours)

Jointly Distributed Random Variables: Joint distribution functions, independent random variables, covariance and variance of sums of random variables, joint probability distribution functions of random variables, conditional probability and conditional expectations. *Curve fitting*: Method of least squares, correlation and regression, line of regression.

### Module IV: (13 hours)

Vibrating strings: One dimensional wave equation – D' Alembert's solution – solution by method of separation of variables One dimensional heat equation - solution of the equation by the method of separation of variable Solutions of Laplace's equation over a rectangular region and a circular region by the method of separation of variable

### Reference books

1. Kreyszig E. Advanced Engineering Mathematics. Wiley Eastern
2. Johnson, Miller and Freud. Probability and Statistics for Engineers, Pearson Education Asia.
3. Wylie .C.R. Advanced Engineering Mathematics, Mc Grawhill.
4. B.S. Grewal. Higher Engineering Mathematics, Khanna Publishers.
5. Freund. J.E. Mathematical Statistics, Prentice hall of India.

### Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

### University examination pattern

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

## **2K6 CE 402 : HUMANITIES**

3 hours lecture and 1 hour tutorial per week

### **Module I (20 hours)**

**Functional English Grammar:** Sentence Analysis -Basic Patterns -Noun Group, Verbal Group, and Adverbial Group- Tenses – Conditionals - Active and Passive Voice - Reported Speech

### **Module II (14 hours)**

#### **Technical Communication**

1. Nature, Growing need, and importance of technical communication – technical communication skills – listening, speaking, reading, and writing.
2. Barriers to effective communication – improper encoding, bypassing inter- cultural differences etc.
3. Organization in technical communication – spatial, chronological etc.
4. Style in technical communication - objectivity, accuracy, brevity, clarity etc.
5. Technical reports – types and format

**Professional Ethics:** 1. Ethics in Engineering, copyright – IPR- patents

### **Module III (10 hours)**

#### **Humanities, Science and Technology**

1. Importance of humanities to technology, Education and Society
2. Relevance of a scientific temper
3. Relation between science, society and culture – the views of modern thinkers
4. The development of science and technology in society – science and technology in ancient Greece and India – the contribution of the Arabs to science and technology – recent advances in Indian science.

#### **Reference books**

1. Huddleston R, English Grammar – An outline, Cambridge University Press
2. Pennyor, Grammar Practice Activities, Cambridge University Press
3. Murphy, Intermediate English Grammar, Cambridge University Press
4. Hashemi, Intermediate English Grammar, Supplementary Exercises with answers, Cambridge University Press
5. Vesilind; Engineering, Ethics and the Environment, Cambridge University Press
6. Larson E; History of Inventions, Thompson Press India Ltd.
7. Bernal J. D., Science in History, Penguin Books Ltd.
8. Dampier W. C., History of Science, Cambridge University Press
9. Encyclopedia Britannica, History of Science, History of Technology
10. Subrayappa; History of Science in India, National Academy of Science, India
11. Brownski J, Science and Human Values, Harper and Row
12. Schrödinger, Nature and Greeks and Science and Humanism, Cambridge University Press
13. Bossel. H., Earth at a Crossroads – paths to a sustainable future, Cambridge University Press
14. McCarthy, English Vocabulary in Use, Cambridge University Press
15. M. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill, New Delhi, 2005

#### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

#### **University examination pattern**

- Q I - 10 short type questions of 2 marks, from Module 1
- Q II - 10 questions of 5 marks, from module II and III for writing short notes with choice to answer any **seven**
- Q III - 2 questions A and B of 15 marks from module I for writing essay with choice to answer any one
- Q IV - 2 questions A and B of 15 marks from module II for writing essay with choice to answer any one
- Q V - 2 questions A and B of 15 marks from module III for writing essay with choice to answer any one

## **2K6 CE 403 STRUCTURAL ANALYSIS I**

3 hours lecture and 1 hour tutorial per week

### **MODULE I (13 Hrs)**

#### **Deflection of determinate beams:**

Differential equation of the elastic curve – Slope and deflection of beams by method of successive integration – Macaulay's method – Moment area method – Conjugate beam method – Deflection due to shear.

### **MODULE II (13 Hrs)**

#### **Energy theorems:**

Strain energy due to axial load, bending, shear and torsion – Principle of superposition – Castigliano's first theorem – Betti's theorem – Maxwell's law of reciprocal deflection – Unit load method and strain energy method for determination of deflection of statically determinate beams, pin jointed frames, effect of temperature and lack of fit.

### **MODULE III (13 Hrs)**

#### **Moving loads and influence lines:**

Introduction to moving loads – Concept of influence lines – Influence line for reaction, shear force and bending moment for determinate beams – Analysis for different types of moving loads – single concentrated load, several concentrated loads, uniformly distributed load shorter and longer than the span – Absolute maximum bending moment

### **MODULE IV (13 Hrs)**

#### **Cables and Suspension bridges:**

General cable theorem – Analysis of cables under concentrated and uniformly distributed loads – Shape and stresses due to self weight – Anchor cables – Temperature effect – Suspension bridges with three hinged and two hinged stiffening girders – Influence lines for bending moment and shear force – Temperature stress in stiffening girder

#### **References:**

1. Basic Structural Analysis, Reddy C. S. Tata McGraw Hill
2. Mechanics of Structures Vol I & II ..Junnarkar S.B., Charotar Publishing House
3. Elementary Structural Analysis, Norris and Wilbur, Tata McGraw Hill
4. Strength of Materials and Mechanics of Structures, Punmia B. C., Laxmi Publications
5. Theory of Structures, Timoshenko & Young, Tata McGraw Hill
6. Structural Analysis Vol I, Bhavikatti S. S., Vikas Publishing House Pvt. Ltd.

#### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

#### **University examination pattern**

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

## **2K6 CE 404 FLUID MECHANICS II**

3 hours lecture and 1 hour tutorial per week

### **MODULE-I**

Flow in open channels: Open Channel flow in rigid boundary channels – equations for uniform flow, Chezy's and Manning's formula – most efficient cross section – circular cross section not flowing full – velocity – distribution in open channels- conveyance of a canal cross section – normal depth – normal discharge curve – hydraulic exponent for uniform flow computation – determination of normal depth and velocity – algebraic method – graphical method

### **MODULE-II**

Gradually varied flow: Basic assumptions – dynamic equation for gradually varied flow- different forms of the dynamic equation – characteristics of flow profiles in prismatic Channels – type of flow in prismatic channels. Back water curve: Computation of length backwater curve – approximate formula – modified Bernoulli's formula – graphical integration method – direct step method – direct integration method- Brasses, Bakhmeteff, Chow method.

### **MODULE -III**

Rapidly varied flow: Characteristics of the flow – hydraulic jump – initial and sequent depths – non-dimensional equation – practical application of hydraulic jump – type of jump in horizontal floor basic characteristics of the jump – energy loss – efficiency – height of jump types as energy dissipater – stilling basins- jump position – tail water conditions- jump types – stilling basins of generalized design (No detailed study) Unsteady flow in open channels: shallow water waves – capillary waves – gravity waves- translatory waves – surge and bore.

### **MODULE- IV**

Hydraulic turbines: Importance of hydropower, classification of turbines, description, typical dimensions and working principles of Pelton, Francis and Kaplan turbines (detailed design need not be dealt with).Description and function of drafts tube. Pumps: classification of pumps, Description and general principle of working of centrifugal and reciprocating pumps (detailed design need not be dealt with). Cavitations in pumps and turbines.

### **Reference**

1. Chow V.T., Open Channel Hydraulics, McGraw Hill, Inc.
2. K. Subramanya, Flow in Open Channel, Tata Mc Graw Hill.
3. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics including Fluid
4. K.G Rangaraju, Flow through Open Channels, Tata McGraw Hill

### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

### **University examination pattern**

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

## **2K 6CE 405 SURVEYING II**

3 hours lecture and 1 hour tutorial per week

### **MODULE I (10 Hours)**

Geodesy: figure of earth – spherical trigonometry – conveyance of meridians – parallel of latitude – computation of spherical coordinates and determination of bearing and distance

### **MODULE II (12 Hours)**

Map projection: introduction – ideal map projection – scale and scale factor – methods of projection – simple equidistant projections and its modifications – Lambert projection – mercator projection – electronic distance measurement – basic sources of errors – principles – slope and height corrections – brief study of EDM's – geodimeter – tellurometer – distomat – total station – global positioning system

### **MODULE III (16 Hours)**

Photogrammetry – basic principles – terrestrial photogrammetry – photo theodolite – aerial photogrammetry – aerial cameras – height and distances from photographs – relief displacement – flight planning – ground control for aerial photogrammetry – plotting – stereoscopy – photo mosaic – photo interpretation – applications of photogrammetry.

### **MODULE IV (14 Hours)**

Remote sensing : introduction – electromagnetic radiation – target interactions – atmospheric effects – remote sensing systems – radiometer – scanners – side looking air borne radar – passive microwave systems – remote sensing from space – applications of remote sensing.

### **References**

1. Punmia B.C., Surveying Laxmi Pub
2. Thomas. M. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, Inc., 2002
3. M. Anji Reddy, Text Book of Remote Sensing and Geographical Information Systems, B.S. Publications, 2001
4. D. P. Rao, Association of Exploration Geophysicists, 1995, Remote Sensing for Earth Resources.
5. L.R.A. Narayan, Remote Sensing and its Application, Universities Press, 1999.
6. E.T. Engman., R.J. Gurney, Remote Sensing in Hydrology, Chapman & hall, 1991
7. Kanetkar T.P. & Kulkarni S.V., Surveying Vol I &II, Vidyarthigriha Prakashan

### **Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

### **University examination pattern**

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

## 2K6 CE 406 ENGINEERING GEOLOGY

3 hours lecture and 1 hour tutorial per week

### MODULE I: Physical Geology and Environmental Geology (13 hours)

Geology and its subdivisions – Importance of Geology in Civil Engineering\_ **Weathering:** Agents, types and engineering significance – Influence of climate and lithology on weathering. **Soils:** Geological classification, Soil erosion and its control. **Wind, Rivers and Oceans:** Geological work – Major erosional and depositional land forms – Engineering significance. **Landslides:** Definition, classification, causes and control of landslides. **Volcanoes:** Mechanism and causes of volcanism, volcanic products, types of volcanic eruptions and their distribution. **Earthquakes:** Introduction, classification, causes, effects and recording of earthquakes- Earthquake resistant structures – Basic concepts of plate tectonics. Impact of geology on environmental health hazards.

### MODULE II: Mineralogy and Petrology (13 hours)

Definition and Physical properties of minerals. **Physical properties and chemical composition of:** Quartz, Feldspars (Orthoclase and Microcline), Micas (Biotite and Muscovite), Amphibole (Hornblende), Pyroxenes (Augite and Hypersthene), Olivine, Serpentine, Asbestos, Garnet, Talc, Gypsum, Calcite, Magnetite and Kaolinite. Three fold divisions of rocks – Rock cycle – Distinguishing features of Igneous, Sedimentary and Metamorphic rocks. **Igneous rocks:** Forms, Classification (Chemical, mineralogical and textural), Texture and Description of Granite, Basalt, Dolerite and Gabbro. **Sedimentary rocks:** Classification, Primary structures and Description of Conglomerate, Breccia, Sandstone, Shale and Limestone. **Metamorphic rocks:** Agents and Types of metamorphism, Structures and description of Slate, Phyllite, Schist, Gneiss, Quartzite and Marble. **Engineering properties of rocks:** Crushing strength, Transverse strength, porosity, density, abrasive resistance, frost and fire resistance.

### MODULE III: Structural Geology and Engineering Geology (13 hours)

Outcrops – Dip and Strike – Folds, Faults, Joints and Unconformities: Definition, parts, classification, recognition and engineering significance. Selection of sites for Dams and Reservoirs, Silting up of Reservoirs and remedies. Selection of sites for Tunnels, bridges and highways. Basic concepts of remote sensing – Application of remote sensing in Civil Engineering.

### MODULE IV: Hydrogeology and Exploration Geology (13 hours)

Hydrological cycle – Sources and zonal distribution of ground water – Aquifer – Types of aquifers – Occurrence of artesian water – Wells – Basic concepts – Springs – Artificial recharge of ground water – Quality of ground water – Saline water intrusion in coastal aquifers – Ground water pollution – Importance of ground water investigation in Civil Engineering projects. Ground water exploration – Geological, geophysical and hydrological investigations – Electrical resistivity and seismic methods.

### References

1. Holmes A., Principles of Physical Geology, Thomas Nelson and sons
2. Singh P, Engineering and General Geology, S. K. Kataria
3. Kesavalu C. N., Text Book of Engineering Geology, Macmillan India Limited
4. Venkat Reddy D., Engineering Geology for Civil Engineers, Oxford, IBH
5. Read H. H., Rutleys Elements of Mineralogy, CBS Publishers
6. Tyrrel G. W., Principles of Petrology, B. T. Publications, New Delhi
7. Billings M. P., Structural Geology, Asia Publishing House
8. Todd D. K., Groundwater Hydrology, John Wiley and sons
9. Juds W. R., Principles of Engineering Geology and Geotechniques, McGraw Hill
10. Voldiya K. S., Environmental Geology in Indian Context, McGraw Hill
11. Pandey S. N., Principles and Applications of Photogeology, Wiley Eastern Ltd.
12. Sathya Narayanaswami B. S., Engineering Geology, Dhanpat Rai & Co (P) Ltd.
13. Kennie and Mathews., Remote Sensing and Civil Engineering, John Wiley and sons

**Sessional work assessment**

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

**University examination pattern**

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

## **2K6 CE 407(P) STRENGTH OF MATERIALS LAB**

3 hours Practical per week

1. Standard tension test on MS rod using UTM and suitable extensometer
2. Torsion test on MS specimen
3. Bending test on steel beams
4. Spring test –open and closed coil springs
5. Compression test on cubes and cylinders –Determination of Modulus of elasticity
6. Split test on concrete cylinder and flexure test on concrete.
7. Study of extensometers and strain gauges
8. Bending test on reinforced concrete beam-under reinforced
9. Bending test on reinforced concrete beam- over reinforced

### **Sessional work assessment**

Lab Practicals and Record	= 30
Test	= 20
Total marks	= 50

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.

Note: Duly certified lab record must be submitted at the time of examination

## **2K6 CE 408(P) SURVEY PRACTICAL II**

3 hours Practical per week

### **List of Exercises**

1. Determination of tacheometric constants
2. Heights and distances by stadia tacheometry
3. Heights and distances by tangential tacheometry
4. Heights and distances by solution of triangles
5. Setting out of simple curves- linear method
6. Setting out of simple curves- angular method
7. Setting out of transition curve
8. Permanent adjustment of Theodolite
9. Heights and distances by using substance bar
10. Study of minor instruments- planimeter, pantagraph, handlevels, clinometers, Ceylon ghat tracer and sextant.
11. Theodolite traversing.

Study of modern instruments- automatic levels and total station.

### **Sessional work assessment**

Lab Practicals and Record	= 30
Test	= 20
Total marks	= 50

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.

Note: Duly certified lab record must be submitted at the time of examination