Detailed Syllabus

of

DIPLOMA IN CIVIL ENGINEERING
DIPLOMA IN CIVIL ENGINEERING

COURSE PERIOD: 3 YEARS (SIX SEMESTER)  TOTAL MARKS- 3000

FIRST SEMESTER

| COURSE TITLE                  | PAPER CODE | MARKS |                  |               |               |
|-------------------------------|------------|-------|------------------|---------------|
|                               |            | THEOREY | PRACTICAL | TOTAL |               |
| APPLIED MATHEMATICS-I         | DCE-110    | 100    | 00           | 100           |             |
| APPLIED PHYSICS               | DCE-120    | 50     | 50           | 100           |             |
| DCE-120P                      |            |         |               |               |             |
| APPLIED CHEMISTRY             | DCE-130    | 50     | 50           | 100           |             |
| DCE-130P                      |            |         |               |               |             |
| INTRODUCTION OF IT            | DCE-140    | 100    | 00           | 100           |             |

SECOND SEMESTER

| COURSE TITLE                  | PAPER CODE | MARKS |                  |               |               |
|-------------------------------|------------|-------|------------------|---------------|
|                               |            | THEOREY | PRACTICAL | TOTAL |               |
| COMMUNICATION SKILLS-I        | DCE-210    | 50     | 50           | 100           |             |
| DCE-210P                      |            |         |               |               |             |
| APPLIED MATHEMATICS-II        | DCE-220    | 100    | 00           | 100           |             |
| APPLIED PHYSICS-II            | DCE-230    | 50     | 50           | 100           |             |
| DCE-230P                      |            |         |               |               |             |
| ENGINEERING DRAWING           | DCE-240    | 50     | 50           | 100           |             |
| DCE-240P                      |            |         |               |               |             |
| WORKSHOP PRACTICE-II          | DCS-250P   | 00     | 100          | 100           |             |

THIRD SEMESTER

| COURSE TITLE                  | PAPER CODE | MARKS |                  |               |               |
|-------------------------------|------------|-------|------------------|---------------|
|                               |            | THEOREY | PRACTICAL | TOTAL |               |
| COMPUTER APPLICATION-I        | DCE-310    | 50     | 50           | 100           |             |
| DCE-310P                      |            |         |               |               |             |
| APPLIED MACHINES              | DCE-320    | 50     | 50           | 100           |             |
| DCE-320P                      |            |         |               |               |             |
| CONSTRUCTION MATERIALS        | DCE-330    | 50     | 50           | 100           |             |
| DCE-330P                      |            |         |               |               |             |
| BUILDING CONSTRUCTION         | DCE-340    | 100    | 00           | 100           |             |
| HYdraulics                    | DCE-350    | 50     | 50           | 100           |             |
| DCE-350P                      |            |         |               |               |             |

FOURTH SEMESTER

| COURSE TITLE                  | PAPER CODE | MARKS |                  |               |               |
|-------------------------------|------------|-------|------------------|---------------|
|                               |            | THEOREY | PRACTICAL | TOTAL |               |
| CIVIL ENGINEERING DRAWING –I | DCE-410    | 00     | 100          | 100           |             |
| CONCREATE                     | DCE-420    | 50     | 50           | 100           |             |
### TECHNOLOGY

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Note:

**Theory Paper:** 30% Continuous Internal Assessment and 70% University examination.

**Practical Paper:** 30% Continuous Internal Assessment and 70% University examination.

**Continuous Internal Assessment:**

1) Two or three tests out of which minimum 60% of Continuous Internal Assessment will be considered for Assessment
2) Seminars/Assignments/Quizzes 30% of Continuous Internal Assessment
3) Attendance, class participation And behavior 10% of Continuous Internal Assessment
SEMESTER-I

DCE-110 APPLIED MATHEMATICS-I

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks : 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter

1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

1. ALGEBRA

Application of Quadratic equations simultaneous equations (one linear and other Quadratic equation) in two variables to engineering problems.

Arithmetic Progression, its nth term and sum of n terms with their applications to engineering problems. Geometrical Progression, its nth term and sum of n terms and to infinity with application to engineering problems.

Partial fractions (excluding repeated quadratic factors) formally introduction of permutations & combinations, applications of formulae for npr ncr

Binomial theorem (expansion without proof) for positive integral index (expansion and general term).

Binomial theorem for any index (expansion without proof only). First and second binomial approximation with application to engineering problems.

SECTION B

2. TRIGNOMETRY

Concept of angles, measurement of angles in degrees, grades and radians and their conversions. Trignometrical ratios and their relations.

Review of ratios of some standard angles (0,30,45,60,90 degrees), T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof).

Area of a triangle, Hero’s formulae, solution of triangles with direct applications of cosine formulae, sine formulae, Napier’s analogy only.

SECTION C

3. CO-ORDINATE GEOMETRY
Cartesian coordinates (two dimensions), Distance between two points, Internal and External division formulae, Application of area formulae (without proof).

Area of triangle when its vertices are given, coordinates of centroid, incentre of a triangle when the vertices are given, using the formulae, simple problems on locus.

Application of equation of straight line in various standard forms, intersection of two straight lines, angle between two lines. Perpendicular distance formulae.

General equation of a circle and its characteristics. To find the equation of a circle given (i) Center and radius (ii) Three points on it (iii) Co-ordinates of end points of a diameter.

SECTION D

Plotting of curves $y = (f(x), f(x)$ being algebraic function of $x$ (maximum upto $2^{nd}$ degree).

Definition of conic section. Standard equation of parabola, To find equations of parabola when its focus and directrix are given. Given the equation of a parabola, determination of its focus, vertex axis, directrix and lactus rectum.

Ellipse and hyperbola (standard equations without proof), given the equation in the standard form, determination of focus, directrix, lactus rectum. Axes, eccentricity and center.

Concept of Polar coordinates & their conversion to Cartesian coordinates & vice versa, cylinder, cone, 3D

DCE-120 APPLIED PHYSICS-I

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed
SECTION A

MECHANICS

1. UNITS AND DIMENSIONS
Fundamental and derived units in SI System,
Dimensions of Physical Quantities,
Principle of homogeneity
Dimensional equation,
Applications of dimensional analysis: Checking the correctness of physical equations,
Derivation of simple physical relations, Limitation of Dimensional Analysis, significant figures and Error Analysis.

2. FORCE AND MOTION
Scalars and Vectors,
Velocity & acceleration,
Equations of motion,
Newton’s law of motion,
Force & its derivation from Newton’s laws of motion,
Composition and resolution of forces,
Parabolic Motion
Horizontal projection and projection at an angle, time of flight,
Horizontal range and maximum horizontal range,
Simple Problems,
Centripetal acceleration, centripetal and centrifugal forces,
Concept of friction and its application.
Application to banking of roads

SECTION B

3. WORK, POWER AND ENERGY
Work and its Units,
Work done on bodies moving on horizontal and inclined planes (consider frictional forces also).
Concept of Power and its units,
Calculations of power (simple cases).
Concept of Kinetic energy and potential energy
Expressions for P.E and K.E,
Conservation of energy in the case of freely falling bodies,
Principle of conservation of energy.

4. ROTATIONAL AND SIMPLE HARMONIC MOTIONS
Definition of moment of inertia,
Moment of inertia of disc, ring & sphere,
Torque and angular momentum and their inter relation,
Principles of conservation (angular momentum and its applications).
Kinetic energy of rolling body,
S.H.M – derivation of displacement, velocity, acceleration, time period and frequency,
Motion of cantilever, Free, forced and resonant vibrations (No derivation).
SECTION C

HEAT

1. TEMPERATURE AND ITS MEASUREMENT
Concept of heat and temperature on the basis of K.E. of molecules.
Unit of heat
Basic Principles of measurement of temperature,
Thermocouple,
Bimetallic and resistance,
Pyrometers and Thermometers
Criteria for the selection of thermometers.

2. EXPANSION OF SOLIDS

Coefficient of linear,
Surface and cubical expansions and relation amongst them,
Thermal stresses (qualitative only) and their applications.

SECTION D

3. HEAT TRANSFER

Three modes of transfer of heat,
Coefficient of thermal conductivity, its determination by Searle’s method and Lee’s disc method.
Conduction through compound media (Series and parallel for two materials only),
Heat radiation, Characteristics of heat radiations,
Prevost’s theory of heat exchange,
Black body radiations,
Emissivity and absorbtivity
Kirchoff’s law and steфан’s law of radiation.

DCE-120P APPLIED PHYSICS-I

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks :40%

1. To determine the density of a cylinder using vernier calipers and balance.
2. To determine area of cross section of wire using screw guage.
3. To determine the thickness of glass piece using spherometer.
4. Calculation and verification of period of vibration of a cantilever (use graph)
5. Verify Parallelogram law of forces.
6. Measurement of K.E. gained by a body dropped through height h.
7. To find the coefficient of linear expression of given rod.
DCE-130 APPLIED CHEMISTRY-I

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A

1. STRUCTURE OF ATOM
Chemistry as important branch of science, Basic concept of Elements Mixture and compound, Chemical Equation, its balancing, implications and limitations.
Recapitulation of Fundamental Particles of atom i.e electron. Proton and neutron.
Bohr’s model of atom
Line Spectrum of Hydrogen
Modern concept of atom-four quantum numbers, shells, subshells, orbital (shapes of s & p orbitals
Pauli’s exclusion principle.
Afbau Energy ranking rule.
Orbital concept types of bonds co-valency, formation of s-s, s-p, p-p, bonding with examples.
Hybridization sp, sp2, sp3, (consider BeF2, BF3, CH4) molecules.
Brief concept of modern periodic table of elements.

SECTION B

2. CHEMICAL EQUATION, OXIDATION & REDUCTION
Concept of Oxidation & Reduction.
Electronic concept of oxidation and reduction.
Redox reactions (direct and indirect).
Oxidation No. balancing of simple redox reactions by oxidation No.

SECTION C

3. IONIC EQUILIBRIUM
Ionization., degree of ionization,
Focus effecting ionization
Ionization of water, ionization equilibrium in aqueous solutions, common ion effect

4. ACIDS AND BASES
Concept of acids and bases, their strength in ionization constant.
PH value, acid base titration, choice of indicators.
Hydrolysis
Buffer solution

5. ELECTROLYSIS
Concept of electrolysis.
Faraday’s law of electrolysis.
Engineering applications (electro-metallurgy, electroplating & electro-refining)

SECTION D

6. WATER
Hard and soft water, removal of hardness by :
a. Soda lime process.
b. Permutit’s process.
c. Ion exchange method.
Disadvantages of hard water in industrial use, boiler scales, priming, foaming corrosion and
caustic embrittlement.
Expressing the degree of hardness of water in (with simple problems)
a. Clark’s degree
b. O’Hener’s method
Determination of degree of hardness by (with simple problems) :
a. Soap titration method :
b. O’Hener’s method :
Water for drinking purposes .

7. SOLUTIONS & COLLOIDS
Solute, solvent, solution & colloids.
Particle size and colloidal state
Tyndell effect, Brownian movement , coagulation.
DCE-130P  APPLIED CHEMISTRY-I

Maximum Time :  3 Hrs.  University Examination : 35 Marks
Total Marks :  50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks :40%

1. Introduction of basic concepts of volumetric analysis & other related equipment.
2. Find the strength in grams per litre of the given solution or sodium hydroxide with the help of standard oxalic acid solution.
3. Find the strength of sulphuric acid in grams per litre using standard oxalic acid solution and an intermediate alkali solution indicator phenolphthalein.
4. Determine the strength of oxalic acid solution in grams per litre using standard sulphuric acid, Indicator methyl orange.
5. Determine the total alkalinity in ppm in the given sample of water by soap solution method.
6. Estimate the total hardness of a sample of water by soap solution method.
7. Estimate the amount of chlorides present in water using silver nitrate solution. Indicator potassium chromate.
8. Determine percentage purity of commercial samples like blue vitrol and green vitrol volumetrically.
9. Qualitative analysis of some important acidic & basic radicals with direct testing with demonstration of group analysis.

DCE-140  INTRODUCTION TO IT

Maximum Time :  3 Hrs.  University Examination : 70 Marks
Total Marks :  100  Continuous Internal Assessment : 30 Marks
Minimum Pass Marks :40%

A) Instructions for paper-setter
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2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A

information concepts & processing

definition of information, data Vs information, introduction to information system, information representation digital media, images, graphics, animation, audio, video etc. Need a value & quality of information the concept of information entropy & numericals.
**SECTION B**

**Computer appreciation**

definition of electronic computer, history, generation, characteristics & application of computers, classification of computers, RAM, ROM, computer hardware, CPU, various I/O devices, peripherals, storage media, software definition and concepts.

**SECTION C**

**Data communication & networks**

computer networks, networking of computers, introduction to LAN, WAN, MAN, network topologies, basic concepts in computers computer networks, introduction to GPRS, CDMA, GSM & FM technologies.

**SECTION D**

**Introduction to internet technologies**

HTML, DHTML, WWW, FTP, TELENET, web browser, net surfing, search engines, e-mail, ISP, e-commerce, public key, private key, safety of business transaction on web.

**Concepts in operation system**

Elementary concepts in operation system, GUI, introduction to DOS, MS windows,
SEMESTER-II

DCE-210 COMMUNICATION SKILLS-1

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Corresponding : (Official, Business And Personal)
   ? One Letter from each category (Official, Business and Personal) may be set in the examination paper and the students be asked to write one of them.

SECTION B
2. Grammar

SECTION C
3. Essay
   ? Preferably on scientific topic from the given outlines. The paper setter may be instructed to give a choice of attempting one out of three topics. The question paper may provide the outlines. The essay will be of 250 to 300 words. The examiner may select three topics one from each of the following.
   (i) Science
   (ii) Technology
   (iii) General.

SECTION D
Written Communication
report, notices, agenda notes, business correspondence preparation of summery & prices.
DCE-210P  COMMUNICATION SKILLS-1

Maximum Time :  3 Hrs.  University Examination : 35 Marks
Total Marks :  50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

1. Locate a particular book in the library.
2. Find out some words in the dictionary.
4. Give abbreviations of particular words and vice versa
5. Give meaning of some words.
6. Spell some words.
7. Practice of handling some communication systems like telephone and noting down and conveying messages.

DCE-220  APPLIED MATHEMATICS-II

Maximum Time :  3 Hrs.  University Examination : 70 Marks
Total Marks :  100  Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Differential Calculus

Concept of limits. Four standard limits \( \lim_{x \to a} \frac{f(x)}{g(x)} \)

\[ \begin{align*}
\lim_{x \to a} & \quad x^a = a^n \\
\lim_{x \to 0} & \quad \sin x = 0 \\
\lim_{x \to 1} & \quad \frac{1}{x} = 1 \\
\lim_{x \to 0} & \quad \frac{a^x - 1}{x} = \ln a
\end{align*} \]

Differentiation by definition of \( x, \sin x, \cos x, \tan x, e \)
Differentiation of sum, product and quotient of functions. Differentiation of function as a function.
Differentiation of trigonometric inverse functions. Logarithmic differentiation, Successive differentiation (excluding nth order)

Applications:
(a) Rate Measures
(b) Errors
(c) Maxima and Mínima
(d) Equation of tangent to a curve for explicit functions only and equation of a normal.
(e) Newton’s Method of solving equation using the formula \( f(a) / f'(a) \)

**SECTION B**

2. **Integral Calculus**
Integration as inverse operation of differentiation.
Simple Integration by substitution, by parts and by partial fractions (for linear factors only).
Evaluation of definite integrals (simple problems)-

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</tr>
<tr>
<td>( \int_{0}^{\pi/2} \sin x \cos x , dx )</td>
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using formulae without proof (m and n being positive integers only)

Applications:
(a) area bounded by a curve and axes
(b) volume of solid formed by revolution of an area about axes. (Simple problems).
(c) Centre of gravity
(d) Moment of Inertia
(e) Average value
(f) Root mean square value of a function
(g) gama function(reduction formula)

**SECTION C**

3. **Differential Equation**
Concept of formation of Differential Equation and solution of first order differential equation.
(a) Variables separation.
(b) Homogeneous differential Equation
(c) Linear Differential Equation. ax \( n \)

Solution of Linear differential Equations having \( e \), Sin \( ax \), Cos \( ax \) and \( x \) in the right hand side.

**SECTION D**

matrix
addition, subtraction, multiplication, rank of matrix
A) Instructions for paper-setter

1. The question paper will consist five sections namely A, B, C, D and E.
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3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A

1. Waves
   Generation of waves by vibrating particles, wave motion and its parameters.
   Equating a wave. Energy transfer by particle and wave.
   Superposition of waves and interference (graphical).
   Sound and light as waves-frequencies, wavelength and velocities and their relationship.

SECTION B

2. Applications of Sound
   Ultrasonics
   (a) Production of ultrasonic waves by using magnetostriction and piezo–electric methods.
   (b) Applications to drilling cold welding, cleaning, flaw detection and exploration (Sonar).
   Acoustics
   (a) Reflection, refraction and absorption of sound waves by surfaces.
   (b) Echo and reverbration.

3. Applications of Light
   Refraction and refractive index.
   Defects in image formation (Qualitative), Simple and compound microscope, astronomical and Galaleo telescopes and their magnifying powers.

4. Electrostatics
   Coloumb’s law, Unit charge
   Electric field and Electric lines of force.
   Electric intensity due to charged straight conductor and plane sheet.
   Capacitance and its units, Parallel plate capacitor.
   Grouping of capacitors in series and parallel (simple problems).
   Dielectric constant - its functions.
SECTION C
5. D.C. Circuits
Ohm’s law
Kirchoff’s law
Wheatstone Bridge Principle.
Simple Problems on series and parallel circuits.

SECTION D
6. Electromagnetism
Magnetic fields and its units.
Magnetic field around a current carrying conductor.
Circular loop and solenoids.
Force on a moving charge and current in a magnetic field.
Force between two current carrying parallel conductors.
Moving coil galvanometer; Conversion of galvanometer into Ammeter and Voltmeter.
Permeability; Dia, para and Ferro magnetic materials.

7. Modern Physics
Introduction to laser, its characteristics and important applications.
Introduction to common modes of communication, viz Fax, E-mail, Internet etc.

DCE-230P APPLIED PHYSICS-II

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

1. To find the velocity of sound by resonance method.
2. Determine the focal length of a convex lens by displacement method.
3. Setting up a model of telescope and determination of its magnifying power.
4. Setting up a model of compound microscope and determination of its magnifying power.
DCE-240P  ENGINEERING DRAWING-I

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

SECTION A
1. Handling Use and Care of Drawing instruments and Materials.
   Drawing Instruments
   Materials
   Layout of Drawing sheets

SECTION B
2. Free Hand Sketching and Lettering
   Different types of lines in Engineering drawing as per ISI specifications.
   Practice of free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles and circles.
3. Lettering Technique and Practice
   Instrumental single stroke lettering of 35 mm and 70 mm height in the ratio of 7:4 Free hand Lettering (Alphabet and numerals)- lower case and upper case, single stroke and block letters, vertical and inclined at 75 degree in different standards, series of 3:5 8 and 12 mm heights in the ratio of 7:4
4. Dimensioning Technique
   Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions).
   Dimensioning of Overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sink holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches.
SECTION A
1. Scales
Scales – their need and importance –(Theoretical instructions).
Drawing of plain and diagonal scales.

SECTION B
2. Projection
Theory of projections (Elaborate theoretical instructions)
Drawing 3 views of given objects (Non symmetrical objects may be selected for this exercise).
Drawing 6 views of given objects (Non symmetrical objects may be selected for this exercise).
Identification of surfaces on drawn views and objects drawn.
Exercises on missing surfaces and views.
Orthographic drawing or interpretation of views.
Introduction to third angle projections.

SECTION C
3. Sections
Importance and salient features, Methods of representing sections, conventional sections of various materials, classification of sections, conventional in sectioning.
Drawing of full section, half section, partial or broken out sections, offset sections, revolved sections and removed sections.
Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square angle, channel, rolled sections.
Exercises on sectional views of different objects.

SECTION D
4. Isometric Views
Fundamentals of isometric projections (Theoretical Projections)
Isometric views from 2 to 3 given orthographic views.
Preparation of simple working drawing of Furniture items like table, stool and any job prepared in the workshop.

DCE-250P WORKSHOP PRACTICE-II

<table>
<thead>
<tr>
<th>Maximum Time :</th>
<th>3 Hrs.</th>
<th>University Examination : 70 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Marks :</td>
<td>100</td>
<td>Continuous Internal Assessment : 30 Marks</td>
</tr>
<tr>
<td>Minimum Pass Marks :</td>
<td>40%</td>
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</tbody>
</table>

The following shops are included in the syllabus : Student can opt relevant shops depending upon the need of his/her course :
1. Carpentry and painting shop.
2. Fitting shop.
3. Welding & sheet metal shop.
4. Electric shop.
5. Smithy or electronic shop.
SECTION A
1. Carpentry and Painting shop
Introduction to joints, their relative advantages and uses.
Job I - Preparation of Dovetail joint.
Job II - Preparation of Mitre joint.
Job III - Preparation of lengthening joint.
Job IV - Preparation of at least one utility job with and without lamination.
Demonstration of job showing use of Rip saw, Bow saw and Tramme, method of sharpening various saws.
Demonstration of job on Band Saw and Circular saw, chain & diesel universal wood working machine, saw resharpening machine, Saw Brazing unit.
Demonstration of various methods of painting various items.
Job V - Preparation of surface before painting.
Job VI - Application of primer coal
Job VII - Painting wooden items by brush/roller/spray

SECTION B
2. Fitting Shop
Description and demonstration of various types of drills, taps and dies
Selection of dies for tapping, Types of taps, tapping, dieing and drilling operations.
Job I – Making Internal and External Threads on a job by tapping and dieing operations (manually).
Precautions while drilling soft materials, specially lead.
Job II - Drilling practice on soft metals (Aluminium, Brass and lead)
Care and maintenance of measuring tools like calipers, steel rule, try square, vernier micrometer, height gauge, combination set, reading gauge, Handling measuring instruments, checking of zero error, finding of least count.
Job III - Preparation of a job by filling on non-ferrous metal.
Job IV - Production of a utility job involving all the operations.
different types of elbow T-Union, Socket, stopstock, taps etc.
Job V - Preparation of job involving thread on GI pipe / PVC pipe and fixing of different types of elbow T-Union, socket, stopstock, taps
Description and demonstration of various types of drills, taps and dies; Selection of dies for tapping; Types of taps, Tapping and dieing operations.

SECTION C
3. Welding Shop
Introduction of the gas welding, gas welding equipment, adjustments of different types of flames, demonstration and precautions about handling welding equipment.
Job I - Practice in handling gas welding equipment and welding practice.
Common welding joints generally made by gas welding.
Job II - Preparation of Butt joint by gas welding.
Job III – Preparation of small cot conduit pipe frame by electric arc welding / gas welding.
Job IV- Preparation of square pyramid from M.S Rods by welding (type of welding to be decided by students themselves).
Job V- Exercise job on spot/seam welding machine.
Demonstration of various methods adopted for painting steel items.
Job VI - Painting steel items by brush/roller/spray.
SECTION D
4. Electric Shop
Importance of three phase wiring and its effectiveness.
Job I - Laying out of 3 phase wiring for an electric motor or any other 3 phase machine. Estimating and costing power consumption.
Job II - Connecting single phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.
Job III - Checking continuity of connection (with tester and bulbs) location of faults with a 00multimeter and their rectification in simple machines and/or other electric circuits filled with earthing.
Demonstration of dismantling, servicing and reassembling a table fan/air cooler/mixer/electric iron, Electric Heater, geaser, electric oven.
Job IV - To forge a ring to acquaint the students with forge welding.
Job V - To prepare a trus joint of MS angle iron.
Job VI - To forge a chisel and acquaint the students with simple idea of hardening and tempering.
Forge Welding, defects in forging and inspection.
Job IV - To forge squares on both ends of a circular rod with the elp of power hammer.
Job V - Fullering of a given mild steel flat.
Job VI - Production of a utility job.

OR
5. Electronic Shop
Demonstrate (or explain) the joining (or connecting) methods or/and mounting and dismantling method as well as uses of the items mentioned below:
a) Various types of single, multi-cored insulated screened pour, Audio video, general purpose wires/cables.
b) Various types of plugs, sockets connectors suitable for general purpose audio video use. Some of such connectors area: 2 and 3 pin mains plug and sockets。
Banana-plugs, and sockets, BNG, RCA, DIN, UHF, Ear phone speaker connector, Telephone jacks and similar male and female connectors and terminal strips.
c) Various types of switches such as normal/ miniature toggle, slide, push button plano key, rotatory, SPST, SPDST, DPST, DPDT,
d) Various types of protective devices such as: Wire fuse, cartridge fuse, slow acting/ fast acting fuse, HRC fuse, thermal fuse, single/multiple miniature circuit beakers, over and current relays.
Demonstrate the skill to make facilities solder joints.
Demonstrate the skill to remove components/wires by unsoldering
Demonstrate the skill to assemble components on boards, chassis, tape strips
Explain (or demonstrate) various methods of making and laying of cable forms, wiring techniques
Exposure to modern soldering and desoldering processes.
Field visits
Job I - Desolder, remove and clean all the components, wires from a given equipment
APCB or a tip strip
Job II- Soldering iron
Job III- Temperature Control soldering iron
Job IV- Desoldering strip.
SEMESTER-III
DCE-310 COMPUTER APPLICATIONS-I

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Familiarization With Operating System
Introduction to computer Operating System (Dos, Windows’95).
Introduction to Dos structure, system files, batch files & configuration files.
Booting the system from floppy & hard disk.
Brief Introduction to Dos internal & external commands.
Familiarisation with windows structures, its use and application.

SECTION B
Idea of text editors like Microsoft word, write etc.
Opening a document.
Preparing documents, inserting diagrams & tables.
Editing document.
(a) Character, word and Line Editing.
(b) Margin Setting, Paragraph alignment.
(c) Block Operations.
(d) Spell Checker
(e) Saving a document.

SECTION C
3. Information Presentation For Decision Making Using Spread Sheet :
(Excel/Lotus 1-2-3)
Applications of spread sheet.
Structure of spread sheet.
Preparing spread sheet for simple data and numeric operations.
Using formulae in spread sheet operations.
Making Tables, sorting and querying.
Creation of graphs, Pie charts, bar charts.
Printing reports.

SECTION D
4. Computer aided Drafting (CAD)
Making simple drawings using features of CAD and confirming the drafting spacifications.
Saving and retrieving drawings.
Dimensioning.
Lettering.
Plotted drawing

DCE-310P COMPUTER APPLICATIONS-I

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks :40%

Simple exercises based upon theory syllabus.

DCE-320 APPLIED MECHANICS

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks :40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Introduction
Concept of mechanics and applied mechanics- Explanation of Mechanics and applied Mechanics, its importance and necessity, giving suitable examples on bodies at rest and in motion, explanation of branches of this subject. Concept of rigid bodies.

SECTION B
2. Laws of Forces
Force and its effects, units and measurement of force, characteristics of force vector representation, Bow’s notation, Types of forces, action and reaction, tension, thrust and
shear force. Force systems: Coplaner and space force systems. Coplaner concurrent and non-concurrent forces. Free body diagrams. Resultant and components concept of equilibrium; Parallelogram law of forces. Equilibrium of two forces, superposition and transmissibility of forces. Newton’s third law, triangle of forces, different cases of concurrent coplanar, two force systems, extension of parallelogram law and triangle law to many forces acting at one point-polygon law of forces, method of resolution into orthogonal components for finding the resultant, graphical methods, special case of three concurrent, coplanar forces, Lami’s theorem.

3. Moments
Concept of moment, Varignon’s theorem – statement only. Principle of moments – application of moments to simple mechanism, parallel forces, calculation of their resultant, concept of couple properties and effect, moving a force parallel to its line of action, general cases of coplanar force system, general conditions of equilibrium of bodies under coplanar forces.

4. Friction
Concept of friction, laws of friction, limiting friction and coefficient of friction, sliding friction.

SECTION C
5. Centre of Gravity
Concept of gravity, gravitational force, centroid and center of gravity, centroid for regular lamina and center of gravity for regular solids. Position of center of gravity of compound bodies and centroid of composition area. CG of bodies with portions removed.

SECTION D
6. Laws of Motion
Concept of momentum, Newton’s laws of motion, their application, derivation of force equation from second law of motion, numerical problems on second law of motion, piles, lifts, bodies tied with string. Newton’s third law of motion and numerical problems based on it, conservation of momentum, impulsive force (definition only).

7. Simple Machines.
Concept of machine, mechanical advantage, velocity ratio and efficiency of a machine their relationship, law of machine, simple machines (lever, wheel and axle, pulleys, jacks winch crabs only).
DCE-320P  APPLIED MECHANICS

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

1. Verification of the laws of polygon of forces.
2. To verify the forces in the different members of a jib crane.
3. To verify the reaction in the supports of a simple supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in the case of inclined Planes.
5. To find the mechanical advantage, velocity ratio and efficiency in the case of Screw Jack.
6. To find the mechanical advantage, velocity ratio and efficiency in the case of Worm and Worm Wheel.
7. To find the mechanical advantage, velocity ratio and efficiency in the case of Winch Crab-Single Graphical Representation.
8. To find out center of gravity of regular laminas.
9. To find out center of gravity of irregular laminas.
10. To determine coefficient of friction between 3 pairs of given surfaces.
11. To determine personal horse power of the experimenter.

DCE-330  CONSTRUCTION MATERIALS

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Building Stones
Classification of Rocks: (Brief review only)
Geological classification: Igneous, sedimentary and metamorphic rocks.
Chemical classification: Calcareous, argillaceous and siliceous rocks.
Physical classification: Unstratified, stratified and foliated rocks.
General characteristics of stones.
Requirements of good building stones and their testing.
Identifications of common building stones.
Various uses of stones in construction.

2. Bricks and Tiles
Introduction to bricks.
Raw materials for manufacturing and properties of good brick making earth.
Manufacturing of bricks
(i) Preparation of clay (manual/mechanically).
(ii) Moulding: hand moulding and machine moulding, drying of bricks, burning of bricks, types of Kilns (Bull’s Trench Kiln; traditional brick, refractory brick, clay-flyash bricks, sundried bricks.
Classification of bricks as per BIS:1077
Size of brick-IS specifications, commercial sizes.
Testing of common building bricks as per BIS: 3495
Compressive strength, water absorption, efflorescence, dimensional tolerance test.
Special bricks.
(i) Building tiles: Types of tiles-wall, ceiling, roofing and flooring tiles
(ii) Ceramic tiles, their properties and uses.
Stacking of bricks and tiles at site.

3. Cement
Introduction, raw materials, manufacture of ordinary Portland cement, flow diagram for wet and dry process.
Properties and uses of ordinary portland cement.
Testing of cement as per BIS: Strength of cement, fineness by sieving, consistency, soundness, setting times.
Special Cements and their uses.
Storage of Cement.

SECTION B

4. Lime
Introduction: Lime as one of the following materials.
Natural sources for the manufacture of lime.
Definition of terms: quick lime, fat lime, hydraulic lime, hydrated lime, lump line.
Calcination and slaking of lime.
IS classification of lime.
Testing of lime.

5. Timber and Wood Based Products
Classification of trees: Exogeneous and Endogeneous trees, cross-section of an exogenous tree and explanation of various terms.
Identification of various types of timber: Teak, Deodar, Shisham, Sal, Mango, Kail and Chir.
Market forms of converted timber as per BIS.
Seasoning of timber: Purpose, methods of seasoning, Kiln seasoning as per BIS.
Defects in timber, decay in timber.
Preservation of timber and methods of treatment as per BIS.
Properties of timber and specifications of structural timber.
Common structural timbers in India, their availability and uses-Teak, Deodar, Shisham, Sal, Mango, Kail and Chir.
Plywood; Veneers and veneering, manufacturing plywood (brief description only), uses of plywood.
Other wood based products, their brief description of manufacture and uses;
laminated board, block board, fibre board, hard board and gypsum board, applications of boards in false ceiling and wall paneling.

SECTION C
6. Paints and Varnishes
Purpose and uses of paints.
Different types of paints: oil paints, water paints, cement paints and plastic paints.
(i) Oil paints: Constituents of an oil paint, raw materials used for different constituents of oil paints and their properties, preparation of an oil paint, characteristics of a good oil paint. Application on wood and metal surfaces.
(ii) Cement paints - commonly available cement paints, their properties and uses.
Application of cement paints
(iii) Water paint, Plastic paints and their uses.
(iv) Varnishes and polish - types, properties and their uses.
(v) Lacquers and enamels -their properties and their uses.

SECTION D
7. Metals
Ferrous Metals: Composition, properties and uses of cast iron, steel (mild and high tension steel), requirements of mild steel as per BIS.
Non Ferrous Metals: properties and uses of the following non ferrous metals in Civil Engineering works -copper, lead, zinc, tin and aluminium.
Commercial forms of ferrous and non ferrous metals.

8. Miscellaneous Materials
Plastics: Important commercial products of plastics used in Civil Engineering Construction.
Asbestos based products: Commercial forms and their uses.
Insulating materials for Sound and Thermal Insulation
Geotextiles.
Construction chemicals like: water proofing compounds epoxies, sulphides, polymers.
Glass: Types of glasses, their properties. Commercial forms and uses: plate glass, wired glass, bullet resisting glass, coloured glass, fibre glass, foamed glass wool, float glass, glass reinforced plastic.
Water proofing materials; Bitumen sheets and felts, chemical admixtures
Composite materials.
Note: - A field visit may be planned to explain and show the relevant things
DCE-330P  CONSTRUCTION MATERIALS

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

1. To physically identify different types of stones.
2. To determine the crushing strength of stones.
3. To determine the water absorption of bricks.
4. To conduct dimensional tolerance test on bricks.
5. To conduct field tests on cement.
6. To determine fineness (by sieve method) of cement.
7. To determine normal consistency of cement.
8. To determine initial and final setting times of cement.
9. To determine soundness of cement.
10. To determine compressive strength of cement.
11. To identify various types of timbers such as: Teak, Sal, Chir, Sisso, Deodar, Kail, Mango etc.

DCE-340  BUILDING CONSTRUCTION

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Introduction
Definition of a building, classification of buildings based on occupancy, requirements of a good residential building.
Different parts of a building.
2. Foundations
Excavation in ordinary and hard soils, excavation in soft and hard rock, excavation in weak soils.
Concept of foundation and its purpose
(i) Types of foundations-shallow and deep

(iii) Construction-preparing foundation plans, setting out, excavation and timbering.

3. Brick Masonry
Definition of terms: mortar, bond, facing, backing, hearting, column, pillar, plinth, plinth masonry, header stretcher, bed of brick, bat, queen closer, king closer, frog and quoin. Bond—meaning and necessity: English bond only: 1, 1-1/2 and 2 Brick thick walls in English Bond, T, X and right angled corner junctions. Thickness for 1, 1-1/2 and 2 brick square pillars in English Bond.

Construction of Brick walls - Method of having bricks in walls, precautions observed in the construction of walls, method of bonding new brick work with old (Toothing, raking back and block bonding)

Principles and precautions to be observed in brick masonry

Classification of brick masonry

4. Stone Masonry
Glossary of terms—Natural bed, bedding planes, string course, corbel, cornice, block incourse, grouting, mouldings, template, throating, through stones, parapet, coping, pilaster and buttress.

Types of Stone Masonry: Rubble Masonry: random and coarsed. Ashlar Masonry: Ashlar fine, Ashlar rough, Ashlar facing, specifications for coarsed rubble masonry, principles to be observed in construction of stone masonry walls

SECTION B

5. Walls
Purpose of walls
Classification of walls—load bearing, dwarf, retaining, breast walls and dhaji walls, partition walls, cavity walls, composite masonry walls.
Classification of walls as per materials of construction: brick stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite, masonry walls.

Factor affecting thickness of walls,

Partition walls, constructional details, suitability and uses of brick and wooden partition walls.

6. Mortars and Concretes
Preparation, use, average strength and suitability of cement, lime, lime cement, lime surkhi, mud mortar. Ingridient of concrete, advantages of concrete, types and uses of concrete

7. Form Work and Scaffolding
Constructional details and suitability of mason’s brick layers and tubular scaffolding. Form work for columns, walls, beams and slabs. Strutting and shoring and underpinning types and uses.

8. Damp Proofing
Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance, damage to heat insulating materials, damage to stored articles and health, sources and causes of dampness

Types of dampness-moisture penetrating the building from outside e.g. rain water, surface water, ground moisture
Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering work etc.
Moisture which originates in the building itself i.e. water in kitchen and bath rooms etc.
Damp proofing materials and their specifications: rich concrete and mortar, bitumen, bitumen mastic.
Methods of damp proofing basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, WC and Kitchen, damp proofing for roofs and window sills.
Plinth protection and aprons.

SECTION C
9. Arches and Lintels
Meaning and use of arches and lintels.
Glossary of terms used in arches and lintels—Abutment, arch ring, intrados, soffit extrados, voussoiers, springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandril, bearing, thickness of lintel, effective span
Arches
(i) Types of Arches—Semi circular, segmental, elliptical and parabolic, flat, inverted and relieving
(ii) Stone arches and their construction
(iii) Brick arches and their construction
10. Doors and Windows
Glossary of terms used in doors and windows.
Doors-name, uses and sketches of metal doors, ledged and battened doors, ledged doors, collapsible doors, rolling steel shutters, side sliding doors, door frames, PVC shutters and metal doors.
Windows-names, uses and sketches of metal windows, fully paneled windows, fully glazed windows, casement windows, fanlight windows and ventilators, sky light window rames, louvered shutters (emphasis shall be given for using metals and plastics etc. in piece of timber)

11. Roofs
Types of Roofs, concept of flat, pitched, hiped, arched and cell roofs
Glossary of terms for pitched roofs—batten, eaves, barge, facia board, gable hip-lap, purlin, rafter, rag bolt, valley, ridge
Drainage arrangement for pitched roofs
Drainage arrangement for flat roofs

12. Floors
Ground floors
Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose
Types of floor finishes—cast-in-situ, concrete flooring (monolithic, bonded) Terrazo tile flooring, cast-in-situ, Terrazo flooring, Timber flooring, floor polishing equipment PVC floor, ceramic floor
Upper floors
Flooring on RCC Slab
Flooring on RB Slab

SECTION D
13. Stairs
Glossary of terms: Stair case, winders, landing, stringer, newel baluster, riser, tread, width of staircase, hand rail, nosing
Planning and layout of staircase: Relations between rise and going, determination of width of stair, landing etc.
Various types of layout-straight flight, dog ledged, open wall, quarter turn. Half turn (new and geometrical stairs), bifurcated stair, spiral stair.
Requirements of good stairs.

14. Surface Finishes
Plastering - classification according to use and finishes like grit finish, rough cast, pebble dashed plain plaster etc., dubbling, proportion of mortars used for different plasters, reparation of mortars, techniques of plastering and curing.
Pointing-different types of pointing, mortar used and method for printing.
Painting-application of paints on wooden, steel and plastered wall surfaces.
White washing, colour washing and distempering, application of cement and plastic paints.
Commonly used water repellant for exterior surfaces, their names and application.

15. Building Planning
Site selection: Factors to be considered for selection of site for residential, commercial, industrial and public building.
Basic principles of building planning, arrangement of doors, windows, cupboards, etc. for residential building.
Orientation of building as per BIS: 7662 relation to sun and wind direction, rains, internal circulation and placement of rooms within the available area.
Note: - An expert may be invited from field/industry for extension lecture
- A field visit may be planned to explain and show the relevant things
A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Introduction
Fluid: Real fluid, ideal fluid
Fluid Mechanics, hydraulics, hydrostatics, hydrokinematics and hydrodynamics
2. Properties of Fluids:
Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillary, vapour pressure and compressibility.
Units of measurement

SECTION B
3. Hydrostatic pressure
Pressure, intensity of pressure, pressure head, pascal’s law and its applications.
Total pressure, resultant pressure, and center of pressure.
Total pressure and center of pressure on vertical and inclined plane surfaces:
Rectangular, triangular, trapezoidal, circular.
Total pressure on dams and lock gates.
4. Measurement of Pressure
Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.
Piezometers, simple manometer, different manometer and mechanical gauges.
Measurement of pressure by manometers and pressure gauges.

SECTION C
5. Fundamentals of Fluid Flow:
Types of flow: Steady and unsteady flow, laminar and turbulent flow, uniform and non uniform flow.
Discharge and continuity equation (flow equation)
Types of hydraulic energy: Potential energy, Kinetic energy, pressure energy.
Bernoulli’s theorem; statement and description (without proof of theorem).
6. Orifice
Definition of Orifice, and types of orifices.
Hydraulic coefficients.
Large vertical orifices and small orifices.
Free, drowned and partially drowned orifice.
Time of emptying a rectangular/circular tanks with flat bottom.

**SECTION D**

7. Flow Through Pipes:
Definition, laminar and turbulent flow, explain through Reynolds’s experiment.
Reynolds number, critical velocity and velocity distribution.
Head lose in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction (No derivation of formulae).
Flow from one reservoir to another through long pipe of uniform and composite section.
Water hammer phenomenon and its effects (Only elementary treatment).
Pipes in series and parallel.
Syphon.

8. Flow Through Open Channels
Definition of a channel, uniform flow and open channel flow.
Discharge through channels using
(i) Chezy’s formulae (no derivation)
(ii) Manning’s formulae
Most economical sections
(i) Rectangular
(ii) Trapezoidal
(iii) Circular

9. Flow Measurements
Measurement of velocity by Pitot tube, current meter, surface float, velocity rods.
Measurement of discharge by a notch
(i) Difference between notches and orifices.
(ii) Discharge formulae for rectangular notch, triangular notch, trapezoidal notch and conditions for their use (no derivation).
Measurement of Discharge by weirs
(i) Difference between notch and weir.
(ii) Discharge formulae for free, drowned and broad crested weir with and without end contractions; velocity of approach and condition of their use.
(iii) Venturi fumes to measure flow.
(iv) Measurement of discharge by velocity area-method

10. Hydraulic Machines
Reciprocating pumps
Centrifugal pumps
Impulse turbines
Reaction turbines
Sketching and description of principles of working of above mentioned machines.
DCE-350P  HYDRAULICS

Maximum Time : 3 Hrs.  
University Examination : 35 Marks  
Total Marks : 50  
Continuous Internal Assessment : 15 Marks  
Minimum Pass Marks : 40%

1. To verify Bernoulli’s theorem  
2. To find out venturimeter coefficient  
3. To determine coefficient of velocity (Cv), Coefficient of discharge (Cd), Coefficient of contraction (Cc) of an orifice and verify the relation between them  
4. To perform Reynold’s Experiment.  
5. To determine Darcy’s coefficient of friction of flow through pipes  
6. To verify loss of head due to:  
   (a) Sudden enlargement  
   (b) Sudden Contraction  
7. To determine velocity of flow of flow of an open channel by using a current meter.  
8. To determine coefficient of discharge of a rectangular/triangular notch.  
9. Study of the following:  
   (i) Reciprocating pump or Centrifugal pump  
   (ii) Impulse turbine or Reaction turbine  
   (iii) Pressure Gauge/water meter/mechanical flow meter/pitot tube.
SEMESTER-IV

DCE-410P       CIVIL ENGINEERING DRAWING-I

Maximum Time :  3 Hrs.  University Examination : 70Marks
Total Marks :   100       Continuous Internal Assessment : 30Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
DRAWING No.1
Details of spread footing foundations for load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC; details of basement showing necessary damp proofing.
Detail of cavity wall.
DRAWING No.2
Plans of T and Corner junction of walls 1 Brick, 1-1/2 Brick and 2 brick thick in English and Flemish bonds brick pillars.

SECTION B
DRAWING No.3
Elevation, sectional plan and sectional side elevation of paneled and glaze d door flush door, steel windows and aluminium windows.
DRAWING No.4
Drawing plan, elevation of a small building by measurement.

SECTION C
DRAWING No.5
Detailed plan, elevation and section of a two bedroom residential building from a given line plan, showing details of foundations, roof and parapet.

DRAWING No.6
Detailed working drawing of a small double stories building on a given plot, keeping in view building eye laws, showing slooping roof or surface drainage plan and flooring details.

SECTION D
DRAWING No.7
Each student should be guided to trace any one of the drawings of sheet no 4,5 and 6 with waterproof ink.

**DRAWING No.8**
Each student should be required to take out ammonia print of the tracing made by him.

**Note:**
a) All drawings should be as per BIS code and specifications in SI units  
b) Intensive practice of reading and interpreting building drawings should be given

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**DCE-420 CONCRETE TECHNOLOGY**

- **Maximum Time:** 3 Hrs.  
- **University Examination:** 35 Marks  
- **Total Marks:** 50  
- **Continuous Internal Assessment:** 15 Marks  
- **Minimum Pass Marks:** 40%

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**A) Instructions for paper-setter**
1. The question paper will consist five sections namely A, B, C, D and E.  
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks  
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

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**B) Instructions for candidates**
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.  
2. Use of non-programmable scientific calculator is allowed

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**SECTION A**

1. **Introduction**
   Definition of concrete, brief introduction to properties of concrete, advantages of concrete, uses of concrete in comparison to other building materials.

2. **Ingredients of Concrete**
   **Cement**  
   The chemical ingredients causing changes in properties, situations of use and special precautions in the use of following types of cements: Ordinary Portland cement, rapid handling cement, low heat cement, high alumina cement, blast furnace slag cement, quick setting, white and coloured cements, Portland pozzolana cement  
   **Aggregates:**  
   (i) Classification of aggregates according to source, size and shape  
   (ii) Characteristics of aggregates: Particle size and shape, crushed and rounded aggregates, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials in the aggregate;  
   (iii) Grading of aggregates, coarse aggregate, fine aggregate; All in aggregate; fineness modulus; interpretation grading charts and combination of two aggregates  
   **Water:**  
   Lime on the impurities as per IS; effect of excessive impurities an concrete, ascertaining the suitability of water with help of concrete cube test

3. **Properties of Concrete:**
   Properties in plastic stage, workability, segregation, bleeding  
   Properties of hardened concrete: strength, durability, impermeability, dimensional changes;
SECTION B
4. Water Cement Ratio:
Hydration of Cement, effect of water cement ratios on the physical structure of hydrated cement, water cement ratio law and the conditions under which the law is valid; internal moisture, temperature, age and size of specimen.
Definition of cube strength of concrete, relations between water cement ratio and strength of concrete.
Use of CRRI charts and BIS codes.
5. Workability
Definition, phenomenon of workability, concept of internal friction, segregation and harshness; factors affecting workability; water content; shape, size and percentage of fineness passing 300 micron.
Measurement of workability; slump test and compaction factor test; recommended slumps for placement in various conditions of placement.

SECTION C
6. Proportioning For Ordinary Concrete
Object of mix design, strength required for various grades from IS 456, preliminary test, cube test, proportionating for ordinary mix as prescribed by BIS and its interpretation.
Adjustment on site for: Bulking water contents, absorption, workability, design data for moisture, bulking, absorption and suitable fine aggregate and coarse aggregate ratio.
Difference between ordinary and controlled concrete. Introduction to fines concrete.

7. Form Work
Concept of factors affecting the design of form work (shuttering and staging)
Materials used for form work (including raw materials).
Sketches of form work for column, beam and slab.
Precautions to be taken before during and after RCC construction
Stripping time for form work as per BIS (no problem on the design of form work)
Removal of form work.

SECTION D
8. Special Concretes:
(i) New materials
Materials for light weight concrete
Flyash
Materials for high strength concrete
Accelerators and retarders
Air entraining and set controlling agents
Water reducing and set controlling agents
Special bonding agents like epoxy
Polymer concrete
(ii) Concreting under special conditions
Cold weather concreting
Under water concreting
Hot weather concreting
Special locations i.e. mass concreting, high strength concreting

9. Concrete Operations
Storing of cement:
Storing of cement in warehouse
Storing of cement at site
Effect of storage on strength of cement
Determination of warehouse capacity for storage of Cement
Storing of Aggregate
Storing of aggregate on site for maintaining uniformity of moisture and cleanliness
Batching
Batching of cement
Batching aggregate by:
Volume, using gauge box (farma) selection of paper gauge box
Weight spring balances and by batching machines
Measurement of water
Mixing
Hand mixing
Machine mixing-types of mixers, capacities of operation of mixers
Transportation of Concrete
Transportations with and situations of use of the following: pans, wheel, barrows, truck mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.
Placement of concrete
Prior preparation before placement; when put on natural soil, rocky base, specially prepared sub base (brick soil and water bound macadam base), hardened concrete base, checking of form work, checking provision for joints
Placement of concrete-precautions to be taken.
Compaction
Hard compaction, pavement, narrow and deep members
Machine compaction compaction-types of vibrators internal screed vibrators and form vibrators, methods of handling screed vibrators and immersion vibrators, suitability of concrete mixes for compaction with vibrators.
Selection of suitable vibrators for various situations
Finishing concrete slabs, floating and trowelling
Curing
Object of curing, method of curing, shading concrete works, covering surfaces with besian, gunny bags, sprinkle of water, ponding method and membrane curing, steam curing
Recommended duration for curing and removal of form work
Jointing
Location of construction joints, treatment of construction joint before the concrete is poured, concreting at these points, expansion joints in concrete in buildings their importance and location
Note: - A field visit may be planned to explain and show the relevant things

DCE-420P                CONCRETE TECHNOLOGY

Maximum Time :3 Hrs.      University Examination : 35 Marks
Total Marks :50            Continuous Internal Assessment : 15 Marks
Minimum Pass Marks :40%

1. To determine the compressive strength of Portland cement (IS-269)
2. To determine flakiness index and elongation index of coarse aggregate (IS 2386-Part I)
3. Field method to determine fine silt in aggregate.
4. Determination of specific gravity and water absorption of aggregate (IS-2386-part III for aggregates of size 40 mm to 10 mm)
5. Determination of bulk density and voids of aggregates (IS-2386-part III)
6. Determination of surface moisture in fine aggregate by displacement method (IS 2383 – Part III)
7. Determination of particle size distribution of fine, coarse and all in aggregate by sieves analysis (grading of aggregate)
8. To determine necessary adjustment for bulking of fine aggregate by field method (IS-2383-Part III)
9. Test for workability (slump test):
   (a) To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
   (b) To test cube strength of concrete with varying water cement ratio
10. Compaction factor test for workability (IS: 1199)
11. Non destructive test on concrete
    (a) Rebound hammer test
    (b) Ultrasound test
12. Tests for compressive strength of concrete cubes for M-15 or M-20 grade

**DCE-430**
**STRUCTURAL MECHANICS**

Maximum Time : 3 Hrs. University Examination : 35 Marks
Total Marks : 50 Continuous Internal Assessment : 15 Marks
Minimum Pass Marks :40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

**SECTION A**

1. **Properties of Materials**
   Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials.
   Tensile test, compressive test, impact test, fatigue test, torsion test.

2. **Simple Stresses and Strains**
   Concept of stress, normal and shear stresses due to torsion
   Concept of strain, strain and deformation, longitudinal and lateral strain, poison’s ratio, Volumetric strain
   Hooke’s law, modulli of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants.
   Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produces in compound bars (two or three) due to axial load.
Stress-strain diagram for mild steel, mechanical properties, factor of safety
Temperature stresses and strains

SECTION B
3. Bending Moment and Shear Force
Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, fixed and continuous beams
Types of loads (point, uniformly distributed and varying loads)
Concept of bending moment and shear force, sign conventions
Bending Moment and shear force diagrams for cantilever, simply supported and over hanging beams subjected to concentrated, uniformly distributed and uniformly varying loads (B.M. and S.F. diagrams should preferably be drawn on graph paper.
Relationship between load, shear force and bending moment, point of maximum bending moment and contraflexure.

4. Second Moment of Area
Concept of second moment of area, radius of gyration
Theorems of parallel and perpendicular axes
Second moment of area for sections of Rectangle, Triangle, Circle, Trapezium, Angle, Tee, I, Channel and Compound sections. (No derivation)

5. Bending and Shear Stresses
Theory of simple bending
Application of the equation \( \frac{M}{I} = \frac{\sigma}{Y} = \frac{E}{R} \) (No derivation is required)
Moment of resistance, sectional modulus and permissible bending stresses in circular, rectangular, I, T and L sections; Comparision of strengths of the above sections.

SECTION C
6. Slope and Deflection
Necessity for determination of reflection
Moment area theorems (no derivation)
Computation of slopes and deflections using moment area theorems for:
(a) Simple supported beam with UDL over entire span and concentrated load at any point
(c) Cantilever with UDL over entire span and concentrated load at free end

7. Columns
Theory of columns, Euler, Rankine’s and I.S. formulae.

SECTION D
8. Combined Direct and Bending Stresses
Concentric and eccentric loads, eccentricity
Effect of eccentric load on the section, stresses due to eccentric loads, examples in the case of short columns.
Effect of wind pressure on walls and chimneys; water pressure on dams and earth pressure on retaining walls their causes of failures and their stability.

9. Analysis of Trusses
Concept of a frame, redundant and deficient frame, End supports, ideal and practical trusses.
Analysis of trusses by:
(i) Methods of joints
(ii) Method of sections and
(iii) Graphical method
DCE-430P  STRUCTURAL MECHANICS

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

1. Determination of yield stress, ultimate stress, percentage elongation and plot the stress
   strain diagram and compute the value of Young’s modulus on mild steel
2. Determination of Young’s modulus of elasticity for steel wire with Searl’s apparatus
3. Determination of modulus of rupture of a timber beam
4. Determination of maximum deflection and Young’s modulus of elasticity in simple
   supported beam with load at middle third
5. Verification of forces in a framed structure

DCE-440  SURVEYING-I

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to
   attempt at least one question compulsorily from each section. Each section carry 15% of
   the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the
   entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of
   the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Introduction
   Content of surveying, purpose of surveying, measurements-linear and angular, units of
   measurements classification of survey based on instruments.
   Instruments used for taking these measurement, Classification to survey based on
   instruments.
   Basic principles of surveying

SECTION B
2. Chain Surveying
   Purpose of chain surveying, principles of chain surveying.
   Equipment used in chain surveying, chain types, ranging rods, arrows, pegs, cross staffs,
   Indian optical square-their construction and use.
   Different operations in chain surveying
   (i) Ranging (Direct/indirect)
   (ii) Offsets (perpendicular/oblique)
Changing (flat and sloping ground)
Conducting chain survey over an area, recording the field data, plotting the chain survey, conventional signs.
Obstacles in chain surveying
(i) Errors in chain surveying
(ii) Correction for erroneous length of chain, simple problems on this.
Testing and adjustment of chain and Indian optical square.

SECTION C
3. Compass Surveying
Purpose of compass surveying, Construction and working of prismatic compass, use of peismatic compass: Setting and taking observations.
Concept of:
a) Meridian-Magnetic and true
b) Bearing-Magnetic. True and Arbitrary
c) Whole circle bearing and reduced bearing
d) Magnetic dip and declination
Local attraction-causes, detection, errors and correction, problems on local attraction, magnetic declination calculation of included angles in a compass traverse.
Concept of a traverse-Open and closed. Traversing with a compass-By included end deflection and closed traverse, plotting a traverse-By included end deflection angles, concept of closing error, adjustment of traverse graphically by proportionate method.

SECTION D
4. Leveling
Purpose of leveling, concept of a level surface, horizontal surface, vertical surface, daturn, reduced level and bench marks.
Principle and construction of Dumpy and I.O.P. (Tilting) levels.
Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis.
Temporary adjustment: setting up and leveling, adjusting for parallax of Dumpy and I.O.P. level, Different leveling
Concept of back sight, foresight, intermediate sight, station change point, height of instrument.
Level book and reduction of levels by
(i) Height of collimation method and
(ii) Rise and fall method.
Arithmetic checks, problem on reduction of levels, fly leveling, check leveling and profile leveling (L-section and X-section), errors in leveling, and precautions to minimize them and permissible limits, reciprocal leveling, testing and adjustment of IOP level.
Numerical problems.

Note: - For various surveying equipment relevant Indian Standards should be followed
1. Chain Surveying
   (i) Ranging a line
   Chaining a line and recording in the field work
   Testing and adjustment of chain
   Taking offsets—perpendicular and oblique (with a tape only)
   Setting out right angle with a tape
   (ii) Chaining of a line involving reciprocal ranging
   Taking offsets and setting out right angles, with cross staff and Indian optical square
   (iii) Chain survey of a small area (field work and plotting)
   Chaining a line involving obstacles to ranging

2. Compass Surveying
   (v) Study of prismatic compass
   Setting the compass and taking observations
   Measuring angles between the lines meeting at a point
   (vi) Traversing with the prismatic compass and chain a closed traverse (Recording and plotting by included angles)

3. Levelling
   (vii) Study of dumpy level and leveling staff
   Temporary adjustments of a Dumpy level
   Taking staff readings of different stations from the single starting and finding differences of level between them.
   (ix) Study of IOP level
   Its temporary adjustments
   Taking staff readings of different stations from the single starting and finding differences of level between them.
   (x) Longitudinal and cross sectioning of a road/railway/canal
   Setting a gradient by dump and IOP level.
A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Introduction
Definition of irrigation
Necessisity of irrigation
History of development of irrigation in India
Types of irrigation
Sources of irrigation water
2. Rain Fall and Run-Off
Definition of rainfall and run-off. Catchment area, Dicen’s and Ryve’s formulae
Types of rain gauges-Automatic and non-automatic
Stream gaugling
3. Water Requirement of Crops
Definition of crop season
Duty, Delta and Base Period, their relationship
Gross command area, culturable command area, Intensity of irrigation, Irrigable area
Water requirement of different crops of different crops-Kharif and Rabi

SECTION B
4. Lift Irrigation
Types of wells- shallow and deep well, acquifer types, ground water flow, construction of open wells and tubewells
Yield of an open/ tube well and problems
Methods of lifting water- Manual and mechanical devices, use of wind mills

5. Canal Head works
Definition, object, general layout, functions of different parts of head works
Difference between weir and barrage

6. Flow Irrigation
Irrigation canals
Perennial irrigation
Different parts of irrigation canals and their functions
Sketches of different canal cross-section
Classification of canals according to their alignment
Design of irrigation canals - Chezy’s formulae, Meanings formulae, Kennedy’s and Lecey’s silt theories and equations, comparison of above two silt theories, critical velocity ratio
Various types of canal lining- Advantages and disadvantages

SECTION C
7. Regulatory Works
Functions and explanation of terms used
Cross and head regulators
Falls
Energy dissipators
Outlets-different types
Escapes

8. Cross Drainage Works
Functions and necessity of the following types: aqueduct, siphon, superpassage, level crossing, inlet and outlet
Constructional detail of the above

SECTION D
9. Dams
Earthen dams-types, causes of failure
Classification into masonry and concrete dams
Labelled cross section of gravity dam
Spillways-types and uses

10. Water Logging and Drainage
Definition, causes and effects, detection, prevention and remedies
Surface and sub-surface drains and their layout

11. Tubewell Irrigation
Introduction, occurrence of ground water, location and command, advantages of tube wells
Tube wells, explanation of terms water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers
Types of tube wells and their choice-cavity, strainer and slotted type:
Method of construction boring, installation of well assembly, development of well, pump selection and installation and maintenance.
SEMESTER-V

DCE-510P CIVIL ENGINEERING DRAWING-II

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks : 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist of five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answer type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
PUBLIC HEALTH ENGINEERING DRAWING
1. Drains and Sewers
Cross section of standard types of open drains (circular, v-shaped and u-shaped) with their foundations
Cross section of earthen ware and RCC sewer pipes
Cross sections of masonry sewers (circular and egg shaped)
2. Traps. Manholes and Inspection chambers
Detailed section of floor trap and gully trap
Detailed plan and section of an inspection chamber
Detailed plan and section of a manhole for the given data

SECTION B
3. Septic Tank and Soak Pit
Detailed plan and cross-sections of a domestic septic tank and soak pit for 10 users with details of open jointed pipes as per IS 2470 Part I
4. Bath Room and W.C. Connections
Cross section through the external wall of lavatories at ground and first floor showing the single and double pipe system and the connections of lavatory, bath, basin tapes, shower and towel rail
5. Draw the plan and section of a two bed roomed double storeyed residential buildings showing details of water supply and sanitary installation and drainage systems. Show the drainage and water supply up to the municipal systems on the site plan also.
6. Practice of reading water supply and sanitary engineering drawings
SECTION C
IRRIGATION ENGINEERING DRAWING
7. Typical Cross –Section of a channel
Typical cross section of an unlined channel in cutting, partly cutting and partly filling
and fully in filling
8. Well and Tube Well
Plan and cross-section of tube well with pump house

SECTION D
9. A.P.M. Outlet
Working plan and L-section through an A.P.M outlet
10. Distributary Falls
Plan, cross section and L-section of Central Design Office (CD)) type fall with details of
wing wall, pitching. Flooring and toe wall
11. Syphon Aqueduct
Detailed cross-section and L-section of a siphon aqueduct from a given data
12. Culvert
Plan and cross section of a simple culvert

DCE-520 ELEMENTS OF RCC CEDIGN

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks : 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to
attempt at least one question compulsorily from each section. Each section carry 15%
of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the
entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of
the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Introduction
Concept of Reinforced Cement Concrete
2. Reinforcement Materials
Various types of reinforcing materials
Suitability of steel as a reinforcing materials
Properties of different types of steel (mild steel, medium tensile steel and deformed bars)
3. Theory of R.C.C. Beams
Assumption in the theory of simple bending for RCC beam
Flexural strength of a singly reinforced beam
Position of Neutral axis, resisting moment of the section, critical neutral axis, concept of
balanced, under reinforced over reinforced sections.
Shaer strength of singly reinforced RCC beam. Assumptions made, permissible shear stresses as per IS code of practice, actual average shear stresses in singly reinforced concrete beam, concept of diagonal stirrups and inclined bars, shear strength of a RCC beam section

SECTION B
4. Bond in RCC beams
Concept of bond local and average bond
Permissible bond stresses for plain and deformed bars as per IS code of practice
Minimum length of embedment of bars
Actual bond stress in RCC Beams
Bond length (standard hook, slice length as per IS code of practice)
Loads and loading standards for beams as per IS_875
Design of singly reinforced concrete beam as per IS code of practice from the given data such as span, load and properties of materials used.
Design of lintel
Design of main/secondary beam for a RCC flat roof and floor
Design of a cantilever beam/slab

5. Doubly Reinforced Concrete Beams
Doubly reinforced concrete beam and its necessity
Strength of a doubly reinforced concrete beam section
Design of a doubly reinforced concrete beam

6. RCC Slabs:
Structural behaviour of slabs under UDL
Type of end supports
Design of one way slab
Design of two slab with the help of tables of IS:456

SECTION C
7. Reinforced Brick Work
Reinforced brick work and its use in slab and lintels
Limitations of the use of RB work
General principles of design of reinforced brick lintels and slabs
Design of RB lintels and slabs
Specifications for RB work construction

8. T-Beams
Structural behaviour of beam and slab floor laid monolithically
Rules for the design of R-beams
Economical depth of T-beams, strength of T- beams
Design of simply supported T-beams using IS code of practice

SECTION D
9. Columns:
Concept of long and short columns
IS specifications for main and lateral reinforcement
Behavior of RCC columns under axial load
Design of Axially loaded short and long columns with hinged ends
Design of Isolated footings

10. Basic Concept of Prestressed Concrete
Introduction of prestressed concrete, general theory, Linear post tensioning-general, post tensioning advantages to the design engineer and the contractor
Linear post tensioning system, high strength post tensioned stands, parallel lay wire, high strength alloy steel bars
Techniques of post tensioning - general, special requirements for forming and false work, ducts and closures, placing of ducts or tendons, concreting, stressing procedure, grouting, protecting anchorage from corrosion
Pretensioning - general, pretensioning yards set up, forms for pretensioning structural elements. Special techniques of pretensioning
Materials of prestressing - cement, aggregates, concrete, admixtures, vibrations, curing light weight aggregates, high strength steel bars, high strength stand, stress relaxation, galvanization Codes specifications and inspection, manufacturers of prestressing equipment, specifications, sizes and costs

DCE-530 TRANSPORTATION ENGINEERING

<table>
<thead>
<tr>
<th>Maximum Time:</th>
<th>3 Hrs.</th>
<th>University Examination: 35 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Marks:</td>
<td>50</td>
<td>Continuous Internal Assessment: 15 Marks</td>
</tr>
<tr>
<td>Minimum Pass Marks:</td>
<td>40%</td>
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</tbody>
</table>

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A
HIGHWAYS

1. Introduction
Importance of highway transportation; Important organizations like Central Road Research Institute, Indian Roads Congress, Ministry of Surface Transport
Functions of Indian Road Congress
IRC classification of roads
Organisation of state highway department

2. Road Geometrics
Glossary of terms used in geometrics and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient
Design and average running speed, stopping and passing sight distance
Curve necessity, horizontal and vertical curves including transition curves and superelevation. Methods of providing superelevation
Widening of roads on curves
Use of IRC design tables and specifications for finding elements of road geometrics.
Drawing of typical cross-sections in cutting and filling on straight alignment and at a curve.
3. Highway Surveys and Plans
Designation of topographic map, reading the data given on a topographic map
Basic considerations governing alignment for a road in plain and hilly area
Highway location; marking of alignment; importance of various stages viz;
a) Reconnaissance survey: Conduct reconnaissance and prepare reconnaissance report
b) Preliminary survey: Object, Organising, conducting and informations to be collected
c) Location survey
d) Standards for preparing the highway plans as per Ministry of Surface Transport
(MOST)

4. Road Materials
Different types of road materials in use; soil aggregates binders
Function of soil as highway subgrade
California Bearing Ratio; method of finding CBR value and its significance
Testing aggregates: Abrasion test, impact test, crushing strength test, water absorption test and soundness test
Aggregates: Availability of road aggregates in India, requirements of road aggregates as per IS specifications
Binders: Common binders; cement bitumen and Tar, properties as per IS specifications penetration and viscosity test of bitumen, procedure and significance, cutback and emulsion and their uses

SECTION B
5. Road Pavements
Road Pavement: Flexible and rigid pavement, their merits and demerits, typical crosssections,
functions of various components
Sub-grade preparation:
Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, making profiles of embankment, construction of embankment compaction, stabilization, preparation of subgrade, methods of checking Camber, gradient and alignment as per recommendations of IRC, equipment used for subgrade preparation.
Flexible pavements: sub base necessity and purpose, stabilized sub base, purpose of stabilization
Types of stabilization
a) Mechanical stabilization
b) Lime stabilization
c) Cement stabilization
d) Fly ash stabilization
Base of Course
Preparation of base course: Prime coat, Tack coat
a) Brick soiling
b) Stone soiling
c) Metalling: Water bound macadam and bituminous macadams
Methods of construction as per Ministry of Surface transport
Prime coat, tack coat, seal coat
Surfacing: Types of surfacing
a) surface dressing
b) (i) premix carpet
(ii) semi dense carpet
c) Bituminous concrete
d) Grouting
Methods of constructions as per Ministry of Surface transport, specifications and quality control; equipment used.
Rigid Pavements:
Construction of concrete roads as per IRC specifications: Form laying, mixing and placing the concrete, compacting and finishing, cutting, joints in concrete pavement, equipment used

SECTION C
6. Hill Roads
Introduction: typical cross-sections showing all details of a typical hill road in cutting, partly in cutting and partly in filling
Landslides: Causes, preventions and control measures
7. Road Drainage
Necessity of road drainage work, cross drainage works
Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage. Intercepting drains, pipe drains in hill roads, details of drains in cutting embankment, typical cross sections
8. Road Maintenance
Common types of road failures-their causes and remedies
Maintenance of bituminous roads such as patch work and resurfacing
Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices
9. Construction Equipment
Output and use of the following plant and equipments
Hot mix plant and mix all battery
Tipper, factors (wheel and crawler) scraper, bull-dozer, drummers, shovels, grader, roller, dragline.
Asphalt mixer and tar boilers
Road pavers

SECTION D
10. Railways
Different types of gauges and sections
Characteristics of Railway embankments
Concept of creep
11. Bridges
Different types of bridges
Components of a bridge
Bridge foundations
12. Tunnels
Necessity of tunnels
Methods of construction of tunnels in hard and soft rocks
Ventilation and drainage of tunnels
DCE-530P  TRANSPORTATION ENGINEERING

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

1. Determination of the California bearing ratio (CBR) the sub-grade soil (demonstration only)
2. Determination of penetration value of bitumen
3. Determination of softening point of Bitumen
4. Determination of impact value and crushing value of the road aggregate
5. Determination of abrasion value of road aggregate
6. Determination of ductility of bitumen
7. Determination of viscosity of tar / bitumen

DCE-540  SOIL AND FOUNDATION ENGINEERING

Maximum Time : 3 Hrs.  University Examination : 35 Marks
Total Marks : 50  Continuous Internal Assessment : 15 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Introduction
Importance of soil studies in Civil Engineering
Geological origin of soils with special reference to soil profiles in India : Residual and transported soil, Alluvial deposits. Lake deposits, dunes and loess, glacial deposits, conditions in which above deposits are formed and their engineering characteristics.
Engineering classification of soils, comparision between sand and clay.

2. Physical Properties of Soils:
 Constituents for soil, phase diagram for soil
 Definitions and meaning of void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weight, dry unit weight
 Simple numerical problems with the help of phase diagrams

3. Soils Classification and Identification
 Particle size, shape and their effect on engineering properties of soil
 Gradation of soil particles and its influence on engineering properties
 Relative density and its use in describing cohesionless soils
Behaviour of cohesive soils with change in water content, Atterberg limits definitions, use and practical significance
Field identification test for soils
BIS soils classification systems; basis, symbols, major divisions and sub divisions, groups, plasticity chart; procedure to be followed in classifying a given soil into a group

SECTION B
4. Flow of Water Through Soils:
Concept of permeability and its importance
Darcy’s law, coefficient of permeability, seepage velocity and factors affecting permeability
Comparison of permeability of different soils as per BIS
Measurement of permeability in the laboratory and in the field

5. Effective Stress: (Concept Only)
Stresses in subsoil
Definition and meaning of total stress, effective stress and neutral stress
Principle of effective stress
Importance of effective stress in engineering problems

6. Deformation of Soils
Meaning, conditions/situations of occurrence with emphasis on practical significance of:
a) Consideration and consolidation settlement
b) Creep
c) Plastic flow
d) Heaving
e) Lateral movement
Definition and practical significance of compression index, coefficient of consolidation, degree of consolidation
Meaning of total settlement, uniform settlement, different settlement and rate of settlement and their importance
Settlement due to construction operations and lowering of water table
Tolerable settlement for different structures as per Bis

SECTION C
7. Strength Characteristics of Soils
Examples of shear failure in soils
Factors contributing to shear strength of soils, Coulomb’s law
Determination of shearing strength direct shear test and unconfined compression test.
Brief idea about triaxial shear test, comparison between direct shear test and triaxial test.
Drainage conditions of test and their significance
Stress and strain curve, peak strength and ultimate strength, their significance
Discrepancies between laboratory and field tests.

8. Soil Compaction
Definition of compaction and its necessity
Laboratory compaction test (light and heavy as per BIS) definition and importance of optimum water content, maximum dry density, moisture dry density relations for typical soils with different compactive efforts
Field compaction; methods and equipment, choice of equipment
Compaction requirements
Compaction control; Density control, field density test. (sand replacement), moisture control, Proctor’s needle and its use, thickness control, jobs of an embankment supervisor in relation to compaction
SECTION D
9. Bearing Capacity
Concept of bearing capacity
Definition and significance of ultimate bearing capacity safe bearing capacity and allowable bearing pressure
Bearing capacity from building codes
Factors affecting bearing capacity
Concept of vertical stress distribution in soils due to foundation loads
Plate load test and interpretation of its results, limitations of plate load test
Bearing capacity by SPT and unconfined compression test
Soil properties governing choice of foundation type
Methods of improving bearing capacity of soil

10. Soil Exploration
Purpose and scope of soil exploration
Undertaking planning of subsurface investigations
Influence of soil conditions on exploratory programme
Possibility of misjudgement of subsoil conditions
Location, depth and spacing of exploration
Influence of size of project and type of structure on exploratory programme
Methods of soil exploration; Reconnaissance, Trial pits, borings, (Auger, wash, rotary percussion to be briefly dealt), SPT and dynamic cone penetration test (Brief description and information collected)
Groundwater level measurement
Sampling: undisturbed, distributive and representative samples; selection of type of sample; thin wall and piston samples; area ratio, recovery ratio of samples and their significance. Number and quantity of samples, resetting, sealing and preservation of samples.
Presentation of soil investigation results

11. Foundation Engineering
Concept of hollow and deep foundation; types of shallow foundations and their suitability; Factors affecting the depth of shallow foundations; deep foundations, classification of piles according to function and material; installation of concrete piles (under reamed, bored, compacted) and their suitability; load carrying capacity of piles; constructional features of pile foundations, well foundation
1. Auger Boring and standard penetration test
   Identifying the equipment and accessories
   Conducting boring and SPT of a given location
   Collecting soil samples and their identification
   Preparation of boring log and SPT graphs
   Interpretation of test results

2. Extraction of Disturbed and Undisturbed Samples
   Extracting a block sample
   Extracting a tube sample
   Extracting a disturbed sample for mechanical analysis. Compaction and limit test
   Field identification of samples

3. Field Density Measurement (Sand Replacement and Core Cutter Method)
   Calibration of sand
   Conducting field density test at a given location
   Determination of water content
   Computation and interpretation of results

4. Liquid Limit and Plastic Limit Determination
   Identifying various grooving tools
   Preparation of sample
   Conducting the test
   Observation soil behaviour during tests
   Computation, plotting and interpretation of results

5. Mechanical Analysis
   Preparation of sample
   Conducting sleeve analysis
   Computation of results
   Plotting the grain size distribution curve
   Interpretation of the curve

6. Laboratory Compaction Tests (Standard Proctor test)
   Preparation of sample
   Conducting the test
   Observing soil behaviour during test
   Computation of results and plotting
   Determination of optimum moisture and maximum dry density

7. Unconfined Compression Test
   Specimen Preparation
   Conducting the test
   Plotting the graph
   Interpretation of results and finding/bearing capacity

8. Direct shear test on sandy soil samples
DCE-550 SURVEYING-II & CAMP

Maximum Time: 3 Hrs. University Examination: 35 Marks
Total Marks: 50 Continuous Internal Assessment: 15 Marks
Minimum Pass Marks: 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A
1. Plane Table Surveying
   Purpose of plane table surveying, equipment used in plane table survey:
   Plane table
   Alidade (Plain and Telescopic)
   Accessories
   Setting of a Plane Table
   Centering
   Levelling
   Orientation
   Methods of plane table surveying
   Rediation,
   Intersection
   Traversing
   Resection
   Two Point Problem
   Three Point Problem
   Mechanical method (Tracing paper)
   Bessel’s Graphical method
   Trial and error method
   Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidade

2. Contouring
   Concept of contours, purpose of contouring, interval and horizontal equivalent, factors affecting contour interval, characteristics of contours, methods of contouring:
   Direct and indirect, use of stadia measurements in contour survey, interpolation of contours, use of contour map. Drawing cross section from contour map; marking alignment of a road, railway and a canal on a contour map, composition of earth work and reservoir capacity from a contour map
SECTION B
3. Theodolite Surveying
Working of transit vernier theodolite, fundamental axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of vernier, least count and reading a vernier; concept of transmitting, swinging, face, left face right and changing face, measurement of horizontal and vertical angles. Prolonging a line (forward and backward) measurement of bearing of a line; traveling by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse, concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimise them; limit of precision in theodolite traversing. Brief introduction to tacheometry and use of tacheometric tables.

SECTION C
4. Curves:
Simple circular curves
Need and definition of a simple circular curve; Elements of simple circular curves- Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point length of a curve, long chord deflection angle, Apex distance and Mid-ordinate. Setting out of simple circular curve:
   a) By linear measurements only
      offsets from the tangents
      Successive bisection of arcs
      Offsets from the chord produced
   b) By tangential angles using a theodolite
      Transition curves
      Need (centrifugal force and super elevation) and definition of transition curve, requirements of transition curves for roads; by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only.
      Vertical curves
      Setting out of a vertical curve

SECTION D
5. Minor Instruments
Study and use of the instruments given below to be explained in addition to providing practice:
   a) Abney level
   b) Tangent clinometer
   c) Proportionate compass
   d) Ceylon Ghat Tracer
   e) Pentagraph
   f) Planimeter
Note: -
   a) For various surveying equipment relevant Indian standards should be followed
   b) No sketch of the instruments may be asked in the examination
DCE-550P

SURVEYING-II & CAMP

Maximum Time : 3 Hrs.
Total Marks : 50
Minimum Pass Marks :40%

1. Plane Table Surveying
   Study of the plane table survey equipment
   Setting the plane table
   Marking the north direction
   Plotting a few points by radiation method
   Orientation by
   Trough compass
   Back sighting
   Plotting a few points by intersection method
   Traversing an area with a plane table (at least five lines)
   To plot the position of plane table station by solving:
   a) Two point problem
   b) Three point problem by
   Tracing paper method
   Bessel’s graphical method
   Trial and Error method
   Setting and checking grades with abney level. Setting and checking grades with
   Ceylong Ghat Tracer
   Use of proportionate compass for enlargement reduction of lines and areas of geometrical
   plane figures, volume of solids and drawing geometrical figures of required number of
   sides in a circle.
   Finding heights by Indian Pattern Clinometer (Tangent Clinometer)
   Enlargement/reduction of a plan by the use of pentagraph
   Use of planimeter for computing areas

2. Contouring
   Preparing a contour plan by radial line method by the use of a Tangent Clinometer/ Tacheometer
   Preparing a contour plan by method of squares
   Preparing a contour plan of a Road/Railway track/ Canal by taking cross sections.

3. Theodolite:
   Taking out the theodolite, mounting on the tripod and placing it back in the box
   Study of a transit vernier theodolite; temporary adjustment of theodolite
   Reading the vernier and working out the least count, measurement of horizontal angles
   by repetition and reitration
   Prolonging a line forward and backward
   Measurement of magnetic bearing
   Measurement of vertical angles and use of techeometric tables
   Running a closed traverse with a theodolite (at least five sides) and its plotting

4. Curves
   Setting out of a simple circular curve with the given data by the following methods
   a) Offsets from the chords produced
   b) One theodolite method
   Setting out a circular curve with transition length by linear measurements
SEMESTER-VI

DCE-610 EARTHQUAKE RESISTENT BUILDING CONSTRUCTION

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks : 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
ELEMENTS OF ENGINEERING SEISMOLOGY
cause of earthquake, seismic wave, earthquake size (magnitude, intensity), classification of earthquake, seismic zoning map of India, static and dynamic loading, static and dynamic equilibrium, fundamental period

SECTION B
seismic behavior of traditionally built construction of India.
Seismic performance during earth quake and mode of failure (out of plane failure, in plane failure, diaphragm failure, connection failure, non structural component failure).

SECTION C
seismic provision of strengthening and retrofitting measure for traditionally built constructions.

SECTION D
Common modes of Failure of Reinforced Concrete buildings
Horizontal & vertical irregularities identifications seismic damage in building components (columns, beams, slabs, infill wall, foundation etc.), ductile detailing as per IS-13920.
DCE-620 ELEMENTS OF STEEL STRUCTURAL DESIGN

Maximum Time : 3 Hrs. University Examination : 70 Marks
Total Marks: 100 Continuous Internal Assessment : 30 Marks
Minimum Pass Marks : 40%

A) Instructions for paper-setter
1. The question paper will consist of five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates
1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A
1. Structural Steel and Sections:
Properties of structural steel as per IS: 226 and IS:197
Designation of structural steel sections as per IS handbook and IS:800
Concept of determinate and indeterminate structures

SECTION B
2. Structural Steel Connections:
Riveted connections, types of rivets, permissible stresses in rivets as per IS:800, types of riveted joints, specifications as per IS 800 for riveted joints, design of riveted joints for axially loaded members; testing and inspection of riveted joints as per IS:800
Welded connections: Types of welds, permissible stresses in welds, types of welded connections, design of butt and fillet welded connections subjected to axial loads, testing and inspection of welded joints as per IS:800

SECTION C
3. Tension Members:
Permissible stresses in tension for steel, design of tension members as per IS:800 (flats, angles and fee sections only).
4. Compression Members:
Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in comparison as per IS:800, strength of columns of single and built up sections with the help of table of permissible compressive stresses.
IS specifications for design of angle, struts and axially loaded columns (no built up columns); use of tacking rivets
Column base sketch of slab base and guessed base, beam and column connections (no design)

SECTION D
5. Beams:
IS specifications for the design of simply supported steel beams including design of base plate at the ends (laterally restrained beams only), structural behaviour deflected shapes and function of various elements of a plate girder and freehand sketching of a plate girder and its elements.

DCE-630  

ESTIMATING AND COSTING

Maximum Time : 3 Hrs.  
University Examination : 70 Marks
Total Marks : 100  
Continuous Internal Assessment : 30 Marks
Minimum Pass Marks :40%

A) Instructions for paper-setter

1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks
3. Section E will comprise of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed

SECTION A

1. Buildings

Introduction to estimating: Types of estimates, drawings to 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 methods
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.
Preparation of a detailed estimate, complete with detailed reports, specifications, abstract of cost and material statement for pitched roof with steel truss only

SECTION B

2. Analysis of Rates:

Steps in the analysis of rates for any item of work requirement of material, labour, sundries and contractors profit
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 of the following items 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) Damp proof course.
d) RCC and RB in roof slabs

c) First class burnt brick masonry in cement mortar

f) Cement plaster

g) Cement pointing-flush, deep pointing

SECTION C

2. Irrigation
Calculation of earth work for inclined channels with the help of drawings for different cross-sections
Preparation of detailed estimate for a brick lined distributory from a given section

3. Public Health
Preparation of detailed estimate for laying a water supply line (CI pipe)
Preparation of detailed estimate for sanitary and water supply fittings in a domestic containing one set of toilets and septic tank
Preparation of detailed estimate for laying a brick sewer

SECTION D

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 for 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.

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
Steel Structural Drawing
1. Preparation of a working drawing (elevation, plan, details of joints as ridge, eaves and other connections) for a riveted steel roof truss resting on a masonry wall with the given span, shape of the truss and the design data regarding the size of the members and the connections. Also calculate the quantity of steel for the truss.
2. Steel connections (a,b,c,d) riveted and (e) welded all unstiffened
   Beam to beam connections (Seated and franed)
   Beam to column (Seated and franed)
   Column base connections (Slab base and gusseted base)
   Details of column splices
   Connections of a steel bracket with flange of a column
3. Detailed drawing showing plan and elevation for a riveted plate girder with the given design data regarding the sizes of its parts, with details at the supports and connections of stiffeners, flange angles and cover plates with the web.

MAJOR PROJECT WORK

Some of the suggested project activities are given below
1. Setting up of an enterprise
2. Projects connected with repair and maintenance of civil works
3. Estimating and costing projects
4. Design of residential buildings including design of structural members
5. Project work related to quality control of materials, concrete and construction activities
6. Project work related to waste minimization and waste utilisation
7. Preparation of bar bending schedules and estimation of steel requirement
8. Survey Work
9. Valuation of buildings
10. Alignment of roads
11. Design of septic tanks
12. Design of water supply scheme for a locality
13. Design of flood water disposal system
14. Pollution prevention and control studies etc.