Integral University, Lucknow

University Polytechnic

Study and Evaluation Scheme

Program: Diploma in Civil Engineering

Semester –VI

S. No.	Course code	Course Title	Type of Paper	Period Per hr./week/sem.			Evaluation Scheme				Sub. Total	Credit	Total Credits	Attributes						
				L	T	P	CT	TA	Total	ESE				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEORIES																				
1	DCE – 601	Design of Reinforced Concrete Structure – II	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y		Y		
2	DCE – 602	Transportation Engineering– II	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y				
3	DCE – 603	Estimating, Costing & Valuation	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y		Y		
4	DCE – 604	Design of Steel & Masonry Structures.	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y				
5	DCE – 605	Earthquake Engineering	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y		Y		
6	DCE - 606	Construction Management & Accounts – II	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y		Y				Y
7	DCE - 651	Reinforced Cement Concrete & Highway Lab	Core	00	00	02	40	20	60	40	100	0:0:1	1	Y	Y	Y				
8	DCE - 657	Project.	Core	02	00	02	--	120	120	80	200	2:0:1	3	Y	Y	Y				Y
9	GP- 651	General Proficiency	Core	--	--	--	--	--	60	--	60								Y	Y
Total				**20**	**06**	**04**	**280**	**140**	**600**	**360**	**960**		**28**							

DESIGN OF REINFORCED CONTRETE STRUCTURE – II

(DCE-601)

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UNIT – 1 Design of RCC Slabs

(i) Structural behaviour of slabs under uniformly Distributed load (UDL). **(ii)** Types of end supports. **(iii)** Design of one way slab. **(iv)** Design of Two-way slab with the help of tables of IS: 456. (Corners not held down)-IS-code method. **(v)** Detailing of reinforcement.

Design of Reinforced Brick-Work

(i) Plain brick masonry, permissible stresses. **(ii)** Reinforced Brick work and its use in slabs and lintels. **(iii)** Limitations of the use of R.B. Work. **(iv)** General principles of design of reinforced brick lintels and slabs. **(v)** Design of R.B. beams, slab and lintels 8

UNIT – 2 Design of Tee Beams

(i) Structural behaviour of a beam and slab floor laid monolithically. **(ii)** Rules for the design of T-Beams. **(iii)** Economical depth of T-Beams, Strength of T-Beams. **(iv)** Design of singly reinforced Tee-Beams. **(v)** Detailing of reinforcement. 7

UNIT – 3 Designs of Columns & Column Footings

(i) Concept of long and short columns. **(ii)** IS specifications for main and lateral Reinforcement. **(iii)** Behavior of RCC column under axial load. **(iv)** Design of Axially loaded short and long columns with hinged ends (circular, square and rectangular as per IS specifications). **(v)** Concept of column footing. Design criteria. Design of square isolated column footings. **(vi)** Detailing of reinforcement. 8

UNIT – 4 Cantilever Retaining Wall

Concept of design and function of different parts of a Cantilever retaining wall and reinforcement details (No numerical shall be asked in the examination) **Water Tank:** Components of Overhead Water Tanks (Dome Shaped), Description of different component e.g. roof, side wall and ring beam, floor slabs, supporting structure and foundations (only reinforcement details be shown and emphasized). 8

Unit – 5 Components of Multi-Storied Framed Structures

General concept of multistoried framed structures of Columns, beam, slabs, and footing, design criteria and method of placing reinforcement in framed structures. Lifts basements (only diagrams to be taught. No numerical shall be asked in the examination) 7

Ref Books:

1. Reinforced cement concrete : AK Jain.
2. Reinforced cement concrete : Sushil kumar

TRANSPORTATION ENGG.-II

(DCE-602)

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RAILWAYS

UNIT – 1 Introduction

Railways - An important system of communication in India.

Permanent Way: Definition of a permanent way, components of a permanent way, sub grade, ballast, sleepers, rails, fixtures and fastenings. Concept of gauge and different gauges present in India. Suitability of these gauges under different conditions.

(i) RAILS: Function of rails. Different types of rail sections-double headed, bull headed and flat footed their standard length, weights and comparison. Welded rails-appropriate length of welded rails and advantages of welded rails. **Creep:** Its definition, causes, effects and prevention. Wear of rails, its causes and effects.

(ii) SLEEPERS: Function of sleepers, Different types of sleepers, wooden, steel, cast iron (pot type), concrete and pre stressed concrete, their sizes, shapes, characteristics and spacing. **(iii) BALLAST:** Function, materials used for making ballast stone, brick, slag and cinder, their characteristics.

(iv) FIXTURES AND FASTENINGS: (a) Connections of rail to rail-Fishplate and fish bolts. (b) Connection of Rail to sleepers, Sketches of connection between flat footed rails with various types sleepers with details of fixtures and fasteners used. 8

UNIT – 2 Geometrics for Broad Gauge and Points and Crossings

Typical Cross-sections of single and double broad gauge railway tracks in cutting and embankment. Permanent and temporary land width. Gradients rulling, maximum, minimum for drainage. Gradients in station yards. Curves, Limiting radius of a curve for broad gauge. Transition length to be provided for railway curves as per railway code. Super-elevation-its necessity and limiting value. Definiton of equilibrium cant and cant deficiencny, Widening of

gauage on curves. **Points and Crossings:** Necessity and details of arrangement, sketch of a turnout definiton of stock rail, tongue rail, check rail, lead rail, wing rail, point rail, splice rail, stretcher bar, throw of switch, heel of switch, nose of crossing, angle of crossing, overall length of turnout, facing and trailing points, diamond crossing, cross over, triangle. 7

UNIT – 3 Track Laying and Maintinance Of Track

Preparation of subgrade. Collection of materials setting up of material depot and carrying out initial operations such as edging of sleepers, bending of rails and assembling of crossings. Definitions of base and rail head. Transportation by material trollies, rail carriers and material trains. Method of track laying (parallel, telescopic and American methods). Organisation of layout at rail head. Ballasting of the track.

Maintenance of Track: (i) Routine maintenance of formation and side slopes, rails, fixtures and drainage. **(ii)** Special maintenance - Replacement of defective sleepers and rails. **(iii)** Tools used for the above operations. 8

BRIDGES

UNIT – 4 INTRODUCTION and Classification

Bridge: Its function and component parts, different parts, difference between a bridge and a culvert.

CLASSIFICATION OF BRIDGES: Their structural elements and suitability:

(i) According to life: Permanent and temporary. **(ii) According to road way level :** Deck, through and semi-through. **(iii) According to material:** Wooden, steel, RCC, pre stressed and masonry. **(iv) According to structural form:** (a) Beam type - RCC, T-Beam, steel girder bridges, plate girder and box girder, trussed bridges N and warren girder bridges. (b) Arch type-open spandril and filled spandril, barrel and rib type. (c) Suspension type-Unstiffened sling type, its description with sketches. (d) According to the position of highest flood level: submersible and non submersible. **Site selection and collection of data:** Factors affecting the selection of site for a bridge data to be collected. Bridge span. Economical span and factors affecting it. 8

UNIT – 5 piers, abutments and wing walls

Piers: Definition parts. Types: solid (masonry and RCC); Open cylindrical and abutment piers. Definition of the following terms; height of pier, water way (natural and artificial), afflux and clearance. Abutments and wing walls: Definition, types of abutments (straight and tee) abutment with wing walls (straight, splayed, return and curved).

Bridge Bearings and Temporary Bridges and Maintinance

Purpose of bearings: Types of bearings: Fixed plate, sliding plate, deep cast base, rocker and roller bearings, their functions with sketches.

Temporary Bridges: Necessity, description with sketches of pontoon and boat bridges. **Maintenance of Bridges:** Inspection of bridges, routine maintenance.

IN THE Base course: Methods of construction as per Ministry of Shiping and transport (Government of India).**(v) IN THE Surfaceing:** Methods of constructions as per Mininstry of Surface and Transport, Government of India, specifications and quality control;equipment

used . **Maintenance of Track:** NOTE:The study of the subject must be supplemented by a visit to a nearbyrailway station.

ESTIMATING, COSTING AND VALUATION

(DCE-603)

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[A] BUILDING

UNIT – Introduction to Estimating

Types of estimates, drawings (to be attached with these estimates. Preparation of rough cost estimates). Units of measurement and units of payment of different items of work. **Different methods of taking out quantities:** Centre line in-to-in/out-to-put methods. **(a)** Preparation of a detailed estimate, complete with detailed reports, specifications, abstract of cost and material statement for a small residential building with a flat roof**. (b)** Preparation of a detailed estimate with specification, abstract of cost and material statement for pitched roof with steel truss only. 8

UNIT – 2 Specifications

Need, general and detailed specifications, method of writing specifications, Analysis of rates: **(i)** Steps in the analysis of rates for any item of work, requirement of material, labour, sundries T.& P. contractors profit. **(ii)** Calculation of quantities of materials for: (a) Plain cement concrete of different proportions. (b) Brick masonry in cement and lime mortar. (c) Plastering and pointing with cement mortar in different proportions.

(d) White washing.

Analysis of Rates: Analysis of rates of the following item of work when the data regarding labour, rates of material and rates of labour is given. (a) Earth work in excavation and filling with a concept of lead and lift. (b) Cement concrete in foundation. (c) R.C.C. and R.B. in roof slabs. (d) First class burnt brick masonry in cement mortar. (e) Cement plaster. (f) **Cement pointing:** Flush, deep pointing. Tender and preparation of tender document. 9

UNIT – 3 [B] Irrigation

Preparation of detailed estimate for a brick lined distributory from a given section. **Public health:** Preparation of detailed estimate for laying a water supply line (C.I. Pipe). Preparation of detailed estimate for sanitary and water supply fittings in a domestic building containing one Set of toilets and septic tank. 7

UNIT – 4 Roads

Methods for calculating earth work using: **(i)** Average depth. **(ii)** Average cross sectional area. **(iii)** Graphical method. Calculations of quantities of materials for roads in plains from given drawings. Preparation of detailed estimate using the above quantities. Detailed estimate of a single span slab culvert with return wing walls. Calculation of quantities of different items of work for a masonry retaining wall from given drawings. 7

UNIT – 5 Valuation

Purpose of valuation, principles of valuation. Definition of terms such as depreciation, sinking fund, salvage and scrap value. Valuation of a building property by replacement cost method and rental return method. Method of calculation of standard rent-Concept of capitalized value and years purchase. 8

DESIGN OF STEEL AND MASONRY STRUCTURES

(DCE-604)

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UNIT – 1 Structural Steel and Sections

(i) Properties of structural steel as per IS: 226 and IS: 1977. **(ii)** Designation of structural steel sections as per IS Handbook and IS: 800. **Structural Steel Connections- (i)** Riveted connections - types of rivets, permissible stresses in rivets. Types of riveted joints, Failure of riveted joints, Assumptions made in the design of riveted joints. Specification for riveted joints. Design of riveted joints for axially loaded members. **(ii) Welded Connections:** Comparison between riveted and welded joints, types of welds, permissible stresses in welds, types of welded connections, strength of welded joint, Design of welded joints for axially loaded members. 8

UNIT – 2 (A) Tension Members

Forms of common sections. Permissible Stresses in tension for steel. Strength of a tension member. Design of tension members (flats, angles & Tee Sections only). Tension splice and their design.

(B) Compression Members: Design of struts and columns as per IS:800. Effective length, slenderness ratio and permissible stresses, simple and built up sections, concept of lacings in built up columns. 7

UNIT – 3 Beams

Design criteria, allowable stresses, Design of laterally restrained beams including simple built-up sections. Checks for web bulking, web crippling and deflection. 7

UNIT – 4 (A) Column Bases

Column bases, design of simple column base. **(B) Steel Roof Trusses:** Different types of trusses, Loads on roof trusses. Various combinations of loads to cause worst condition. Design of angle and tubular trusses (Tension and compression members), Design of purlins. 7

UNIT – 5 Masonry and Foundation Structures

Gravity masonry dams, retaining walls and chimneys subjected to lateral pressures. Design of masonry wall foundation (stepped footing). 7

EARTHQUAKE ENGINEERING.

(DCE-605)

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UNIT – 1

[1] Causes of earthquakes and seismic waves, magnitude, intensity and energy release, Basic terminology, Characteristics of earthquakes, Seismic hazard, vulnerability and risk, Seismic Zoning.

[2] Earthquakes performance of structures in past earthquakes. 7

UNIT - 2

[1] Philosophy of earthquake resistant design and concept of ductility, Short and long period structures, Concept of spectrum, Static force calculations. 7

UNIT – 3

Architectural considerations: Building simplicity, symmetry. Irregularities, Continuity and Uniformity. Effect of soils and liquefaction, Remedial measures, Construction of earth structures. Seismic construction of masonry buildings, precisions of IS: 4326. 8

UNIT - 4

Seismic construction of RC buildings detailing, provisions of IS: 13920. Retrofitting of masonry and reinforced concrete buildings.

Disaster Management: Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features. 8

UNIT – 5

Disaster Management: National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication. 8

CONSTRUCTION MANAGEMENT & ACCOUTS – II

(DCE-606)

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UNIT – 1 Stock and Tools & Plant

(a) Kind of articles in stock, (b) Sources of stock receipt, Suppliers. Other departments, divisions and sub divisions. Manufacturers, Works (c) Sub heads of stock. (d) Quantity accounts of stock. Rules for preparing indent and invoices, preparation of indent in proper form. Register of stock receipts and issues, procedure for recording entries in proper form. Actual filling of the form. (e) Return of monthly transaction of stock and half yearly return of stock. (f) Stock taking of stores-general rules. (g) Surpluses and shortages of stock action for rectification of mistakes in stock accounts. (h) Losses of stock-reporting the loss, estimates for loss of stock and writing off. **Tools and Plants (T&P):** (a) Meaning. (b) Classification of T&P - Register of T&P receipts and issues-Rules for actual filling of the prescribed form. - Statement of receipts and issues of T&P in prescribed form. (c) Sources of recipe of T&P (d) Authority of issue of T&P. (e) Surpluses and shortage of T&P-reconciliation of accounts. (f) Points of difference in accounts of stock and T&P. (g) Disposal of unserviceable articles of T&P. Preparation of survey report in prescribed form. 8

UNIT – 2 Works

(i) Categories: (a) Original works. (b) Repair works. **(ii)** Classification of works according to cost: (a) Major works. (b) Minor works. (c) Petty works. **(iii)** Conditions to be fulfilled before a work can be taken in hand: (a) Administrative approval. (b) Technical sanction. (c) Appropriation of funds. (d) Expenditure sanction (for plan works) **(iv)** Methods of carrying out works: (a) Departmentally through daily labour (b) Through contractors - Piece work system - work order - Contract system - Agreement. **(v)** Different types of contract: (a) Item rate contract. - Labour rate (%age above or below) for various items or for covered areas construction (Private construction only) - Through rate basis (%age above or below) (b) Lump-sum contract.

(vi) Allotment of works: (a) Concept of quotations and tenders (b) Work order - Rules and Form. **(vii)** Definition of deposit works and Taccavi works. 9

UNIT – 3 Payment for Works

(i) Daily labour: (a) Meaning. (b) Muster roll. Rules. Instruction for maintenance. Three parts of M.R. - Nominal roll, unpaid wages, detail of work done and filling of prescribed form. (c) Daily labour report, filling of prescribed form. (d) Casual labour-Rolls its difference from M.R. (e) Mistakes of common occurrence. **(ii)** Payment of work charged establishment preparation of pay bill on prescribed form. **(iii) Payment to contractors and suppliers:** (a) Record of measurement. Measurement book (M.B.) General Instructions. Method of payment after measurements are recorded in M.B. Common mistakes in the use and maintenance of M.B. Student may be directed to record the measurement of different item such as W/w, Distemper, Painting, Glass fitting, Plastering, etc. for maintenance of a building. (b) Check measurement Book (C.M.B.) Purpose, administration with regard to its maintenance. (c) Standard measurement book (SMB) Purpose and instruction with regard to its maintenance. **Different types of payment:** (a) First and final payment. (b) Running payment. Secured advance. On account payment,, Advance payment, Running and final payment. Hand receipt. Clause in which the detailed

measurements are dispensed. 9

UNIT – 4 Miscellaneous and Entrepreneurship Development

(i) Duties of Junior Engineer / S.O. and S.D.O. **(ii)** Instructions on transfer of charge. **(iii)** Maintenance of log books of vehicles and machinery. **(iv)** Manufacturers accounts and out turn of machinery. **(v)** Dealing with railways-booking of consignment, taking delivery, credit note, demurrage and wharf age charges and damaged consignment. **Entrepreneurship Introduction:** Entrepreneur, entrepreneurship, its meaning & importance. Qualities of an entrepreneur. Entrepreneur Motivation Training. 7

UNIT – 5 Financing Agencies

Financial agencies for land, infra structure, machinery, raw material, import of raw material and machinery. Role and function of Govt. department connected with the development of industries/business ventures in the State. **Industrial Legislation and taxes:** Industrial and labour laws, production tax, local tax, trade tax, excise duty and income tax. **Project Report:** Component of project report - Land, building, electricity, water, equipment and other utilities. Materials, its availability, cost, labour availability and wage rates. Project report preparation, provisional registration and plan of acquiring finance from proper source (financing agencies). **Intellectual Property Rights:** Introduction to IPR (Patents, Copy Right, Trade Mark), Protection of undisclosed information, Concept and history of patents, Indian and International Patents Acts and Rules, Patentable and Non patentable invention including product versus Process. 9

Reinforced Cement Concrete & Highway Lab

(DCE-651)

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List of Experiments

1. Determination of resistance to abrasion of aggregates by Los Angel's Abrasion Testing Machine.

2. Determination of Aggregate impact value by aggregate impact tester.

3. Determination of C.B.R. Value of sub grade soil.

4. Determination of Aggregate crushing value by aggregate crushing test apparatus.

5. Determination of Penetration Value of bitumen.

6. Determination of softening point of bitumen.

8. Determination of flash and fire point of bitumen.

9. Determination of Compressive Strength of Cement by Cube test.

10. Determine the workability of fresh mix (M-15) by slump test.

11. Determine Initial and Final setting time of Cement.

12. Determine Normal Consistency of Cement.