KANNUR UNIVERSITY

(Abstract)

M-Tech Degree Programme in **Structural Engineering And Construction Management** – Scheme, Syllabus & Model Question Papers -Implemented with effect from **2014** admission - Orders issued.

ACADEMIC BRANCH

U.O.No.Acad/C5/91/2015 (i) Dated, Civil Station P.O , 05-05-2015.

Read: 1. U.O No. Acad/C3/ 10834/2011 dated 22.08.2012
2. U.O No. Acad/C3/ 10834/2011 (2) dated 07.10.2013
3. Minutes of the meeting of the Board of Studies in Engineering (PG) held on 29.01.2015.
4. Letter dated 2.03.2015 from the Convenor of the Expert Committee for framing the Syllabus & Pattern of Question Papers for M-Tech Degree Programme in **Structural Engineering And Construction Management.**
5. Minutes of the meeting of the B.O.S.in Engineering (P.G) held on 5.03.2015.
6. Minutes of the meeting of the Faculty of Engineering held on 21.04.2015.

ORDER

1. The modified Regulations for M-Tech Degree Programmes were implemented in the University with effect from 2011 Admission as per the paper read (1) above, and certain modifications were effected to the same w.e.f 2013 admission vide paper read (2).

2. As per the paper read (3) above, an Expert Committee was constituted as recommended by the BOS in Engineering (PG) at its meeting held on 29.01.2015, for framing the Scheme ,Syllabus and Model Question Papers for M-Tech Degree Programme in **Structural Engineering And Construction Management** to be implemented in the University with effect from 2014 Admission.

3. The Convenor of the above Committee, vide paper read (4) above has submitted the Scheme, Syllabus &Model Question Papers for M-Tech Degree Programme in **Structural Engineering And Construction Management** to the University, for implementation w.e.f.2014 Admission.

4.As per paper read (5) above the Board of Studies in Engineering (P.G) finalized the Scheme ,Syllabus and Model Question Papers for M.Tech Programme in **Structural Engineering And Construction Management** for implementation w.e.f. 2014 Admission.

5.As per the paper read (6) above the meeting of the Faculty of Engineering approved the Scheme ,Syllabus and Model Question Papers for M.Tech. Programme in **Structural Engineering And Construction Management** for implementation w.e.f. 2014 admission.

contd...2

6. The Vice-Chancellor after examining the matter in detail and in exercise of the powers of the Academic Council conferred under Section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with has

i) approved the draft Scheme, Syllabus and MQPS for M-Tech Programme in **Structural Engineering And Construction Management** prepared by the Expert Committee appointed by the Board of Studies .

ii) accorded sanction to implement the Scheme, Syllabus and Model Question Papers of the M-Tech Degree Programme in **Structural Engineering And Construction Management** with effect from 2014 admission, subject to report to the Academic Council.

7. Orders are issued accordingly.

8. The implemented Scheme, Syllabus & Model Question Papers are appended.

Sd/-
DEPUTY REGISTRAR(Academic)
FOR REGISTRAR

To

The Principals of Affiliated Engineering Colleges offering M.Tech. Programme.

Copy to

1. The Examination Branch (Through PA to CE)
2. The Chairman, BOS in Engineering (PG) 3.PS to VC /PA to CE/ P.A to Registrar.
4. DR/AR-I (Academic) 5. SF/DF/FC.

KANNUR UNIVERSITY
CIVIL STATION P.O.
KANNUR
Pin-670 002
THAVAKKARA

Forwarded/By Order

SECTION OFFICER

CURRICULUM, SCHEME OF EXAMINATIONS AND SYLLABI FOR M.TECH DEGREE PROGRAMME WITH EFFECT FROM ACADEMIC YEAR 2014-2015

KANNUR UNIVERSITY

FACULTY OF ENGINEERING

CIVIL ENGINEERING

M Tech in

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT

COURSE RATIONALE

Today's Civil engineering professionals face a highly competitive global engineering and construction environment which requires a fundamental understanding of management, technology and finance as well as business and legal principles.

Structural engineering has emerged as a critical part of the construction process. Its first recorded use dates back to 27th century B.C. when Egyptian Polymath Imhotep designed and constructed the famed step pyramid of Saqqara. With advanced technology and introduction of CAD for design along with finite element analysis the structural engineering wing has become a part and parcel of construction. Expert structural engineers are being entrusted with the responsibility to make designs, structural analysis, steel detailing and safety assessment of structures to be constructed. It assures error-free design, risk analysis, effective cost and material estimation, and creative use of individual structural elements.

Construction Management: This track trains Civil engineers who aim to develop a career in construction engineering, construction management, supervision, quality control and assurance, production and development of materials and technology. The major purpose of this study track is to prepare engineers for leadership positions in construction and management of complex building projects, becoming increasingly common in the construction industry. For this purpose, the program combines a focused basis in the technological, structural and managerial aspects of construction, with a broad basis in general civil engineering.

With the Master of technology in structural engineering and Construction Management program, students learn to design structures that support their own weight and the loads they carry, and that resist wind, temperature, earthquake, and many other forces. Bridges, buildings, offshore structures, space platforms, amusement park rides, and many other kinds of projects are included within this exciting discipline. The contents of the core courses incorporate topics in the areas of structural engineering and construction management. Based on the background of the students, elective courses may be taken from courses in structural, building and its environment, Humanities & Social Sciences, Management Studies and material studies. Two semesters are devoted to project work, which can be done at the institute /or the sponsoring agency. Skilled professionals in this field are in high demand in developed countries and in developing countries. Structural engineers are engaged in all important building plans carried out by the private construction firms, railways projects, military, engineering services, state or central government and consultancy services.

Eligibility for SCM: B.E. / B.Tech. (Civil Engineering)

FIRST SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination		Credit
		L	T	P		Hrs	Marks	
*SCM 1*01	Theory of Elasticity	3	-	-	50	3	100	3
*SCM 1*02	Structural Dynamics	3	-	-	50	3	100	3
*SCM 1*03	Advanced Theory and Design of Concrete Structures	3	-	-	50	3	100	3
*SCM 1*04	Construction Management	3	-	-	50	3	100	3
*SCM 1*05	Elective I	3	-	-	50	3	100	3
*SCM 1*06	Elective II	3	-	-	50	3	100	3
SCM 107 (P)	Construction Management Lab	-	-	2	50	3	100	2
SCM 108 (P)	Seminar	-	-	2	50			2
TOTAL		**18**	**-**	**4**	**400**		**700**	**22**

ELECTIVE I (SCM 105)	
SCM 105(A)	Advanced Concrete Technology
SCM 105 (B)	Quality Control & Project Safety Management
SCM 105 (C)	Design of Steel Concrete Composite Structures
SCM 105 (D)	Building Services
SCM 105 (E)	Modern Construction Materials, Methods and Equipments

ELECTIVE II (SCM106)	
SCM 106 (A)	Design of Bridges
SCM 106 (B)	Industrial Structures
SCM 106 (C)	Forensic Engineering and Rehabilitation of Structures
SCM 106 (D)	Advanced construction techniques

SECOND SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination		Credit
		L	T	P		Hrs	Marks	
SCM 201	Advanced Pre stressed Concrete Design	3	-	-	50	3	100	3
SCM 202	Finite Element Analysis	3	-	-	50	3	100	3
SCM 203	Construction Personnel Management	3	-	-	50	3	100	3
SCM 204	Elective III	3	-	-	50	3	100	3
SCM 205	Elective IV	3	-	-	50	3	100	3
SCM 206	Elective V	3	-	-	50	3	100	3
SCM 207 (P)	Structural Engineering Lab	-	-	2	50	3	100	2
SCM 208 (P)	Term Paper	-	-	2	50			2
TOTAL		**18**	**-**	**4**	**400**		**700**	**22**

ELECTIVE

ELECTIVE III - SCM 204	
SCM 204 (A)	Offshore Structures
SCM 204 (B)	Construction Economics and Finance Management
SCM 204 (C)	Research Methodology
SCM 204 (D)	Design of Tall Buildings

ELECTIVE IV - SCM 205	
SCM 205 (A)	Construction Project Management
SCM 205 (B)	Structural Health Monitoring
SCM 205 (C)	Pavement Construction Practice
SCM 205 (D)	Advanced Design of Foundation
SCM 205 (E)	Quantitative Techniques in Management

ELECTIVE V- SCM206	
SCM 206(A)	Stability of Structures
SCM 206 (B)	Earthquake Analysis and Design of Structures
SCM 206 (C)	Disaster Management
SCM 206 (D)	System Integration in Construction

Sessional marks for all the Theory based Subjects

The marks allotted for internal continuous assessment and end-semester university examinations shall be 50 marks and 100 marks respectively with a maximum of 150 marks for each theory subject.

The weightage to award internal assessment marks should be as follows:

Test papers (two tests) : 25 marks

Assignments and/or class performance : 25 marks

THIRD SEMESTER

Code	Subject	Hours/Week			Marks					Credit
					Internal		University		Total	
		L	T	P	Guide	Evaluation Committee	Thesis	Viva		
SCM 301 (P)	Thesis Preliminary			22	200	200	---	---	400	8
TOTAL				**22**	**200**	**200**			**400**	**8**

THESIS PRELIMINARY: This shall comprise of two seminars and submission of an interim thesis report. This report shall be evaluated by the evaluation committee. The fourth semester Thesis- Final shall be an extension of this work in the same area. The first seminar would highlight the topic, objectives, methodology and expected results. The first seminar shall be conducted in the first half of this semester. The second seminar is presentation of the interim thesis report of the work completed and scope of the work which is to be accomplished in the fourth semester.

FOURTH SEMESTER

Code	Subject	Hours/Week			Marks					Credit
					Internal		University		Total	
		L	T	P	Guide	Evaluation Committee	Thesis	Viva		
SCM 401 (P)	Thesis			22	200	200	100	100	600	12
TOTAL				**22**	**200**	**200**	**100**	**100**	**600**	**12**

Towards the middle of the semester there shall be a pre submission seminar to assess the quality and quantum of the work by the evaluation committee. This shall consist of a brief presentation of Third semester interim thesis report and the work done during the fourth semester. The comments of the examiners should be incorporated in the work and at least one technical paper is to be prepared for possible publication in journals / conferences. The final evaluation of the thesis shall be an external evaluation.

SCM 101 THEORY OF ELASTICITY

3 hours lecture per week

Module I

Introduction to the mathematical theory of elasticity: Elasticity, stress, strain, Hooke's law, two-dimensional idealizations, plane stress and plane strain problems, equations of equilibrium, strain-displacement relations, constitutive relations, compatibility conditions, displacement and traction boundary conditions.

Module II

Introduction to Cartesian Tensors: Transformation laws of Cartesian tensors, special tensors and tensor operations, the Kronecker's delta, the permutation tensor, the e-d identity, symmetry and skew-symmetry, contraction, derivatives and the comma notation, Gauss theorem, the base vectors and some special vector operations, Eigen value problem of a symmetric second order tensor, equations of elasticity using index notation.

Module III

Two-dimensional problems in rectangular coordinates: Stress function, solution by polynomials, Saint Vénant's principle, bending of a cantilever, determination of displacements. Two-dimensional problems in polar coordinates: General equations, problems of axisymmetric stress distribution, pure bending of curved bars, effect of circular hole on stress distribution in plates, concentrated force at a point on a straight boundary.

Module IV

Stress and strain problems in three dimensions: Principal stresses, principal strains, Three dimensional problems. Energy Theorems and Variational Principles of Elasticity: Strain energy and complementary energy, Clapeyron's theorem, virtual work and potential energy principles, principle of complementary potential energy, Betti's reciprocal theorem, principle of linear superposition, uniqueness of elasticity solution.

Module V

Torsion of straight bars: Elliptic and equilateral triangular cross-section, membrane analogy, narrow rectangular cross-section, torsion of rectangular bars, torsion of rolled profile sections, hollow shafts and thin tubes.

References:

1. Timoshenko, S.P. and Goodier, J.N., Theory of Elasticity, Mc Graw Hill, Singapore,1982.
2. Leipholz, H., Theory of Elasticity, Noordhoff International Publishing, Layden,1974.
3. Sokolnikoff, I.S., Mathematical Theory of Elasticity, Tata Mc Graw Hill, India,1974.
4. Xu, Z., Applied Elasticity, Wiley Eastern Ltd, India, 1992.
5. Srinath, L.S., Advanced Mechanics of Solids, Second Edition, Tata McGraw Hill,India,2003.
6. Ameen, M., Computational Elasticity

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 101**

SCM102- STRUCTURAL DYNAMICS

3 hours lecture per week

Module I

Over view:- Basic features of dynamic loading and response – models for dynamic analysis– lumped mass, generalized displacements and finite element models Formulation of equation of motion – Direct equilibration, principle of virtual displacement and Hamilton's principle.

Module II

Degrees of freedom – Translational and rotational systems - mass moment of inertia Generalized single degree of freedom systems- rigid body assemblage determination of characteristic properties. Free vibration of single degree of freedom system:- Solution of equation of motion, undraped free vibration - Damped free vibration, critically damped, under damped and over damped systems, Negative damping.

Module III

Single degree of freedom system – Response:- Response to harmonic loading, Un damped system- damped system, Response to periodic loading -Fourier series expansion of the loading- response to Fourier series loading Exponential form of Fourier series loading and response- Complex frequency transfer functions Response to impulsive loads :- Suddenly applied load, sine wave impulse, rectangular impulse, triangular impulse, spike loading, approximate analysis Response to general dynamic loading:- Duhamel integral for un damped system – unit impulse response function – numerical evaluation, response of damped system numerical evaluation, Numerical analysis in the frequency domain, fast Fourier transform analysis.

Module IV

Multi degree of freedom system:- Two degree of freedom system – equation of motion, characteristic equation, frequencies and mode shapes, coordinate coupling and choice of degree of freedom, orthogonality of modes, natural coordinates, superposition of natural modes , response of two degree of freedom system to initial excitation, beat phenomenon, response to harmonic excitation Multi- degree of freedom system – analysis of multi- degree of freedom system- mode superposition analysis. Distributed Parameter System: Partial differential equation of motion - Axial vibration of prismatic bars - Elementary CAS of flexural vibration of beams - Beam flexure including axial force effects.

Module V

Practical Vibration Analysis:- Determination of frequency by Rayliegh's method, beam flexure – selection of shape- improved Rayliegh's method. Framed structures – Shear building concept and models for dynamic analysis, discrete parameter system by Rayliegh' method, improvement of frequency, Stodola method for discrete parameter system, reduction of second and higher modes- Stodola method for continuous parameter system.

References:

1. Clough,R.W. and Penzien, J., Dynamics of structures, McGraw Hill
2. Chopra, A.K., Dynamics of structures – Theory and Application to Earthquake Engg.,Prent. Hall.
3. IS 1893 – Criteria for Earthquake Resistant Design of Structures.
4. SP 22: Explanatory Handbook on Codes for Earthquake Engineering.
5. Meirovitch L., Elements of Vibration Analysis, Mc.Graw Hill.
6. Thomson W.T., Theory of Vibration with Applications, CBS Publ.
7. Craig, Jr. R.R., Structural Dynamics, John Wiley.
8. Hurty, W.C. and Rubinstein M.F., Dynamics of Structures, Prentice Hall.

***Common to CAS 102**

SCM103- ADVANCED THEORY AND DESIGN OF CONCRETE STRUCTURES

3 hours lecture per week

Module I

Stress-strain characteristics of concrete under multi- axial stresses- confined concrete-Effect of cyclic loading on concrete and reinforcing steel. Ultimate Deformation and ductility of members with flexure- strength and deformation of members with tension

Module II

Control of deflections- immediate and long term deflections- Control of cracking – classical theory of cracking- International codal procedures on crack-width computation.

Module III

Strut and Tie Models- Development- Design methodology- selecting dimensions for struts- ACI Provisions- Applications- RCC beam – column joints- classification – shear strength design of exterior and interior joints- wide beam joints.

Module IV

Strength and ductility of concrete frames- analysis of shear walls- distribution of lateral loads in uncoupled shear walls- Equivalent stiffness method- Shear wall frame interactions.

Module V

Behaviour and design of special RCC members- Design of concrete corbels- deep beams, ribbed, hollow block or voided slab- RCC walls.

References:

1. Arthur. H. Nilson, David Darwin and Charles W Dolan, Design of Concrete Structures, Tata McGraw Hill, 2004
2. Park,R and Paulay T, Reinforced Concrete Structures, John Wiley & Sons, New York
3. Macleod, I.A, Shear Wall Frame Interaction. A design aid with commentary Portland Cement Association.
4. Thomas T. C. Hsu, Unified Theory of Reinforced Concrete, CRC Press, London,1993.
5. IS 456 –2000, Indian Standard for Plain and Reinforced Concrete- Code of Practice,New Delhi
6. ACI – 318: 2002, Building Code Requirements for Structural Concrete and Commentary, ACI Michigan.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 103**

SCM104- CONSTRUCTION MANAGMENT

3 hours lecture per week

Module I

Scientific Management : Contributions of pioneers in scientific Management - Basic principles of management with special reference to construction industry- construction organization setup.

Module II

Computer capabilities in management: Methodology and Tools techniques for systematic identification, evaluation, Office and field administrative control reports and records- data processing

Module III

Management information systems – Relatedness of MIS with management activities. Management functions and decision making. Concept of balance MIS effectiveness and efficiency criteria. modification of MIS, Simulation of alternatives.

Module IV

Engineering economy

Cash flow- bases of comparison, decision making amongst alternatives- benefit cost analysis rate of return- replacement analysis – break even analysis. Time value of money, discounted cash flow, Bases of comparison, Incremental analysis, Benefit-Cost analysis, Replacement analysis, Capital budgeting, Working capital management, Construction accounting. Appraisal through financial statements-ratio's analysis, Long term Financing, Practical problems and case studies.

Module V

Construction planning techniques: Introduction , Work scheduling, Basic steps in PERT/CPM techniques, Network diagram presentation, Rules of drawing network diagram, Fulkerson's rule, Time estimates and Critical path in network analysis, Project evaluation and review technique, Application areas of PERT/CPM techniques– Application of Network Techniques.

References:

1. Bonny J. B. (1973), "Hand book of Construction Management Organization", Van NostrandReinhold New York
2. Robert G Murdick, Joel E. Ros, James and Clegget (2005), "Information systems forModern Management"- second edition, Prentice Hall of India, New Delhi.
3. Collier, William BG. Ledbetter, "Engineering Cost Analysis"- Courtland A., Harper andRow Publishers, New York.
4. Srinath L. S. (2001), "PERT and CPM –Principles and Applications", 3rd edition Affiliated East- West Press Pvt Ltd., New Delhi
5. Jerome D Wiest and Ferdinand K Levy (1974), "A Management Guide to PERT /CPM withGERT/PDM/DCPM and other networks"- 2nd edition, Prentice Hall of India, Pvt Ltd., New Delhi.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM105 (A) ADVANCED CONCRETE TECHNOLOGY

3 Hours Lecture Per Week

Module I

Ready Mixed Concrete - manufacture, transporting, placing, precautions, Methods of concreting- Pumping, under water concreting, shotcrete, High volume fly ash concrete concept, properties, typical mix

Module II

Self compacting concrete concept, materials, tests, properties, application and Typical mix.

Module III

Fibre reinforced concrete - Fibers types and properties, Behavior of FRC in compression,tension including pre-cracking stage and post-cracking stages, behavior in flexure and shear, Ferro cement - materials, techniques of manufacture, properties and application

Module IV

Light weight concrete-materials properties and types. Typical light weight concrete mix High density concrete and high performance concrete-materials, properties and applications, typical mix.

Module V

Test on Hardened concrete-Effect of end condition of specimen, capping, H/D ratio, rate of loading, moisture condition. Compression, tension and flexure tests. Tests on composition of hardened concrete-cement content, original w/c ratio. NDT tests concepts-Rebound hammer, pulse velocity methods.

References:

1. Neville, A.M., "Concrete Technology", Longman Scientific & Technical, 1990.
2. Neville, A.M.., "Properties of Concrete", Longman Scientific & Technical, England,1981.
3. Gambier, “Concrete Technology”, Tata McGraw Hill, New Delhi.
4. Orchard, D.F., "Concrete Technology", Vols. 1 & 2, 1963.
5. Shetty, M.S., "Concrete Technology", S.Chand & Co., New Delhi, 1998.
6. Rixon, M.R., "Chemical Admixtures for Concrete", John Wiley & Sons, 1977.
7. Krishnaraju, N. "Design of concrete mixes", Sehgal Educational Consultants &Publishers Pvt.Ltd., Faridabad, 1988.
8. IS: 10262, "Recommended Guidelines for concrete Mix Design", 1982

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 105 (A)**

SCM105 (B) – Quality Control & Project Safety Management

3 hours lecture per week

Module I

Construction Organization: Types of Organization-Inspection, Control and enforcement-Quality Management Systems and Method- Responsibilities and authorities in Quality assurance and Quality control-Architects, Engineers, Contractors, and Consultants, Quality circle

Module II

Quality Management: Quality policy, Objectives and methods in construction industry-Consumer satisfaction-Ergonomics-Time of Completion-Statistical Tolerance-Taguchi's concept of quality- Codes and standards-Documents-Contract and construction programming-Inspection procedures-Processes and products-Total QA / QC Programme and cost implication

Module III

Quality Assurance and Control -Objectives-Regularity agent-Owner, Design, Contract And Construction Oriented Objectives, Methods-Techniques and Needs Of QA/QC-Different Aspects of Quality-Appraisals, Factors Influencing Construction Quality-Critical, Major Failure AspectsAnd Failure Mode Analysis. Standardization - Selection Of New Materials-Influence Of Drawings, Detailing And Specification Based On Codal Provisions.

Module IV

Construction Accidents - Injury And Accidents-Definitions-Unsafe Act –Unsafe Condition-Causes, Investigations And Prevention Of Accidents, Hazards, Type Of Industrial Hazards-Nature, Causes And Control Measures, Hazard Identifications And Control Techniques -Cost of Construction Injuries-Legal Implications Safety Programmes - Introduction to the Concept of Safety- Need- Safety Provisions in the Factory Act-Laws related to the Industrial Safety-Measurement Of Safety Performance, Safety Audit, Problem Areas In Construction Safety-Elements of an Effective and Safety Programme-Job site Safety assessment- Safety Meetings-Safety Incentives

Module V

Safety Organization –Safety Policy, Safety Record Keeping, Safety Culture-Safe Workers-Safety and First Line Supervisors-Safety and Middle Managers-Top Management Practices, Company Activities and Safety-Safety Personnel-Sub contractual obligation.

References:

1. James, J.O Brien, “Construction Inspection Handbook - Quality Assurance and Quality Control ", Van Nostrand, New York, 1989
2. Kwaku A., Tenah and Jose M.Guevera, “Fundamental of Construction Management and Organization ",Prentice Hall of India, 1995.
3. Juran Frank, J.M. and Gryna, F.M. " Quality planning and Analysis ", Tata McGraw Hill, 1982.
4. Hutchins. G., “ISO 9000 ", Viva Books, NewDelhi, 1993.
5. Clarkson H. Oglesby, “Productivity Improvement in Construction ", McGraw Hill 1989.
6. Steven McCabe, “Quality Improvement Techniques in Construction ", Addisson Wesley Longman Ltd.,England, 1998.
7. Jimmy W.Hinze, “Construction Safety ", Prentice Hall Inc., 1997.
8. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, “Construction Safety and Health Management ",Prentice Hall Inc., 2001

SCM105 (C) – DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES

3 hours lecture per week

Module 1

Introduction: Introduction to steel - Concrete composite construction - Theory of composite structures - Introduction to steel - Concrete - Steel sandwich construction.

Module 1I

Design of composite members

Behaviour of composite beams - Columns - Design of composite beams - Steel – Concrete composite columns - Design of composite trusses.

Module III

Design of connections: Types of connections - Design of connections in the composite structures – Shear connections - Design of connections in composite trusses.

Module 1V

Composite box grider bridges

Introduction - Behaviour of box girder bridges - Design concepts.

Module V

General: Case studies on steel - Concrete composite construction in buildings - Seismic behaviour of composite structures.

References:

1. Johnson R.P., Composite structures of steel and concrete, Blackwell Scientific Publications (Second Edition), UK, 1994.
2. Owens, G.W. and Knowels.P. Steel Designers manual (Fifth edition), Steel Concrete Institute (UK), Oxford Blackwell Scientific Publications, 1992.
3. Workshop on Steel Concrete Composite Structures, conducted at Anna University, 2000.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 105 (C)**

SCM105 (D) BUILDING SERVICES

3 hours lecture per week

Module 1

Water Supply : Water quality, Purification and treatment- water supply systems-distribution systems in small towns -types of pipes used- laying jointing, testing-testing for water tightness plumbing system for building-internal supply in buildings- municipal bye laws and regulations - Rain Water Harvesting residential and hospital building -

Module 1I

Sewage System-Sanitation in buildings- -pipe systems- storm water drainage from buildings -septic and sewage treatment plant - collection, conveyance and disposal of town refuse systems.

Module III

Vertical Transportation Systems-Types, systems and their choice -planning based on NBC and IS codes for stair, lift, ramp and escalator

Module 1V

Ventilation- Ventilation and its importance-natural and artificial systems-Window type and packaged air-conditioners-chilled water plant -fan coil systems-water piping -cooling load – air conditioning systems for different types of buildings -protection against fire to be caused by A.C. systems.

Module V

Safety Against fire in buildings- Safety-Ability of systems to protect fire-Preventive systems-Fire escape system design-Planning for pollution free construction environmental-Hazard free Construction execution safety regulations-NBC-planning considerations in buildings like Noncombustible materials, construction, staircases and A.C. systems-heat and smoke detectors-dry and wet risers-Automatic sprinklers - Capacity determination of OHT and UGT for firefighting needs.

References:

1. National Building Code(NBC) , IS Codes
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
3. William T. Mayer, Energy Economics and Build Design, McGraw-Hill Book, Company, 1983.
4. William H.Severns and Julian R.Fellows, “Air-conditioning and Refrigeration”, John Wiley and Sons,London, 1988.
5. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, The Architectural Press, London,

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM105 (E) – MODERN CONSTRUCTION MATERIALS, METHODS AND EQUIPMENTS

3 hours lecture per week

Module 1

Modern Construction Materials: Study of Advance Building Materials like, aluminium, glass, fabric, various types of finishes & treatments, Construction chemicals – sealants, grouts, mortars, admixtures and adhesives

Module 1I

Metals and Special Alloys of Steel - Water Jet Cut Stainless Steel, Mill Slab Steel, Tension Rods Assemblies And Cast Iron, Heat Treatment In Steels, Tendons

Module III

Polymers in Civil Engineering-Structural Plastics and Composites- Polymer Membranes-Coatings-Adhesives, Non - Weathering Materials-Flooring And Facade Materials- Glazed Brick, Photo Catalytic Cement, Acid Etched Copper And Composite Fiber

Module IV

Construction methods:

Prefabricated construction method for building, Tunnel Boring Methods, Soil Improvement technique - Mechanical, Thermal and Chemical.

Module V

Construction Equipments

Equipment for Excavating, Dredging, Trenching, Tunneling, Drilling, Blasting-Equipment for compaction-Erection Equipment- Types of pumps used in construction-Equipment for Dewatering and Grouting-Foundation and Pile Driving Equipment , Forklifts and related Equipment-Portable Material -Conveyors-Hauling Equipment

References:

1. Shan Somayaji, *" Civil Engineering Materials* ", 2nd Edititon , Prentice Hall Inc., 2001.
2. Mamlouk, M.S. and Zaniewski, J.P., " *Materials for Civil and Construction Engineers* ", Prentice Hall Inc., 1999.
3. Derucher, K.Korfiatis. G. and Ezeldin, S., " *Materials for Civil and Highway Engineers* ", Prentice Hall Inc., 1999. 4th Edition
4. Peurifoy, R.L., Ledbetter, W.B.and Schexnayder, C., "*Construction Planning, Equipment and Methods* ", 5th Edition, McGraw Hill, Singapore, 1995.
5. Sharma S.C. "*Construction Equipment and Management* ", Khanna Publishers New Delhi, 1988.
6. Deodhar, S.V. "*Construction Equipment and Job Planning* ", Khanna Publishers, New Delhi, 1988.
7. Dr. Mahesh Varma, "*Construction Equipment and its Planning and Application* ", Metro-politan Book Company, New Delhi-, 1983.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM106 (A) – DESIGN OF BRIDGES

3 hours lecture per week

Module 1

Introduction–classification and components of bridges– layout and planning– Structural forms of bridge decks – grillage analysis of slab decks, beam and slab decks, cellular decks.

Module II

Standard specifications for bridges – IRC loadings for road bridges – standards for railway bridges – design of RC slab, skew slab and box culverts.

ModuleIII

Design of T beam bridges – balanced cantilever bridges – rigid frame bridges – Arch bridges – bow string girder bridges.

Module 1V

Design of plate girder bridges – steel trussed bridges – Introduction to long span bridges: cable stayed bridges and suspension bridges –instability.

Module V

Forces on piers and abutments – Design of piers and abutments – types of wing walls –types of bearings – design of bearings

References:

1. E.C. Hambly, Bridge deck behaviour, Chapman and Hall, London
2. E.J. O'Brien and D.L. Keogh, Bridge deck analysis, E& FN Spon, New York
3. D.Johnson Victor, Essentials of bridge engineering, Oxford & IBH publishing Co.Ltd., New Delhi.
4. N.Krishna Raju, Design of bridges, Oxford & IBH publishing Co. Ltd., New Delhi.
5. Jaikrishna and O.P Jain, Plain and reinforced concrete-vol.II, Nem Chnand &Bros,Roorkee.
6. IRC: 5 -1970, Standard specifications and code of practice for road bridges, Sections I to V, Indian Roads Congress, New Delhi.
7. Indian railway standard code of practice for the design of steel or wrought iron bridge carrying rail, road or pedestrian traffic, Govt. of India, Ministry of Railways, 1962.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 106 (A)**

SCM106 (B) – INDUSTRIAL STRUCTURES

3 hours lecture per week

Module I

Planning and functional requirements: Classification of Industries and Industrial structures - planning for Layout Requirements regarding Lighting, Ventilation and Fire Safety - Protection against noise and vibration - Guidelines from Factories Act.

Module II

Industrial Buildings: Roofs for Industrial Buildings - Steel and RC - Folded Plates and Shell Roofs

Module III

Gantry Girders : Design of Corbels and Nibs - Machine Foundations.

Module IV

Power plant structures: Bunkers and Silos - Chimneys and Cooling Towers - High Pressure boilers and piping design – Nuclear containment structures.

Module V

Power Transmission structures: Cables - Transmission Line Towers - Substation Structures - Tower Foundations – Testing Towers.

References:

1. Procs. Of Advanced course on Industrial Structures, Structural Engineering Research Centre, 1982.
2. P.Srinivasulu and C.V.Vaidyanathan, Handbook of Machine Foundations, Tata McGraw Hill 1976.
3. S.N.Manohar, Tall Chimneys - Design and Construction, Tata McGraw Hill, 1985.
4. A.R.Santhakumar and S.S.Murthy, Transmission Line Structures, Tata McGraw Hill, 1992.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 106 (B)**

SCM106 (C) – FORENSIC ENGINEERING AND REHABILITATION OF STRUCTURES

3 hours lecture per week

Module I

Failure of Structures: Review of the construction theory – performance problems – responsibility and accountability – case studies – learning from failures – causes of distress in structural members – design and material deficiencies – over loading

Module II

Diagnosis and Assessment of Distress: Visual inspection – non destructive tests – ultrasonic pulse velocity method – rebound hammer technique – ASTM classifications – pullout tests – Bremor test – Windsor probe test – crack detection techniques – case studies – single and multistorey buildings – Fibreoptic method for prediction of structural weakness

Module III

Environmental Problems and Natural Hazards: Effect of corrosive, chemical and marine environment – pollution and carbonation problems –

Module IV

Durability of RCC structures : damage due to earthquakes and strengthening of buildings – provisions of BIS 1893 and 4326

Module V

Modern Techniques of Retrofitting: Structural first aid after a disaster – guniting, jacketing – use of chemicals in repair – application of polymers – ferrocement and fiber concretes as rehabilitation materials – strengthening by pre-stressing – case studies – bridges – water tanks – cooling towers – heritage buildings – high rise buildings.

References:

1. Dovkaminetzky, Design and Construction Failures, Galgotia Publication, NewDelhi,
2. Jacob Feld and Kenneth L Carper, Structural Failures, Wiley Europe.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 106 (C)**

SCM106 (D) ADVANCED CONSTRUCTION TECHNIQUES

3 hours lecture per week

Module I

Box Jacking -pipe jacking - Under water construction of diaphragm walls and Basement. Tunnelling techniques. piling techniques - driving well and caisson -sinking cofferdam –cable anchoring and grouting - driving diaphragm walls sheet piles

Module II

Laying operations for built up offshore system: shoring for deep - well points - dewatering and stand by plant equipment for underground open excavation - Trenchless Technology.

Module III

Techniques for concreting: Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections launching techniques –Slip form techniques- suspended form work - erection techniques of tall structures - launching techniques for heavy decks -in situ prestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures - erection of lattice towers and rigging of transmission line structures.

Module IV

Construction sequence and methods: Bow string bridges, cable stayed bridges. launching and pushing of box decks. Construction sequence and methods in domes and prestressed domes. Vacuum dewatering of concrete flooring - concrete paving technology- erection of articulated structures.

Module V

Construction techniques for foundation: Mud Jacking grout through slab foundation - micro piling for strengthening floor and shallow profile pipeline laying - protecting sheet plies, screw anchors - sub grade water proofing under pinning advanced technique: and sequence in demolition and dismantling.

References:

1. Robertwade Brown, “Practical foundation engineering hand book”, McGraw Hill Publications, 1995
2. Patrick Powers .J, “Construction Dewatering: New Methods and Applications”, John Wiley & Sons, 1992
3. Jerry Irvine, “Advanced Construction Techniques”, CA Rockers, 1984

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM107 (P) – CONSTRUCTION MANAGEMENT LAB

2 hours practical per week

A. **Communication skills:**

a. Audio visual and inter personal
b. Listening skills, show and tell skills and skills to manage difference.
c. Social skills
d. Skills in dealing with selected work groups: clients, construction workers, Government inspectors, trade unionists.
e. Skills in understanding the socio-political state of projects and groups

B. **Training in the following software & packages List of Experiments**

1. Quantity takeoff, Preparation and delivery of the bid or proposal of engineering construction project.
2. Scheduling of a small construction project using like MS project / primavera etc scheduling systems including reports and tracking.

List of Equipments / Software's / Tools Requirements
MS OFFICE, MS PROJECT/ PRIMAVERA, AutoCAD , PERT MASTER etc

Sessional work assessment
Laboratory class work and Record – 35 marks
Test – 15 marks
Total: Internal continuous assessment: 50 marks

University evaluation
Examination 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

SCM108 (P) – SEMINAR

2 hours practical per week

The student is expected to present a seminar in one of the current topics in the field of specialization and related areas. The student shall prepare a Paper and present a Seminar on any current topic related to the branch of specialization under the guidance of a staff member. The student will undertake a detailed study based on current published papers, journals, books on the chosen subject and submit seminar report at the end of the semester.

The student shall submit typed copy of the paper to the Department. Grades will be awarded on the basis of contents of the paper and the presentation. A common format in (.pdf format) shall be given for reports of Seminar and Project. All reports of Seminar and Project submitted by students shall be in this given format

Sessional work assessment

Presentation : 25

Report : 25

Total marks: 50

SCM 201 – ADVANCED PRESTRESSED CONCRETE DESIGN

3 Hours Lecture Per Week

Module I

Review on basic concept and principles of pre-stressed concrete systems, losses in prestress, Design and analysis of post and pre-tensioned members for flexure and shear;

Module II

Limit state design of statically determinate prestressed beams, limit state of collapse against flexure, shear, torsion. Limit state of serviceability – deflection and cracking, Anchorage zone stresses for post-tensioned members, Design of end block.

Module III

Statically indeterminate structures- Analysis and design-continuous beams and frames, choice of cable profile,- linear transformation and concordancy.

Module IV

Composite construction with precast prestressed concrete beams and cast in site
RC slab analysis and design of composite section,-effect of creep and differential shrinkage, flexural and shear strength of composite sections. Partial pre stressing – limit state design of partially pre-stressed concrete beams, crack and crack-width computations.

Module V

Analysis and design of pre-stressed concrete pipes, tanks and railway sleepers. Analysis of pre-stressed concrete spatial structures.

References:

1. Lin.T.Y., Design of Pre-stressed concrete structures, Asia Publishing House
2. Sinha., Prestressed Concrete, Tata McGraw Hill Co.
3. Mallick and Rangaswamy, Mechanics of Prestressed Cocrete Design, Khanna Publishers.
4. Guyon Y.,Introduction to prestressed concrete Vol I & II, Asia Publishing House
5. Krishna Raju. ,Prestressed Concrete, Tata Mcgraw Hill Co.
6. Pandi & Gupta, Prestressed Concrete, CBS
7. F.K.Hong & R.H.Evans., Reinforced and Prestressed Concrete, Tata Mcgraw Hill Co.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 201**

SCM 202 – FINITE ELEMENT ANALYSIS

3 hours lecture per week

Module I

Boundary Value Problem - Approximate Solution - Variational and Weighted Residual Methods - Ritz and Galerkin Formulations - Concepts of Piecewise Approximation and Finite Elements - Displacement and Shape Functions - Weak Formulation – Minimum Potential Energy - Generation of Stiffness

Module II

Matrix and Load Vector.Basic concepts - Different methods in Finite Element Methods - Steps involved in FEM. Interpolation Polynomials - Linear elements Shape function –

Module III

Element and Global matrices Two dimensional elements, triangular and rectangular elements - Local and Global Coordinate systems.

Module IV

The Isoparametric Formulation:- Introduction – An isoparametric bar element – Plane bilinear element – Numerical Integration – Quadratic plane elements — Triangular isoparametric elements

Module V

Finite element Solution of structural problems - Two dimensional elasticity problems – Plane Stress, Plain Strain and Axisymmetric Problems - Triangular and Quadrilateral Elements

References:

1. Cook, R.D., et al, Concepts and Applications of Finite Element Analysis, John Wiley.
2. Desai, C.S., Elementary Finite Element Method, Prentice Hall of India.
3. Chandrupatla, T.R., and Belegundu, A.D., Introduction to Finite Elements in Engineering, Prentice Hall of India.
4. Bathe, K.J., Finite Element Procedures in Engineering Analysis, Prentice Hall of India.
5. Gallaghar, R.H., Finite Element Analysis: Fundamentals, Prentice Hall Inc.
6. Rajasekaran, S., Finite Element Analysis in Engineering Design, Wheeler Pub.
7. Krishnamoorthy, C.S., Finite Element Analysis – Theory and Programming, Tata Mc Graw Hill.
8. Zienkiewicz, O.C., and Taylor, R.L., The Finite Element Method, Vol. I and II, Mc Graw Hill.
9. Bhatti, Asghar, *Fundamental Finite Element Analysis and Applications: with Mathematica and Matlab Computations*

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM 203 – CONSTRUCTION PERSONNEL MANAGEMENT

3 hours lecture per week

Module I

Manpower Planning: Manpower Planning, Organizing, Staffing, directing and Controlling-Personnel Principles-case studies.

Module II

Organization: Organization-Span of control-Organization charts-Staffing plan-Development and Operation of Human resources- Managerial Staffing-Recruitment-Selection-Placement, Training and Development.

Module III

Human Behaviour: Introduction to the Field Of Management-basic individual psychology-motivation-job design and performance management-Managing groups at work-self managing work teams-Inter group behaviour and conflict in organizations-Leadership-Behavioural aspects of decision-making; and communication for people management.

Module IV

Management and Development Methods :Compensation-Wages and Salary, Employee Benefits, employee appraisal and assessment- Employee services- Safety and Health-Discipline and Discharge-Special human resource problems,

Performance appraisal

Module V

Employee Hand Book and Personnel Manual-Job descriptions and organization structure and Human relations-Productivity of Human resources.

References:

1. Carleton Counter II and Jill Justice Coulter, *"The Complete Standard Hand Book of Construction*
   Personnel Management ", Prentice Hall, Inc., New Jersey, 1989.
2. Memoria, C.B., *" Personnel Management* ", Himalaya Publishing Co., 1992.
3. Josy.J Familaro, " *Handbook of Human Resources Administration* ", McGraw Hill International
   Edition, 1987.
4. Justin Gooderl Longenecker, Charles D. Pringle, " *Management "* C.E. Merrill, 1981.
5. R.S.Dwivedi, *" Human Relations and Organizational Behaviour* ", B.H - 1987.
6. Shamil Naoum, "*People and Organizational Management in Construction*",Thomas Telford,2001
7. Stephen Bach & Keith Sissons,"*A Comprehensive Guide to Theory and Practice"*, John Wiley &
   Sons,2000.
8. Andrew Dainty, Martin Loosemore, "Human Resource Management in Construction Projects", Routledge,2012.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM204 (A) – OFFSHORE STRUCTURES

3 hours lecture per week

Module I

Wave theories: Wave generation process, small and finite amplitude wave theories.

Module II

Forces of offshore structures: Wind forces, wave forces on vertical, inclined cylinders, structures - current forces and use of Morison equation.

Module III

Offshore soil and structure modelling: Different types of offshore structures, foundation modeling, structural modeling.

Module IV

Analysis of offshore structures: Static method of analysis, foundation analysis and dynamics of offshore structures.

Module V

Design of offshore structures: Design of platforms, helipads, Jacket tower and mooring cables and pipe lines.

References:

1. Chakrabarti, S.K. Hydrodynamics of Offshore Structures, Computational Mechanics Publications, 1987.
2. Thomas H. Dawson, Offshore Structural Engineering, Prentice Hall Inc Englewood Cliffs, N.J. 1983
3. API, Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms, American Petroleum Institute Publication, RP2A, Dalls, Tex.
4. Wiegel, R.L., Oceanographical Engineering, Prentice Hall Inc, Englewood Cliffs, N.J. 1964.
5. Brebia, C.A.Walker, S., Dynamic Analysis of Offshore Structures, New-nes Butterworths, U.K. 1979.
6. Reddy, D.V. and Arockiasamy, M., Offshore Structures, Vol.1, Krieger PublishingCompany, Malabar, Florida, 1991.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 204 (A)**

SCM 204 (B) – CONSTRUCTION ECONOMICS AND FINANCE MANAGEMENT

3 hours lecture per week

Module I

Economics- Role of Civil Engineering in Industrial Development-Advances in Civil Engineering and engineering economics- Support matters of Economy as related top Engineering-Market demand and supply-Choice of technology- Quality control and Quality Production-Audit in economic law of returns governing production

Module II

Construction of economics- Construction development in housing, Transport and other infrastructures-Economics of Ecology, environment, energy resources-Local material selection- Form and Functional designs-Construction workers-Urban problems-Poverty-Migration- Unemployment-pollution.

Module III

Financing- The need for financial management-Types of financing-Short term borrowing-Long term borrowing-Leasing - Equity financing-Internal generation of funds-External commercial borrowings-Assistance from Government Budgeting support and International finance corporations-

Module IV

Analysis of financial statements-Balance sheet-Profit and loss account-Cash flow and fund flow analysis-Ratio analysis-Investment and financing decision-Financial control-Job control and Centralized management

Module V

Accounting Method- General Overview-Cash basis of an accounting-Accrual basis of accounting- Percentage completion method- Completed contract method-Accounting for Tax reporting purposes and financial reporting purposes. Lending to Contractors- Loans to Contractors-Interim Construction Financing-Security and Risk aspects

References:

1. Prasanna Chandra, “Projects - Planning Analysis Selection Implementation & Review ", Fourth Edition, Tata McGraw Hill Publishing Co., Ltd, New Delhi, 1995.
2. Kwaku A., Tenah and Jose M. Guevera, “Fundamental of Construction Management and Organization ", Prentice Hall of India, 1995 .
3. Halpin, D.W., " Financial and cost concepts for construction Management ", John Wiley and Sons, New York, 1985.
4. Madura J. and Veit, E.T., “Introduction to Financial Management ", WestPublishing Co., 1988.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM204 (C) – RESEARCH METHODOLOGY

3 hours lecture per week

Module I

Introduction: Meaning of research – Objectives of research – Motivation in research – Types of research – Research approaches – Significance of research – Research methods vs Methodology – Criteria of good research.

Module II

Defining Research Problem: What is a research problem – Selecting the problem – Necessity of defining the problem – Literature review – Importance of literature review in defining a problem – Critical literature review – Identifying gap areas from literature review

Module III

Research design: Meaning of research design – Need– Features of good design – Important concepts relating to research design – Different types – Developing a research plan

Module IV

Method of data collection: Collection of data- observation method – Interview method – Questionnaire method – Processing and analysis of data – Processing options – Types of analysis – Interpretation of results

Module V

Report writing: Types of report – Research Report, Research proposal ,Technical paper – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Simple exercises – Oral presentation – Planning – Preparation – Practice – Making presentation – Answering questions - Use of visual aids – Quality & Proper usage – Importance of effective communication – Illustration.

References:

1. Coley S M and Scheinberg C A, 1990, "Proposal Writing", Newbury Sage Publications.
2. Leedy P D, "Practical Research : Planning and Design", 4th Edition, N W MacMillan Publishing Co.
3. Day R A, "How to Write and Publish a Scientific Paper", Cambridge UniversityPress,1989.
4. Uma Sekaran, Research Methods for Business, John Wiley and Sons Inc., New York,2000.
5. C.R. Kothari, Research Methodology, Wishva Prakashan, New Delhi, 2000

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to SPE 206(B)/CSP206(C)/ MCS204 (A) /MTE 204(A)**

SCM 204 (D) – DESIGN OF TALL BUILDINGS

3 hours lecture per week

Module I

Design criteria: Design philosophy, Loading, Sequential loading, materials - high performance Concrete - Fiber reinforced Concrete - Light weight Concrete - Design mixes.

Module II

Loading and movement: Gravity Loading- Dead and live load, methods of live load reduction, Impact, gravity loading, construction load. Wind loading: Static and dynamic approach, Analytical and wind tunnel experimental method.

Earthquake loading : Equivalent lateral force, modal analysis, combinations of loading working stress design, Limit state design, plastic design.

Module III

Behaviour of various structural systems: Factors affecting growth, Height and Structural form. High rise behaviour, Rigid frames, braced frames, In filled frames, shear walls, coupled shear walls, wall-frames, tubular, cores, futrigger - braced and hybrid mega system.

Module IV

Analysis and design: Modelling for approximate analysis, Accurate analysis and reduction techniques, Analysis of building as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist, computerised general three dimensional analysis.

Structural elements- Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow. Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance.

Module V

Stability of tall buildings: Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P-Delta analysis,

Translational, Torsional instability, out of plum effects, stiffness of member in stability,effect of foundation rotation.

References:

1. Taranath B.S., Structural Analysis and Design of Tall Building, McGraw Hill, 1988.
2. Dr. Y.P.Gupta, Editor. Proceedings National Seminar on High Rise Structures - Designand Construction practices for middle level cities Nov. 14 -16, 1995, New Age InternationalLimited, Publishers, Madras -20.
3. Wilf gang Schuller, High Rise Building Structures, John Wiley and Sons, 1977.
4. Bryan stafford Smith, Alexcoull, Tall Building Structures , Analysis and Design, John Wiley and Sons, Inc., 1991.
5. T.Y.Lin, D.Stotes Burry, Structural Concepts and system for Architects and Engineers. John Wiley, 1988.
6. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1986.

***Common to CAS 204 (D)**

SCM205 (A) CONSTRUCTION PROJECT MANAGEMENT

3 hours lecture per week

Module I

Project Management : Trends in Modern Management - Strategic Planning and Project Programming - Effects of Project Risks on Organization - Organization of Project Participants - Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team - Interpersonal Behaviour in Project Organizations - Perceptions of Owners and Contractors

Module II

Quality and Safety Concerns in Construction: Organizing for Quality and Safety – Work and Material Specifications - Total Quality Control - Quality Control by Statistical Methods - Statistical Quality Control with Sampling by Attributes - Statistical Quality Control with Sampling by Variables - Safety

Module III

Network techniques: bar charts – Critical path method – Programme evaluation and review technique – Time estimates- uncertainties of time - time computations – monitoring of projects – updating - Crashing and time-cost trade off PERT and CPM-Software Development - Use of Management Software

Optimization techniques:- Resource allocation – Heuristic approach – Linear programming – Graphical and Simplex methods – Optimality Analysis – Material transportation and Work assignment problems

Module IV

Materials management: planning and budgeting – inventory control – management of surplus materials - equipment control

Process control:- work study- crew size – job layout- process operation.

The Cost Control Problem - The Project Budget - Forecasting for Activity Cost Control - Financial Accounting Systems and Cost Accounts - Control of Project Cash Flows - Schedule Control - Schedule and Budget Updates - Relating Cost and Schedule Information.

Module V

Costs Associated with Constructed Facilities: Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data – Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Allocation of Construction Costs Over Time - Computer Aided Cost Estimation - Estimation of Operating Costs.

References:

1. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Feigenbaum., L., "Construction Scheduling With Primavera Project Planner", Prentice Hall Inc., 1999.
3. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
4. Choudhury, S, Project Management, Tata McGraw-Hill Publishing Company, New Delhi, 1988.
5. A.K Datta, Materials Management , Prentice Hall , India.
6. Arnold, J.R Tony, Introduction to Materials Management, Prentice Hall, India

***Common to CAS 205 (A)**

SCM 205 (B) – STRUCTURAL HEALTH MONITORING

3 hours lecture per week

Module I

Review of Structural Modelling and Finite Element Models: Modelling for damage and collapse behaviour of structures, finite element modelling, theoretical prediction of structural failures.

Module II

Review of Signals, Systems and Data Acquisition Systems: Frequency and time domain representation of systems, Fourier/Laplace transforms, modelling from frequency response measurements, D/A and A/D converters, programming methods for data acquisition systems.

Module III

Sensors for Health Monitoring Systems: Acoustic emission sensors, ultrasonic sensors, piezoceramic sensors and actuators, fibre optic sensors and laser shearography techniques, imaging techniques.

Health Monitoring/Diagnostic Techniques: Vibration signature analysis, modal analysis, neural network-based classification techniques.

Module IV

Integrated Health Monitoring Systems: Intelligent Health Monitoring Techniques, Neural network classification techniques, extraction of features from measurements, training and simulation techniques, connectionist algorithms for anomaly detection, multiple damage detection, and case studies.

Information Technology for Health Monitoring: Information gathering, signal analysis, information storage, archival, retrieval, security; wireless communication, telemetry, real time remote monitoring, network protocols, data analysis and interpretation.

Module V

Project Based Health Monitoring Techniques: Health monitoring techniques based on case studies, practical aspects of testing large bridges for structural assessment, optimal placement of sensors, structural integrity of aging multi storey buildings, condition monitoring of other types of structures.

References:

1. Philip, W., Industrial sensors and applications for condition monitoring, MEP, 1994.
2. Armer, G.S.T (Editor), Monitoring and assessment of structures, Spon, London, 2001.
3. Wu, Z.S. (Editor), Structured health monitoring and intelligent infrastructure, Volumes 1 and 2, Balkema, 2003.
4. Harris, C.M., Shock vibration handbook, McGraw-Hill, 2000.
5. Rao, J.S., Vibratory condition monitoring of machines, Narosa Publishing House, India,2000.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 205 (B)**

SCM 205 (C) – PAVEMENT CONSTRUCTION PRACTICE

3 hours lecture per week

Module I

Construction Practice: Base courses – Bituminous macadam – Dense bituminous macadam – bituminous concrete – Semi Dense Bituminous Concrete – Construction methods – Marshall method of mix design for dense bituminous courses – Surface courses – Surface dressing, Premix carpet, Mix seal surfacing – Mastic asphalt - Construction methods – Quality Control measures – Sampling and analysis of bituminous binders and mixtures.

Module II

Machineries: Road making machineries – Road formation, bituminous constructions, road surface evaluation.

Module III

Methods to improve bitumen quality: Rheological and chemical additives – Polymer modified bitumen – Super pave concepts – Recycling of bituminous courses.

Module IV

Rigid Pavements: Introduction – Construction Practices – Concrete Mix Design – Formwork – Dewatering – Joints – Maintenance.

Module V

Failure of Pavements: Evaluation of Pavement Surface Condition - Effect of Environment and Traffic on Structural Stability, Pavement Deterioration - Evaluation of Pavement Structural Condition by Non-Destructive and Destructive Methods - Pavement Overlays & their design

References:

1. Yoder and Witczak, 'Principles of Pavement Design', John Wiley,1975
2. Huang Yang H.,Pavement Analysis and Design, Pearson Education India, 2008
3. Nai C. Yang, 'Design of Functional Pavements', McGraw Hill ,1972
4. IRC: 37 - 2001, 'Guidelines for the Design of Flexible Pavements'
5. IRC: 58 - 2002, 'Guidelines for the Design of Rigid Pavements'
6. Hass and Hudson, 'Pavement Management System', McGraw Hill Book Co. ,1978
7. Mix Design Methods for Asphalt Concrete and other Hot mix types MS 2, Sixth Edition,The Asphalt Institute, 1997
8. IRC 81-1981- 'Tentative Guidelines for Strengthening of Flexible Pavements by Benklman Beam Deflections Techniques'.
9. Edwin J.Barth, Asphalt Science and Technology, Gordon and Breach Science Publishers, NewYork, 1984

Question Pattern:

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SCM 205 (D) – ADVANCED DESIGN OF FOUNDATION

3 hours lecture per week

Module I

Soil - Structure Interaction: Introduction to Soil - Structure interaction problems - Contact pressure distribution – factors influencing Contact pressure distribution beneath rigid and flexible footings –concentrically and eccentrically loaded cases – contact pressure distribution beneath rafts - Modulus of sub grade reaction – Determination of modulus of sub grade reaction – Factors influencing modulus of sub grade reaction.

Module II

Pile Foundation: Introduction – Estimation of pile capacity by static and dynamic formulae – Wave equation method of analysis of pile resistance – Load - Transfer method of estimating pile capacity – Settlement of single pile – Elastic methods. Laterally loaded piles – Modulus of sub grade reaction method – ultimate lateral resistance of piles. Pile Groups – Consideration regarding spacing – Efficiency of pile groups – Stresses on underlying soil strata – Approximate analysis of pile groups –Settlement of pile groups -Pile caps –Pile load tests – Negative skin friction.

Module III

Introduction to Machine Foundations: Introduction - nature of dynamic loads – stress conditions on soil elements under earthquake loading - dynamic loads imposed by simple crank mechanism - type of machine foundations - special considerations for design of machine foundations – Criteria for a satisfactory machine foundation – permissible amplitude of vibration for different type of machines –

Module IV

Methods of analysis of machine foundations: methods based on linear elastic weightless springs - methods based on linear theory of elasticity (elastic half space theory) - degrees of freedom of a block foundation - definition of soil spring constants - nature of damping - geometric and internal damping - determination of soil constants - methods of determination of soil constants in laboratory and field based on IS code provisions.

Module V

Design of Machine Foundations: Vertical, sliding, rocking and yawing vibrations of a block foundation - simultaneous rocking, sliding and vertical vibrations of a block foundation - foundation of reciprocating machines - design criteria - calculation of induced forces and moments - multi-cylinder engines - numerical example (IS code method) Foundations subjected to impact loads - design criteria - analysis of vertical vibrations - computation of dynamic forces - design of hammer foundations (IS code method) - vibration isolation - active and passive isolation - transmissibility - methods of isolation in machine foundations.

Note: Use of approved charts & tables are permitted in the examinations.

References:

1. Lambe and Whitman, Soil Mechanics, Wiley Eastern., 1976
2. Das B.M., Advanced Soil Mechanics, Mc. Graw-Hill, NY, 1985
3. Winterkorn H.F. and Fang H.Y. Ed., Foundation Engineering Hand Book, Van-Nostrand Reinhold, 1975
4. Bowles J.E., Foundation Analysis and Design (4th Ed.), Mc.Graw –Hill, NY, 1996
5. Poulose H.G. and Davis E.H., Pile foundation Analysis and Design, John-Wiley & Sons, NY, 1980.
6. Bowles J.E., Analytical and Computer Methods in Engineering Mc.Graw-Hill,NY
7. Sreenivasalu & Varadarajan, Handbook of Machine Foundations, Tata McGraw Hill
8. IS 2974 - Part I and II, Design Considerations for Machine Foundations
9. IS 5249: Method of Test for Determination of Dynamic Properties of Soils.

***Common to CAS/ 205 (D)**

SCM 205 (E) – Quantitative Techniques in Management

3 hours lecture per week

Module I

Introduction to Operations research: Linear programming-Graphical and Simplex Methods, Duality and Post- Optimality Analysis-Transportation and Assignment Problems.

Module II

Inventory control: EOQ, Quantity Discounts, Safety Stock-Replacement Theory-PERT and CPM Simulation Models-Quality Control.

Module III

Working Capital Management: Compound Interest and Present Value methods-Discounted Cash Flow Techniques-Capital Budgeting.

Module IV

Decision Theory: Decision Rules-Decision making under conditions of certainty, risk and uncertainty-Decision trees-Utility

Module V

Theory Cost concepts: Break-even -Analysis-Pricing techniques- Game Theory application.

References:

1. Vohra, N.D. "Quantitative Techniques in Management ", Tata McGraw Hill Co., Ltd , New Delhi, 1990.
2. Seehroeder, R.G., "Operations Management ", McGraw Hill, USA, 1982.
3. Levin, R.I, Rubin, D.S., and Stinsonm J., "Quantitative Approaches to Management ", McGraw Hill Book Co., 1988.
4. Frank Harrison, E., "The Managerial Decision Making Process ",Houghton Mifflin, 1995.
5. RL Varshney and KL Maheshwari , "Managerial economics", Sultan Chand, 1990.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM206 (A) – STABILITY OF STRUCTURES

3 hours lecture per week

Module I

Fundamental Concepts: Concept of stability, instability and bifurcation, different forms of structural instability, analytical approaches of stability analysis.

Module II

Discrete Systems: Law of minimum potential energy and its implication, stability of single and two-degrees of freedom systems, large deflection analysis, effect of small imperfections.

Module III

Columns: Governing differential equation, cases of standard boundary conditions, effective length concept, elastically restrained column, column with geometric imperfections, eccentrically loaded column, large deflection analysis.

Beam-Columns & Frames- Standard cases of beam columns, continuous columns and beam columns, single-storey frames, frames with sway and no-sway, buckling analysis using stiffness method, Haarman's method.

Module IV

Thin Rectangular Plates: Governing differential equation and boundary conditions, plate with all edges simply supported, plates with other boundary conditions, buckling under in-plane shear, post buckling analysis.

Module V

Lateral-Torsional Buckling: Torsional buckling, torsional-flexural buckling, lateral buckling of beams with symmetric Isection

References:

1. Timoshenko.S.P & Gere.J.M , Theory of elastic stability Mc. Graw Hill Book Co.
2. Brush & Almorth, Buckling of bars, plates and shells. Mc. Graw Hill Book Co.
3. Aswin Kumar, Stability theory of structures Mc. Graw Hill Book Co.
4. Chajes,A., principles of structural stability theory, Prentice Hall Inc., Englewood Cliffs, New Jersy.
5. Iyengar, N.G.R., structural Stability of Columns and Plates, East West Press.
6. Kumar,a., Stability of structures, Allied Publishers Limited. London. 2001
7. Chen, W.F. & Lui, E.M.: Structural Stability, Elsevier (1987).

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 206 (A)**

SCM 206 (B) – EARTHQUAKE ANALYSIS AND DESIGN OF STRUCTURES

3 hours lecture per week

Module I

Introduction to engineering seismology: Seismic waves primary and secondary waves – Raleigh wave - Love wave – Magnitude of earthquake – Intensity

Module II

Concept of Seismic design: Approach to earthquake resistant design – General principles of a seismic design – Review of IS 1893:2002 – Building equivalent static analysis – Vertical distribution of seismic forces and horizontal shears

Module III

Dynamic analysis: Design spectrums – Seismic weights – Modal combination – Load combinations and permissible stresses – Guide lines for earthquake resistant design – Ductile detailing for seismic design

Module IV

Special structures: Design of water tanks – Elevated tower supported tanks- Hydrodynamic pressure in tanks – examples Design of towers – Stack like structures – Chimneys –

Module V

Design principles of retaining walls: Concept of design of bridges – Design of bearings

References:

1. IS: 1893-2002, Indian Standard Criteria for Earthquake Resistant Design of Structures, Part I, General Provisions, BIS, New Delhi, p.39
2. IS:1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, BIS, New Delhi, p.77
3. IS: 4326-1993, Indian Standard Code of practice for Earthquake Resistant Design and Construction of Buildings, BIS, New Delhi, 1993
4. SP:22-1982, Explanatory Hand Book on Codes of Earthquake Engineering, BIS, New Delhi, 1982.
5. IS:13920-1993, Indian Standard Ductile Detailing of RCC Structures subjected to seismic forces – Code of practice, 1993, p.16
6. Lecture notes prepared by Department of Earthquake Engineering, IIT Roorkee, 2002
7. Short term course notes on Earthquake Resistant Design , by Sudhir K Jain & CVR Murthy, I.I.T Kanpur

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

***Common to CAS 206 (B)**

SCM 206 (C) – DISASTER MANAGEMENT

3 hours lecture per week

Module I

Objectives: Overview of Disaster Management – Distinguishing between an emergency and a disaster situation.

Module II

Disaster Management Cycle: Phase I: Mitigation, and strategies; hazard identification and vulnerability analysis. Disaster Mitigation and Infrastructure, impact of disasters on development programmes, vulnerabilities caused by development, developing a draft country level disaster and development policy

Module III

Phase II: Preparedness, Disaster Risk Reduction(DRR),Emergency Operation Plan (EOP), Mainstreaming Child Protection and Gender in Emergency Planning, Assessment, Disaster Management Cycle – Phases III and IV: Response and recovery, Response aims, Response Activities, Modern and traditional responses to disasters, Disaster Recovery, and Plan , Disasters as opportunities for development initiatives

Module IV

Disaster Community: Community-based Initiatives in Disaster management need for Community-Based Approach, categories of involved organizations: Government, Non-government organizations (NGOs), Regional and International Organizations, Panchayaths, Community Workers, National and Local Disaster Managers, Policy Makers, Grass-Roots Workers, Methods of Dissemination of Information, Community-Based Action Plan, advantages/Disadvantages Of The Community-Based Approach

Module V

Disaster Planning: Disaster Response Personnel and duties, Community Mitigation Goals, Pre- Disaster Mitigation Plan, Personnel Training, Volunteer Assistance, School-based Programmes, Hazardous Materials, Ways of storing and safely handling hazardous materials, Coping with Exposure to Hazardous Materials

References:

1. Ayaz,. Disaster Management: Through the New Millennium. , Anmol Publications. (2009)
2. Dave, P. K.. Emergency Medical Services and Disaster Management: A Holistic Approach. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd., 2009
3. Narayan, B. ,Disaster Management, New Delhi: A.P.H. Publishing Corporation ,2009
4. Kumar, N.. Disaster Management. New Delhi: Alfa Publications. ,2009
5. Ghosh, G. K., Disaster Management. New Delhi: A.P.H Publishing Corporation. ,2008
6. Goel, S. L., Disaster Management. New Delhi: Deep & Deep Publication Pvt. Ltd. ,2008
7. Singh, R. B. ,Disaster Management. New Delhi: Rawat Publications., 2008.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM 206 (D) – SYSTEM INTEGRATION IN CONSTRUCTION

3 hours lecture per week

Module I

Structural system: Systems for enclosing buildings, Functional aesthetic system, Materials selection and Specification. Environmental-Qualities of enclosure necessary to maintain a specified level of interior environmental quality-Weather Resistance-Thermal infiltration- Acoustic control-Transmission reduction-Air quality-Illumination-Relevant Systems integration with structural systems

Module II

Mechanical & Communication systems: Elevators, Escalators, Conveyors, Security Systems In High Rise Building Complexes, Public Buildings, Parking Lots And Complex Structures Like Hospitals, Public Transport Terminals . Design parameters for Determining the Loads & Requirement, Operation and Maintenance of These Services.

Module III

MaintenanceL: Component Longevity in terms of operation performance and resistance to deleterious forces-Planning systems for least maintenance-Feasibility for replacement of damaged components -equal life elemental design- Maintenance free exposed and finished surfaces.

Module IV

Intelligent Buildings: Concept-Purpose-Control Technologies- Automation Of All The Services And Equipment –

Module V

Building Management Systems (BMS): Commercial, Industrial, Institutional and Domestic Buildings-Energy Management Systems and Building controls

References:

1. S. Don Swenson., HVAC Heating, Ventilating, and Air Conditioning ,2004
2. William T.Mayer, " Energy Economics and Build Design ", McGraw Hill Book Co., 1983.
3. Peter R.Smith and Warren G.Jullian, " Building services ", Applied Science Publishers Ltd.,London.1976
4. A.J.Elder and Martiz Vinden Barg, " Handbook of Buildings and Enclosure ", Mc Graw-Hill Book Co., 1983.
5. David Fletcher, Intelligent Buildings: Design Management and Operation, The Institution of Structural Engineers,2004
6. Derek Clements-Croome, Intelligent Buildings: Design, Management And Operation, Thomas Telford, 2004

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

SCM207 (P) – STRUCTURAL ENGINEERING DESIGN STUDIO

2 hours practical per week

Concrete Structures:
Analysis, design and detailing of solid slabs in a typical floor for a residential building-

Analysis, design and detailing of beams in a typical intermediate floor of a multi-storey building-

Analysis, design and detailing of circular ring beam supporting an overhead water tank - Analysis, design and detailing of a ribbed slab floor system- Generation of interaction curves for RC rectangular columns-

Design of slender columns subject to biaxial bending-Analysis, design and detailing of shear walls- considering shear wallframe interaction in a tall RC structure subject to wind loading-

Application of strut-andtie method to design and detail various RC elements and junctions.

Metal Structures:
Design of Steel Industrial Building - Design of Steel Multi-storey Building - Design of Material Handling system - Design of steel Bridge - Design of pre-engineered buildings Design of storage structures - Design of towers

References
1. Arthur. H. Nilson, David Darwin and Charles W Dolan, Design of Concrete Structures, Tata McGraw Hill, 2004
2. Park,R and Paulay T, Reinforced Concrete Structures, John Wiley & Sons, New York
3. Macleod, I.A, Shear Wall Frame Interaction. A design aid with commentary Portland Cement Association.
4. IS 456 :2000, Indian Standard for Plain and Reinforced Concrete- Code of Practice, BIS, New Delhi
5. IS 13920 : 1993, Indian Standard for Ductile Detailing of Reinforced Concrete Structures subjected toSeismic Forces - Code of Practice, BIS, New Delhi
6. Gaylord ., Design of steel structures, McGraw Hill, New York.
7. Dayaratnam, P., Design of steel structures, Wheeler Pub

Sessional work assessment
Laboratory Class work and Record, – 35 marks
Test – 15 marks
Total: Internal continuous assessment: 50 marks

University evaluation
Examination 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

SCM208 (P) – TERM PAPER

2 hours practical per week

The student is expected to present a report on the literature survey conducted as a prior requirement for the project to be taken up in the third and fourth semesters. Head of department can combine TP hours of many weeks and allot a maximum of 4 weeks exclusively for it. Students should execute the project work using the facilities of the institute. However, external projects can be taken up, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work. Project evaluation committee should study the feasibility of each project work before giving consent. An overview on the project work should be introduced before the closure of first semester. A paper should be prepared based on the project results and is to published in refereed Conferences/Journals.

Sessional work assessment

Presentation: 25

Report: 25

Total marks: 50

Note:

The student may undergo an industrial training of a maximum of 4 weeks duration in an industry / company approved by the institution in the stream of structural or construction management during the closure of semester two and beginning of semester three. At the end of the training he / she have to submit a report on the work being carried out.

SCM301 (P) – THESIS PRELIMINARY

This shall comprise of two seminars and submission of an interim thesis report. This report shall be evaluated by the evaluation committee. The fourth semester Thesis-Final shall be an extension of this work in the same area. The first seminar would highlight the topic, objectives, methodology and expected results. The first seminar shall be conducted in the first half of this semester. The second seminar is presentation of the interim thesis report of the work completed and scope of the work which is to be accomplished in the fourth semester.

The student is expected to present a report on the literature survey conducted as a prior requirement for the project to be taken up in the third and fourth semesters at the beginning of the semester. Students should execute the project work using the facilities of the institute. Prior sanction should be obtained from the head of department before taking up external project work. Project evaluation committee should study the feasibility of each project work before giving consent.

Weightages for the 8 credits allotted for the Thesis-Preliminary

Evaluation of the Thesis-Preliminary work: by the guide - 50% (200 Marks)

Evaluation of the Thesis–Preliminary work: by the Evaluation Committee-50% (200 Marks)

SCM401 (P) – THESIS

Towards the end of the semester there shall be a pre submission seminar to assess the quality and quantum of the work by the evaluation committee. This shall consist of a brief presentation of Third semester interim thesis report and the work done during the fourth semester. At least one technical paper is to be prepared for possible publication in journals / conferences. The final evaluation of the thesis shall be an external evaluation. The 12 credits allotted for the Thesis-Final may be proportionally distributed between external and internal evaluation as follows.

Weightages for the 12 credits allotted for the Thesis

Internal Evaluation of the Thesis work: by the guide - (200 Marks)

Internal Evaluation of the Thesis work: by the Evaluation Committee - (200 Marks)

Final Evaluation of the Thesis work by the Internal and External Examiners:-

(Evaluation of Thesis + Viva Voce) - (100+100 Marks)

Reg. No: ……

Name : ……

First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SECM)

SCM 104: CONSTRUCTION MANAGEMENT

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1 Explain Contributions of pioneers in scientific Management. **20**

2 a) Explain concept of balance, effectiveness and efficiency criteria's in MIS **10**

b) Explain Management functions and decision making **10**

3 a) Explain working capital management **10**

b) Explain capital budgeting and benefits of cost analysis **10**

4 a) Explain three time estimate **10**

b) Calculate the expected time of the following **10**

Most Optimistic	**Most Likely**	**Most Pessimistic**
2	4	6
6	6	6
6	12	24
2	5	8
11	14	23

8	10	12
3	6	9
9	15	27
4	10	16

5 a) Explain appraisal through financial statements **10**

b) Explain methodology and tools in MIS **10**

6 a) Explain simulation, along with advantages and disadvantages **10**

b) Explain basic steps in PERT and CPM **10**

7 a) Explain incremental analysis **10**

b) Explain discounted cash flow **10**

Reg. No: ……

Name : ……

First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 104: CONSTRUCTION MANAGEMENT

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1 a) Explain basic principles of management **5**

b) What is an organization. Explain different types of organization **15**

2 a) M/S Lalwani and Co has Rs 2000000 to invest. The following proposals are under consideration. The cost of capital for the company is estimated to be 15%

Project	Initial outlay (Rs)	Annual cash flow (Rs)	Life of project (yrs)
A	100000	25000	10
B	70000	20000	8
C	30000	6000	20
D	50000	15000	10
E	50000	12000	20

Rank the above project on the basis of (1) Pay back method (2) NPV method (3) Profitability index method. Present value of annuity of Re 1 received in steady stream discounted at the rate of 15% 8 yrs = 4.6586 10yrs = 5.1790 20yrs = 6.3345 **10**

b) What is ratio analysis? Explain the principle, advantages and limitations of ratio analysis. **10**

3 a) Derive the expression for model of replacement of items that decorate with time considering the time value of money **10**

b) The cost of a new ink jet printer costs Rs 5500.The running cost of 'n'th Year is given by Rn = 550(n-1); n= 1.2.3..... If the discount rate is o.4 per year, determine how many years it will be economical to replace the printer by a new one. **10**

4 a) A project consists of nine activities whose time estimates (in weeks) are given below. **10**

Activity	**Preceding activities**	**Most Optimistic**	**Most Likely**	**Most Pessimistic**
A	-	2	4	6
B	-	6	6	6
C	-	6	12	24
D	A	2	5	8
E	A	11	14	23
F	B,D	8	10	12
G	B,D	3	6	9
H	C,F	9	15	27
I	E	4	10	16

i. Show the PERT network for the project.
ii. Identify the critical activities.
iii. What is the expected project completion time.

b) Explain the Application areas of PERT and CPN techniques **10**

5 a) Explain time value of money **10**

b) Explain construction accounting. **10**

6 a) Explain decision making and functions of management **20**

7 a) Explain modifications in MIS **10**

b) Explain cash flow analysis **10**

Reg. No: ……

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First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SECM)

SCM 104: CONSTRUCTION MANAGEMENT

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1 Explain Contributions of pioneers in scientific Management. **20**

2 a) A firm is considering to purchase a machine for metal sheet perforation. Two machines, A and B, are available for the purpose in the market. Each of these machines costs Rs 2000000 as under

Year	Machine A (Rs)	Machine B(Rs)
1	450000	150000
2	600000	450000
3	750000	600000
4	450000	900000
5	300000	600000

Indicate which of the machines would be chosen on the basis of pay back method of investment proposals. **10**

b) What is MIS. Explain the objectives, components and role of MIS **10**

3 a) The maintenance cost and resale value per year of a machine, whose purchase price is Rs 7000 is given below **10**

Year	1	2	3	4	5	6	7	8
Maintenance cost	900	1200	1600	2100	2800	3700	4700	5900
Resale value	4000	2000	1200	600	500	400	400	400

b) Explain break even analysis **10**

4 a) A cabinet manufacturing company is planning to introduce a new model of cabinets which requires the following tasks. **10**

Task	Description	Task Time (minutes)
A	Prepare the wheels	10
B	Mount the wheels	5
C	Assemble the sides	15
D	Attach the top	11
E	Attach the base	10
F	Insert the brackets	5
G	Insert the shelves	5
H	Attach the doors	10
I	Attach the back panel	10
J	Paint the unit	15

The wheels are mounted after they are prepared. The base cannot be attached until the sides are assembled and the wheels are mounted. The top cannot be attached nor the brackets inserted until the sides are assembled. The shelves are inserted after the brackets are installed. The back panel is attached after the base and top are attached. The doors are attached after the shelves are inserted and the top and base are attached. The unit is painted after the back panel and doors are attached.

i. Identify the immediate predecessor of each task and draw the network.

ii. Find the critical path and list the critical activities.

b) What are the different categories of WBS **10**

5 a) Explain PERT and CPM **7**

b) Explain rules for obtaining Net work diagrams. **6**

c) Explain Fulkerson's Rule for numbering the event with the help of a diagram. **7**

6 a) Explain computer capabilities in management **10**

b) What is data base. Explain the components **10**

7 a) Explain methodology and tools for evaluation **10**

b) Explain long term planning **10**

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First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 105(B) : QUALITY CONTROL AND PROJECT SAFETY MANAGEMENT

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1	a)	What are the benefits of TQM programme	**10**
	b)	What is ISO 14000? Explain the significance	**10**
2	a)	Write about TQC methodology	**08**
	b)	Explain Quality Management Systems ?	**6**
	c)	Briefly explain the cost implication in QC programme	**6**
3	a)	What is meant by safety programme	**5**
	b)	Briefly explain the elements of effective softy programme	**8**
	c)	Explain the safety incentive	**7**
4	a)	How will you analysis Failure Mode and also explain Critical, Major Failure Aspects	**10**
	b)	In which way influence of Drawings in standardization of quality in Construction industry	**10**
5	a)	Briefly explain the Safety Policy, Safety Record Keeping, Safety Culture and Safe workers (4x 5 marks)	**20**

6	a)	Explain Management Practices for implementing safety in construction organization	**10**
	b)	Briefly explain the Problem Areas In Construction Safety	**10**
7	a)	Briefly explain the Detailing And Specification Based On Codal Provisions for ensuring quality	**10**
	b)	Briefly explain the Factors Influencing Construction Quality	**10**

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First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 105(B) : QUALITY CONTROL AND PROJECT SAFETY MANAGEMENT

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1	a)	Explain the significance of Inspection and Control in construction industry	**8**
	b)	What is meant by quality control	**7**
	c)	Explain the Taguchi's concept of quality	**5**
2	a)	Explain the codes and standards in connection with QM	**08**
	b)	Briefly explain the inspection procedure in process and products for ensuring quality	**12**
3	a)	What is the role of regularity agent in quality control	**05**
	b)	Explain the following in connection with quality management: Time of Completion, Statistical Tolerance, Consumer satisfaction, Documents, Contract	**15**
4	a)	What is meant by Hazard , its nature and causes	**07**
	b)	What is meant by Unsafe Act and conditions	**05**
	c)	Briefly explain the investigations and prevention process of	**08**

construction accidents

5	a)	Briefly explain the errors in measurement	**6**
	b)	What is the need of standardization	**7**
	c)	Explain the role of Owner, Design Engineer in Standardization	**7**
6	a)	Briefly explain the role of Supervisors and Managers for safety in an organization	**8**
	b)	Explain the Project Coordination and Safety Procedures	**6**
	c)	Explain the Sub contractual obligation in safety in construction company	**6**
7	a)	Briefly explain the Selection Of New Materials for ensuring quality	**8**
	b)	Explain the Quality Management Method for quality assurance.	**7**
	c)	Briefly explain the Factors Influencing Construction Quality	**5**

Reg. No: ……

Name : ……

First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 105(B) : QUALITY CONTROL AND PROJECT SAFETY MANAGEMENT

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1	a)	What is meant by Ergonomics?	**6**
	b)	What is ISO 9000 ?, what is the relationship between IS 9000 with TQM	**14**
2	a)	Explain the Quality Management Method for quality assurance	**08**
	b)	Explain the Statistical Tolerance and Time of completion in connection with quality control	**6**
	c)	What is meant by quality costs?, explain in detail	**6**
3	a)	Explain safety problem areas in construction industry	**10**
	b)	Briefly explain how will you assesses the job site safety	**10**
4	a)	What are the Safety Provisions in the Factory Act-Laws related to the Industrial Safety?	**7**
	b)	How will you measure the Safety Performance?	**7**
	c)	What is the need of regular safety meeting in an organization?	**6**
5	a)	Explain the significance of Inspection and Control in construction	**8**

		industry	
	b)	Briefly explain the following : Safety and First Line Supervisors , Safety and Middle Managers	**12**
6	a)	Briefly explain Contract and Construction Oriented Objectives in relation with Quality Assurance and Control.	**7**
	b)	Briefly explain Different Aspects of Quality-Appraisals	**7**
	c)	Briefly explain the need of Standardization for Selection Of New Materials	**6**
7	a)	Explain in detail the Safety Policy, Safety Record Keeping, Safety Culture-Safe Workers in a Organization	**12**
	b)	Explain the Elements of an Effective Safety Programme	**8**

Reg. No: ……

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First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 106(D) : ADVANCED CONSTRUCTION TECHNIQUES

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1		Compare different demolition techniques.	**20**
2	a)	Discuss in detail various tunneling techniques	**10**
	b)	Prepare a note on micro piling for strengthening the floor.	**10**
3	a)	Write a note on caissons. Describe the construction sequence of well foundation	**15**
	b)	Discuss the advantages and disadvantages of slip form techniques	**5**
4		Write a note on various bridge launching techniques	**20**
5	a)	Write any two concreting methods of tall structures	**10**
	b)	Discuss on vacuum dewatering during concrete flooring	**10**
6	a	Explain the transporting handling and erecting lightweight components on tall structures	**12**
	b	Write a note on Vacuum dewatering of concrete flooring	**8**

7 Explain in detail the erection of lattice towers and rigging of transmission line structures. **20**

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First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 106(D) : ADVANCED CONSTRUCTION TECHNIQUES

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1	a)	How will you repair a sunken concrete slab? Discuss the advantages and disadvantages of the same.	**10**
	b)	What are the safety precautions to be taken during demolition?	**10**
2	a)	Differentiate between cable stayed bridges and bow string bridges with neat sketches	**08**
	b)	Illustrate with sketches different piling techniques?	**12**
3	a)	Compare different formworks used in high rise building construction	**10**
	b)	Write a note on construction sequence of domes?	**10**
4	a)	Discuss on different subgrade waterproofing systems	**10**
	b)	Explain the construction of cofferdams using sheet piling	**10**
5	a)	Explain in detail the trenchless technology	**12**
	b)	Write the laying operations for built up offshore system	**8**
6	a)	Briefly explain the shallow profile pipeline laying	**10**
	b)	Explain sub grade water proofing	**10**

7	a)	Briefly explain the stand by plant equipment for underground open excavation	**12**
	b)	Explain suspended form work erection techniques of tall structures	**8**

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First Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 106(D) : ADVANCED CONSTRUCTION TECHNIQUES

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1	a)	What is underpinning? Write a note on various underpinning techniques with neat sketches	**12**
	b)	Write a note on dewatering for underground open excavation	**8**
2	a)	Differentiate box jacking and pipe jacking	**10**
	b)	How can we use diaphragm walls for under water construction?	**10**
3		Discuss any two deep excavation supporting system	**20**
4		Compare various prestressing methods in high rise building	**20**
5	a)	Explain concrete paving technology	**10**
	b)	Discuss on various dewatering techniques	**10**
6	a	Explain the various Techniques of construction for continuous concreting operation in tall buildings	**13**
	b	Explain the launching techniques for heavy decks	**7**

7 a) Explain sinking cofferdam, articulated structures. **10**

b) Explain sheet plies, screw anchors **10**

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Second Semester M.Tech Degree (Regular) Examination, April 2015

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 201: ADVANCED PRESTRESSED CONCRETE DESIGN

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1. a. Explain any one of the prestressing systems in detail. (5)
   b. Explain any two losses of prestress. (5)
   c. A prestressed concrete beam of rectangular section 120mm wide and 300mm deep supports a UDL of 4 kN/m, which includes self weight of the beam. The span is 6m. The beam is concentrically prestressed by a cable carrying a force of 180 kN. Locate the position of the pressure line in the beam. (10)

2. a. Discuss the factors influencing deflection. (5)
   b. A prestressed concrete beam spanning over 8m is made of 150mm wide 300mm deep section. The beam is prestressed by a parabolic cable having an eccentricity of 75mm below the centroidal axis at the centre of span and an eccentricity of 25mm above the centriodal axis at the support section. The initial force in the cable is 350 kN. The beam supports 3 concentrated loads of 10 kN each at intervals of 2m. (i) Neglecting losses of prestress, find short term deflection and (ii) Allowing 20% loss in prestress, estimate the long term deflection. (15)

3. A post tensioned bonded prestressed concrete beam of rectangular cross section 400mm wide and 550mm deep is subjected to a service load bending moment of 180 kNm, torsional moment of 50 kNm and shear force of 70 kN. The section has effective prestressing force, determined from service load requirements, of magnitude 500 kN at an eccentricity of 150mm, provided by 5 numbers of 12.5mm stress relieved strands of cross sectional area of 506 mm^2 with an ultimate tensile strength of 1820 MPa. Grade of concrete is M40. Design suitable longitudinal and transverse reinforcements.

4. a. Differentiate Type I, Type II and Type III structures. (10)
   b. A pretensioed prestressed concrete beam of rectangular section is required to support a design ultimate moment of 100 kNm. Design the section using M50 grade concrete and if yield stress of steel is 1600 MPa. (10)

5. a. Discuss the factors affecting transmission length (10)
   b. A pretensioned prestressed concrete beam of rectangular section 200mm wide and 450mm deep is prestressed by 10 wires of 5mm diameter located at an effective eccentricity of 150mm. The maximum shear force at a particular section is 120 kN. If the modular ratio is 6, calculate the flexural bond stress developed if (i) the section is cracked and (ii) the section is uncracked. (10)

(OR)

6. a. State the advantages and disadvantages of partial prestressing (10+10)
   b. A high tensile cable comprising 12 strands of 15mm diameter with an effective force of 2500 kN is anchored concentrically in an end block of a post tensioned beam. The end

block is 400mm wide and 800mm deep and the anchor plate is 200mm wide and 260mm deep. Design suitable anchorage zone reinforcement using IS 1343 recommendations.

[P.T.O]

7. A two span continuous beam ABC (AB = BC = 10m) is of rectangular section, 200mm wide and 500mm deep. The beam is prestressed by a parabolic cable, concentric at end supports and having eccentricity of 100mm towards the soffit of the beam at centre of spans and 200mm towards the top of beam at mid support B. The effective force in the cable is 500 kN.
   a. Show that the cable is concordant.
   b. Locate the pressure line in the beam when, in addition to its self weight, it supports an imposed load of 5.6 kN/m.

8. Design a cylindrical prestressed concrete water tank to a capacity of 6000 cum. Grade of concrete to be used is M50. Loss ratio is 0.75. Assume steel to be used with a stress of 1200 MPa. Design the tank walls assuming the base as hinged.

9. a. State the advantages and disadvantages of partial prestressing. (10)
   b. Explain the method of prestressing in concrete spatial structures (10)

II Semester M.Tech (Structural Engineering and Construction Management) Degree Examination

SCM 202: FINITE ELEMENT ANALYSIS

Time: 3 Hours Max. Marks: 100

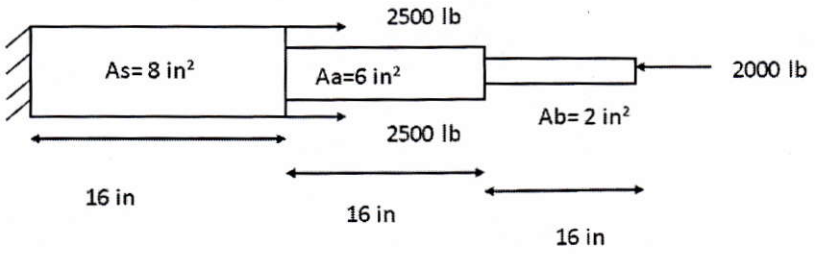
Instructions: Answer **any five** questions

Assume **any missing data,** suitably and mention it **clearly**

1. a. Explain lagrange element and serendipity element with suitable example 12

   b. Explain static condensation 8

2. Find the stresses and displacement in each section of composite member shown in figure below. $E_s=30*10^6$ psi, $E_a=10^7$ psi and $E_b=15*10^6$ psi 20

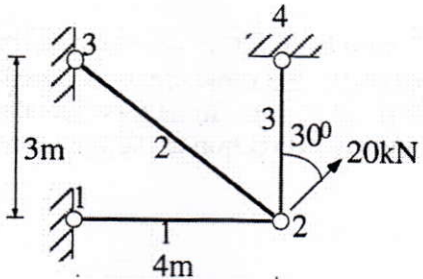


3. a. Derive the stiffness matrix for a three nodedisoparametric element 10

   b. Find displacement at the end of a cantilever beam subjected to uniformly distributed transverse load using Rayleigh Ritz method. Assume 10

   $w= a[1-\cos(\frac{\pi x}{2l})]$

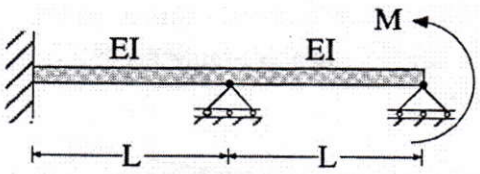
4. Find joint displacement and axial forces in a plane truss shown in the following figure, if in addition to the applied force the support at joint 1 moves towards right by 50 mm. Area of cross section of all members is 10^{-3} m^2, E = 210 GPa. 20



5 a Evaluate consistent nodal load vector for 2 noded bar element due to body force. Density of material is ρ kg/m^3. Use gauss quadrature for integration 8

b Calculate nodal load vector due to surface traction for the four noded rectangular element. For any point on the top side intensity of surface traction can be expressed as the interpolation function $\frac{(1-\xi)w_2}{2} + \frac{(1+\xi)w_1}{2}$. Where w_1 and w_2 are the intensity of uniformly varying surface traction force 12

6. A two span beam is subjected to a moment as shown in the following figure. Find resulting displacements and rotations for the beam. Assume E = 30,000 ksi, I = 200 in^4, L = 15 ft, M = 1000 klbs-in. 20



7 a. Obtain the shape functions for the eight noded rectangular element 15

b. Derive shape function for three noded element using lagrange interpolation 5

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Second semester M.Tech Degree (Regular) Examination, JAN 2016

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SECM 203: CONSTRUCTION PERSONNEL MANAGEMENT

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1	a) Explain personnel principles	**10×2**
	b) Explain directing and controlling	
2	a) Explain organization charts	**10×2**
	b) Write a note on span of control	
3	a) Briefly explain basic individual psychology	**10×2**
	b) Explain managing groups at work	
4	a) Write a note on employee safety	**10×2**
	b) Explain discipline & discharge	
5	a) Explain staffing	**10×2**
	b) Explain organization	
6	a) Explain leadership	**10×2**
	b) Write a note on communication for people management	
7	a) Explain employee hand book	**10×2**
	b) Explain about productivity of human resources	

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Second Semester M.Tech Degree (Regular) Examination, April 2015
STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)
SCM 204 (C) RESEARCH METHODOLOGY

Time: 3 hours **Maximum Marks: 100**

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.
*2) Answer **any five** questions **only**.(5x20 Marks)*

I. What is a research problem? Define the main issues, which should receive the attention of the researcher in formulating the research problem. Give suitable examples to elucidate your points.

II. a) Explain the Importance of literature review in defining a problem **12 marks**

b) Explain in detail the significance of research design proposal **8 marks**

III. Write short notes on:

(1) Design of the research project;

(2) Objectives of research;

(3) Criteria of good research;

(4) Research and scientific method. **(4x 5 marks = 20)**

IV. 1) Briefly explain the Research process

2) Briefly explain the sources of data collection in a Research

V. a)Briefly explain the Methods of data collection

b) Explain the Processing and analysis of data

c) How will you Interpretation of results obtain?

VI.

a) Distinguish between scientific paper and Thesis report **8 marks**

b) What points should be taken into consideration by a researcher in developing Layout and structure of typical reports. ***12 marks***

VII.

a) what is meant by Critical literature review **6 marks**

b) Explain the process of Identifying gap areas of a research work from literature review **8 marks**

c) Explain the Motivation and Significance of research **6 marks**

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Second Semester M.Tech Degree (Regular) Examination, January 2016

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SECM)

SCM 205 (C) : PAVEMENT CONSTRUCTION PRACTICE

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1	a)	Differentiate between flexible pavement and rigid pavement	**10**
	b)	Explain :- a) Bituminous surface dressing b) Bituminous premix carpet	**10**
2	a)	Explain in detail the marshal stability test for bituminous pavement and the graphs obtained from marshal test	**20**
3	a)	Explain in detail the road making machineries for road formation and bituminous construction	**10**
	b)	Explain any two methods to improve the bitumen quality	**10**
4	a)	Write in detail the construction steps for cement concrete pavement slab	**10**
	b)	Briefly explain the steps adopted for concrete mix design	**10**
5	a)	Write a note on types of joints in rigid pavement with neat sketches	**10**
	b)	Explain the function of dowel bar and tie bars	**10**
6	a)	Explain in detail any two roughness measuring equipment	**10**

b) Write a note on :-

i) Potholes

ii) Fatigue cracking

iii) Rutting

iv) Raveling

10

7 a) What is overlay?. Explain the design of overlay of flexible pavement by Benkelman beam deflection method **10**

b) Explain any two non – destructive deflection testing method **10**

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Second Semester M.Tech Degree (Regular) Examination, Jan 2016

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT (SCM)

SCM 206(B): EARTHQUAKE ANALYSIS AND DESIGN OF STRUCTURES

Time: 3 Hours Max Marks: 100

Instructions : 1) Any data, if required may be suitable assumed and clearly indicated.

*2) Answer **any five** questions **only**.*

1 a) Explain the causes and effects of earthquake.

b) Write short notes on body waves and surface waves. (10+10)

2 a) Explain the seismic design philosophy for buildings.

b) Explain the response of different types of structure to earthquake motion. (10+10)

3 Discuss the structural problems associated with the following architectural features and give remedial measures.

a) Open ground storey
b) Extreme plan area
c) Building Separation
d) False symmetry
e) Re-entrant corners (5*4)

4 a) Sketch the typical ductile detailing of an exterior beam column joint, interior beam column joint and a shear wall.

b) Explain special confining reinforcement with reference to ductile detailing code. (15+5)

5 A four storey RC building is located in seismic zone V. The seismic weights and dynamic properties (results of a free vibration analysis in the X direction) are shown in Table 1. The soil below the foundation is hard and is proposed to design the building with a special moment resisting frame. Obtain the design seismic force in the X direction

by the response spectrum method of dynamic analysis and distribute it with building height.

Table 1

	Mode 1	Mode 2	Mode 3	Weight (kN)
Natural Period	0.623s	0.385s	0.242s	
Roof	1	1	1	2000
3rd floor	0.716	0.192	-0.931	5200
2nd floor	0.614	-0.401	-0.674	2100
1st floor	0.296	-0.981	1.216	4600

20

6 a) Explain the procedure to determine the design seismic shear force and moment in stack like structures.

b) Describe the design principles of bridges and retaining walls. (10+10)

7 Analyse an elevated RC circular water tank of the following data for seismic loads.

External diameter : 8m, Depth of water : 4m, Freeboard : 300mm, Thickness of roof slab : 150mm, Tank wall thickness : 300mm uniform throughout, Base slab thickness : 300mm, Weight of beams supporting base slab : 150kN, Height of staging : 12m from foundation level, Weight of columns : 250kN, Weight of bracings : 175kN, Lateral stiffness of staging : 6800kN/m, Location : zone IV on hard soil.

20