W'05 : 4 FN : CV 403(1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time: Three hours

Maximum marks: 100

Answer five questions, taking any two from Group A, any two from Group B and all from Group C.

All parts of a question (a, b, etc) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

Any missing data or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) Define modulus of elasticity.

   (b) Define the requirements of stone to be used for structural purposes.

   (c) Differentiate between mild steel rods and high yield strength deformed bars.

   (d) List the steps involved in the manufacture of cement through ‘dry process’.

   (End of Exam)
2. (a) When does creep occur?
   (b) Write the compound composition limits of Portland cement.
   (c) Describe 'shortcoting' and its application.
   (d) Differentiate between blending and segregation of concrete.

3. (a) Illustrate different market forms of rolled steel sections.
   (b) Define '53 grade' cement. What test will you do to certify that a cement conforms to '53 grade'?
   (c) Highlight three types of admixtures used in concrete with its functions.
   (d) Write a short note on 'Alkali-Aggregate reaction'.

4. (a) How do you determine the fineness modulus of fine aggregate? How is this value used in mix design?
   (b) Define compacting factor? When do you use compacting factor test instead of slump test?
   (c) Define carbonation of concrete.
   (d) How is fire-resistance of material tested?

   Group B

5. (a) Describe the method of sampling of bricks as per BIS.
   (b) Explain 'non-destructive evaluation'.

   CV 403 (1429) (2) (Continued)

   (c) Differentiate between an unit rate contract and turnkey contract.
   (d) What are the shortcomings of a bar chart?

6. (a) Why is dimensional tolerance of bricks important? How are they tested?
   (b) Write the specification you would lay down for 'brickwork' in respect of wall construction.
   (c) How would you take care of 'escalation' in a contract?
   (d) Discuss the role of management in project execution.

7. (a) How do you estimate the time required for an item of work?
   (b) List the safety precautions to be adopted during 'formwork' preparation.
   (c) How will you sample concrete at site for determination of compressive strength as per IS 456?
   (d) Define the terms PERT and CPM.

8. (a) Describe various phases of project management.
   (b) How do you estimate the strength of concrete non-destructively?
   (c) How do you ensure quality control of concreting work at site?
   (d) List the break-up of items of work involved in the construction of stepped footing.
Group C

9. Choose the correct answer for the following: \(1 \times 20\)

(i) Marble is
   (a) a crystalline lime stone.
   (b) composed chiefly of silica and alumina.
   (c) fine grained crystals of felspar and hornblende.
   (d) composed of carbonates of lime and magnesia.

(ii) The ratio of tensile strength to compressive strength of concrete is
   (a) \(1/5\)
   (b) \(1/20\)
   (c) \(1/2\)
   (d) \(1/10\)

(iii) 'Efflorescence' of brick refers to
   (a) brittleness when soaked in water.
   (b) loss in strength when brick is wet.
   (c) degree of deposition of salt on surface when absorbed water evaporates.
   (d) durability characteristics of bricks when subjected to repeated wetting and drying.

(iv) The density of steel in \(\text{kg/m}^3\) is
   (a) 5670
   (b) 7850
   (c) 4250
   (d) 10500

(v) Determination of final setting time of cement is made to decide whether
   (a) further construction can be started.
   (b) shuttering can be removed with props alone left.
   (c) cement has started hardening.
   (d) cement has grained strength.

(vi) Flyash is a
   (a) pottolonic material.
   (b) cementitious material.
   (c) chemical admixture.
   (d) inert filler material.

(vii) Rebe time workability test is useful for concrete which is
   (a) flowing.
   (b) self-compacting.
   (c) very stiff.
   (d) ready mix.
Air-entrainment is done in concrete for
(a) reducing density significantly.
(b) ensuring better performance under freezing and thawing.
(c) reducing workability significantly.
(d) reducing cement content.

The term 'bark' in timber refers to
(a) sapwood.
(b) outermost layer.
(c) cambium.
(d) medulla.

High early strength cement is used for
(a) hot weather concreting.
(b) mass concreting.
(c) cold-weather concreting.
(d) warm-humid weather concreting.

Reinforcement corrosion can be reduced by
(a) increasing water-cement ratio.
(b) reducing permeability of concrete.
(c) increasing maximum size of aggregate.
(d) reducing the coarse aggregate content.

Ultrasonic pulse velocity tester is used to determine
(a) compressive strength of concrete.
(b) impact resistance of concrete.
(c) crushing value of concrete.
(d) quality of concrete (uniform compaction).

In network analysis, an 'event'
(a) acts as an end point of project.
(b) refers to progress of an activity.
(c) refers to an activity requiring help of another activity.
(d) requires resources or time to complete it.

A concrete cylinder of size 150 mm diameter and 300 mm long tested for split tension test, failed at a load of 100 kN. Then the split tensile strength is
(a) 0.35
(b) 0.71
(c) 1.42
(d) 2.83

In a construction contract, the Clause that is used in order to compensate a contractor due to unforeseen situation such as floods, political strike, etc, is known as
(a) deviation.
(b) arbitration.
(c) lignidated damages.
(d) force majeure.

(xvi) The costs attributable to project work items like labour, and materials, which are usually nonlinear, is known as
(a) overhead costs.
(b) crash cost.
(c) direct cost.
(d) indirect cost.

(xvii) In the analysis of rate for estimating, the following items are taken into account:
(a) labour + material + profit
(b) labour + material + construction cost
(c) labour + material + equipment + overhead
(d) labour + material + equipment + idling cost

(xviii) Find out the free float for the following activity:

\[
\begin{align*}
EET &= 40 \\
\text{Activity} &= a \rightarrow b \\
\text{Duration} &= 15 \text{ days} \\
LET &= 40 \\
\text{Late expected time} (LET) &= 69
\end{align*}
\]

(a) 28 days
(b) 29 days
(c) 1 day
(d) 39 days

(xix) In a PERT network, if \( t_o \) is the optimistic time, \( t_m \) is the most likely time, and \( t_b \) is the pessimistic time, then the standard deviation is given by

(a) \( \frac{t_o + t_m + t_b}{6} \)
(b) \( \frac{t_m - t_o}{6} \)
(c) \( \frac{t_b - t_m}{6} \)
(d) \( \frac{t_b - t_o}{6} \)

(xx) Metals and alloys, which are deformed when cold (cold working) becomes

(a) soften, weaker and more ductile.
(b) harder, stronger and same ductility.
(c) softer, weaker and less ductile.
(d) harder, stronger and less ductile.
S'06: 4 FN: CV 403 (1429)

CIVIL ENGG. MATERIALS & CONSTN. PRACTICES

Time : Three hours

Maximum Marks : 100

Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

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Group A

1. Describe in brief the properties and uses of: 4 x 5

   (i) Ordinary portland cement;

   (ii) Rapid hardening cement;

   (iii) Blast furnace slag cement;

   (iv) White cement and

   (v) Super sulphated cement.

(Turn Over)
2. (a) Describe the properties and uses of high tension steel. 8
   (b) Describe fire protection procedures by both corrective and preventive measures. 8
   (c) Write about corrosion and its prevention. 4

3. (a) Describe some special features of building construction in earthquake prone zones. 8
   (b) Describe the procedure of civil engineering structures to be constructed under water condition. 8
   (c) Describe in brief about fibre reinforcement concrete. 4

4. (a) Write about properties, uses and availability in India the stone ‘basalt and trap’. 8
   (b) Write in details about the construction procedure of a multistoreyed building with R.C.C. frame structures. 12

   **Group B**

5. (a) Describe with the help of a neat sketch about the procedure of manufacture of bricks of Hoffman’s kiln. 10
   (b) What are the different methods of manufacture of steel. Describe any one method in detail. 10

6. (a) Describe the major contents of a tender document to be submitted against a big size turn-key project. 10
   (b) What are the important safety measures taken during construction of a large project? 5
   (c) Describe in brief about non-destructive tests of materials. 5

7. (a) Compare between item rate contracts and lump sum contracts. 6
   (b) How progress of work is monitored by Pie-diagram and Bar chart. 6
   (c) Describe about the application of ‘PERT’ in project management. 8

8. (a) Describe about the desirable qualities of bricks. 5
   (b) Explain how crash programe is made in CPM network. 5
   (c) From the following data, prepare the network diagram, determine the completion period and show the critical path method: 10

<table>
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<th>Activity item</th>
<th>Duration in days</th>
<th>Activities immediately preceding</th>
<th>None</th>
<th>Activities immediately following</th>
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<tr>
<td>G</td>
<td>4</td>
<td>E</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

4FN:CV403 (1429) (2) (Continued)
Group C

9. Choose the correct answer:

(i) Sandstone is a

(a) metamorphic rock
(b) sedimentary
(c) igneous
(d) all of these.

(ii) Load applied to the rock should be

(a) parallel to the cleavage plane
(b) perpendicular to the cleavage plane
(c) at 45° angle to the cleavage plane
(d) all of these.

(iii) In the soil stratum, the permeability is higher for

(a) finer soil particles
(b) coarser soil particles
(c) at lower temperature
(d) none of these.

(iv) The size of modular bricks, should be in cms

(a) 7.5 × 12.5 × 25.0
(b) 5 × 10 × 15
(c) 10 × 10 × 20
(d) none of these.

(v) There may be environmental impact on building due to

(a) industrial emission
(b) acid rain
(c) severe climatic changes
(d) all of these.

(vi) Natural defects ‘Rind gall’ is found in

(a) stone blocks
(b) steel sections
(c) bricks
(d) timbers.

(vii) The term ‘HDPE’ generally stands for

(a) Hard and durable plastic equipments
(b) Heat and damp proof equipments
(c) High density polyethylene
(d) None of these.
(viii) The materials added to plastics to improve their mechanical properties and also make them economical is known as

(a) accelerators
(b) plasticisers
(c) stabilizers
(d) fillers.

(ix) This problem is associated with concrete

(a) efflorescence
(b) knots
(c) dry rots
(d) carbonation.

(x) In mild steel iron content is about

(a) 50%
(b) 80%
(c) 90%
(d) 99%.

(xi) The ultimate tensile strength of mild steel in kg/cm² is

(a) 1400
(b) 4000
(c) 6000
(d) 10000.

(xii) The term 'RSJ' generally stands for

(a) rolled steel joints
(b) rail Station junction
(c) rivetted structural joints
(d) none of these.

(xiii) Atterberg's limits are related to properties of

(a) cement
(b) plastics
(c) timbers
(d) steel.

(xiv) The term ‘Laitance’ is associated with

(a) steel sections
(b) concrete work
(c) plastic materials
(d) all of these.

(xv) The term 'Screeding' is associated with

(a) steel sections
(b) concrete work
(c) plastic materials
(d) none of these.

(xvi) Cement and sand required for 25 mm thick (1:6) cement plaster in cu.m for 100 sq. m surface area

(a) 0.884 & 2.65
(b) 0.71 & 2.84
(c) 0.472 & 2.84
(d) 1.0 & 6.0

(xvii) For 1 cu.m brick work with 1:6 cement mortar with modular bricks, quantity of materials required are

(a) bricks 389 Nos, cement 1.0 cu.m, sand 6.0 cu.m
(b) bricks 389 Nos, cement 0.5 cu.m sand 3.0 cu.m
(c) bricks 500 Nos, cement 0.5 cu.m sand 0.9 cu.m
(d) bricks 500 Nos, cement 0.0537 cu.m sand 0.322 cu.m

(xviii) For 4:2:1 cement concrete, 1 cu.m concrete will require

(a) chips 1 cu.m, sand 0.5 cu.m, cement 0.25 cu.m
(b) chips 0.88 cu.m, sand 0.44 cu.m, cement 0.22 cu.m

(c) chips 0.7 cu.m, sand 0.35 cu.m, cement 0.18 cu.m
(d) none of these.

(xix) The use of super plasticiser in concrete may

(a) increase the workability
(b) reduce the W/C ratio
(c) increase the strength of concrete
(d) all of these.

(xx) Gantt chart is also known as:

(a) CPM technique
(b) PERT method
(c) Bar Chart
(d) None of these.
W'06 : 4 FN : CV 403 (1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours

Maximum Marks : 100

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Group A

1. (a) State the advantages of open-hearth process of manufacture of steel.  
   
2. (b) Mention the properties of mild steel.  
   
3. (c) Define the following:  
   
   (i) Porosity  
   
   (ii) Water Absorption
(iii) Fire resistance
(iv) Hardness.

2. (a) Explain the dry process of manufacture of cement.
(b) State the procedure used to determine the compressive strength of cement.
(c) What are the qualities of a good building stone.

3. (a) What are the factors which influence the strength of concrete?
(b) What is workability of concrete? What are the different measures of workability?
(c) What is seasoning of timber? Enumerate various defects in timber.

4. (a) What is called carbonation?
(b) What are the different methods of curing concrete? How will you cure concrete in a pavement?
(c) Explain the term ‘Shotcrete’. Where is shotcrete employed?

Group B

5. (a) Explain the characteristics of a good brick. Briefly state important field tests on bricks.
(b) State and explain the functions of the following ingredients:
(i) Lime

(ii) Alumina
(iii) Silica.

(c) What is called latest allowable occurrence time?

6. (a) Describe the tests to be carried out on bricks to find out their suitability. Give standard specifications for these tests.
(b) Mention the advantages of hollow bricks or cavity bricks.
(c) Where fire bricks are used? What are the various varieties of fire bricks?

7. (a) State the particulars to be given/covered by the tender document.
(b) What is called as lumpsum and schedule contract? Explain.
(c) Explain the term ‘Cost plus percentage contract’.

8. (a) What is CPM? Explain.
(b) What is depreciation? Explain the straight line method and constant percentage method used to calculate depreciation. Briefly state their applications.
(c) Mention the items included in the complete estimate of a project.
Group C

9. Answer all questions: 2 x 10

(i) Define 'Thermal capacity of a material'.

(ii) State the common defects in steel.

(iii) Mention the functions of the following components of cement:

   (a) C₂S
   (b) C₃S
   (c) C₃A
   (d) C₄AF

(iv) What are the nominal sizes of modular and non-modular bricks. What are the dimensional tolerances for bricks.

(v) What are the reasons for segregation in concrete?

(vi) What is the function of silica as an ingredient in brick?

(vii) Briefly state the various types of bonds in brick masonry.

(viii) What is called carpet area of a building? How is it different from plinth area?

(ix) What is called slack in PERT analysis? Mention the various types slack.
CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

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Group A

1. (a) What are the various engineering properties of materials? 4

   (b) How are rocks physically and chemically classified? What are rock forming minerals? 6

   (c) What are the qualities of a good building stone? What is meant by dressing of a stone? Describe its various varieties. 5
(d) What are the forces responsible for causing natural
defects in timber? Discuss the methods adopted for
preservation of timber.

2. (a) What are the important properties of cement?
Discuss at length the manufacturing process of
ordinary cement.

(b) What are the purposes of testing cement? Enumerate
the laboratory tests for cement and describe any two
of them?

(c) What is rapid hardening cement? Enumerate various
varieties of cement in addition to ordinary cement.

3. (a) What are the factors which affect physical properties
of steel? Describe the various processes adopted to
manufacture of steel.

(b) Mention the classification of steel and explain the
properties of hard steel and mild steel? Describe the
measures adopted to prevent corrosion of ferrous
metals.

(c) What is meant by proportioning of concrete? Discuss
the theory of formation of concrete. Also, explain the
workability of concrete.

4. (a) What is slump test of concrete? How is it carried out?
Mention recommended slums for concrete for
different purposes.

(b) Describe the methods adopted for determining the
volumetric proportions of various components of
concrete.

(c) Write short notes on the following:

(i) Blast furnace slag;

(ii) Retarders and superaccelerators;

(iii) Shotcrete;

(iv) Modulus of rupture and elasticity.

Group B

5. (a) What are the constituents of good brick earth? State
some harmful ingredients in brick earth.

(b) Discuss the operation of preparation of clay for the
manufacture of bricks? Explain the process of
burning of bricks in clamps?

(c) Explain various types of bricks? Describe the two
field test which may be carried out to determine the
suitability of soil for the purpose of brick manufacture.

6. (a) Explain the various standardization and standards
needs for manufacturing of bricks nationally and
internationally.

(b) How do you evaluate the quality of brick? Explain
the various non-destructive testing and evaluation
process of bricks.

(c) Differentiate between Bullnose brick and Cowhose
brick.

7. (a) State the main objectives of construction
management and explain six major functions of
construction management.

(b) Explain the safety measures required to be adopted
for scaffolding, ladders and formwork? Discuss
codes for safety against fire?
(c) Describe the procedure for calling a tender. How are
tenders scrutinized and compared before the
selection of the tender is made? How is a tender to
be chosen?

8. Write short notes on any four of the following: 5 x 4

(i) PERT and CPM;
(ii) Bar chart and pie diagrams;
(iii) Turnkey projects;
(iv) E-tendering and E-procurement;
(v) Escalation and depreciation;
(vi) Planning and scheduling.

Group C

9. Choose the correct answer for the following: 2 x 10

(i) Which of the following is a mineral?
   (a) Granite
   (b) Basalt
   (c) Syenite
   (d) Quartz.

(ii) Number of bricks required for one cubic meter of
    brick masonry is
   (a) 550
   (b) 450
   (c) 500
   (d) 400

(iii) Le Chatelier’s device is used for determining the

(a) setting time of cement
(b) soundness of cement
(c) compressive strength of cement
(d) tensile strength of cement.

(iv) Critical path is

(a) always shortest
(b) always longest
(c) may be longest
(d) may be shortest.

(v) The time with which direct cost does not reduce with
    the increase in time is known as

(a) crash time
(b) standard time
(c) optimistic time
(d) normal time.

(vi) The main ingredients of Portland cement are

(a) lime and alumina
(b) lime and silica
(c) lime and iron
(d) silica and alumina.

4FN:CV 403 (1429) (5) (Turn Over)
(vi) Which of the following trees yields hard wood?

(a) Pine
(b) Shishum
(c) Deodar
(d) Chir.

(vii) The slenderness ratio for masonry walls should not be more than

(a) 40
(b) 30
(c) 20
(d) 10.

(ix) Modulus of rupture of concrete is a measure of

(a) split tensile strength
(b) flexural tensile strength
(c) compressive strength
(d) direct tensile strength.

(x) Maximum quantity of water needed per 50kg of cement for M15 grade of concrete is

(a) 34 litres
(b) 32 litres
(c) 30 litres
(d) 28 litres.
CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time: Three hours

Maximum Marks: 100

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Figures on the right-hand side margin indicate full marks.

Group A

1. (a) Explain the classification of rocks in brief. 10

   (b) What are the qualities of good building stone? Explain the dressing of a stone. 10

2. (a) Explain seasoning in timber. 4

   (b) Discuss various defects in timber. 6

   (c) Explain the properties and uses of steel. Discuss various processes adopted to manufacture of steel. 10
3. (a) Explain setting action of cement when water is added to cement. The ingredients of cement react chemically with water and forms various complicated chemical compounds which impart strength to the cement.  
(b) Explain the process of manufacture of cement.  
(c) Discuss the properties and uses of cement.

4. (a) Explain the slump test and tabulate the recommended slumps for concrete.  
(b) What are the various types of concrete? Explain each one of them in brief.  
(c) Write a short note on manufacture of cement.  

**Group B**

5. (a) Explain the process of manufacture of bricks.  
(b) Explain the various tests conducted on bricks.

6. (a) Discuss the qualities of good bricks.  
(b) Explain the classification of bricks on the basis of method of manufacture.  
(c) What are the special types of bricks?

7. (a) Explain the safety issues for scaffolding and form work.  
(b) Describe the procedure involved in the tender document preparation. How is the tender to be chosen?  
(c) Explain construction management.

8. Write short notes on any four of the following:  
(i) Earthquake-resistant construction;  
(ii) Importance of curing for concrete structures;  
(iii) Project management;  
(iv) Escalation and depreciation;  
(v) Bar charts and pie charts;  
(vi) PERT and CPM.  

**Group C**

9. Answer the following:  
(i) What is sedimentary rocks?  
(ii) What are the constituents of good brick earth?  
(iii) Enlist any two properties of cement.  
(iv) What are the various processes involved in heat treatment of steel?  
(v) Mention the types of steel based on the carbon content.  
(vi) What are the objectives of seasoning in timber?  
(vii) What is chemical seasoning in timber?  
(viii) Define water cement ratio giving importance of Abram's law.
(ix) Explain the purpose of curing in cement concrete.

(x) Give relationship between compressive strength of concrete measured through tests on cylinders and cubes.
S'08: 4 FN : CV 403 (1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours

Maximum Marks : 100

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ANY TWO from Group B and ALL from Group C.

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Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) How do you determine yield stress of mild steel? 6

(b) Differentiate between mild steel, high yield strength deformed bars, and high tension steel. 7

(c) Define the term admixtures as used in concrete. Give two examples of chemical and mineral admixtures. What is the purpose of their use? 7

2. (a) How do you classify cements in terms of types and grades? 7
(b) Explain briefly two commonly used tests for measuring workability of concrete.

(c) Define (i) creep, and (ii) fatigue limit.

3. (a) What are the detects encountered in timber? How do you prevent them?

(b) What are the physical significance of initial and final setting time of cement?

(c) When does alkali aggregate reaction occur? How do you prevent it?

4. (a) What are the properties of coarse and fine aggregate affecting a concrete mix?

(b) What are the advantages of fibre reinforced concrete? Give examples where it is commonly used?

(c) List the uses of plastics as a construction material.

6. (a) Describe the tests carried out on masonry mortar.

(b) Explain the features of a unit rate contract.

(c) Differentiate between PERT and CPM.

7. (a) What are the steps taken in drawing a CPM network diagram for the construction of a residential building?

(b) Explain how the strength of concrete can be assessed using non-destructive tests?

(c) Assume that you are owning a concrete mixer machine for the past five years. How do you account for its present value allowing for its depreciation?

8. (a) How is bar chart useful in monitoring progress of a project? What are its limitations?

(b) How is the safety of workers carrying out bitumen road laying taken?

(c) What quality control tests you would carry out on bricks?

Group B

5. (a) What are the precautions required to be taken while constructing brick masonry wall?

(b) How do you take care of quality control during concrete construction?

(c) What do you mean by the escalation clause in a typical contract.

Group C

9. Answer the following in brief:

(i) List two important characteristics of building stones.

(ii) Give density of (a) brick, (b) concrete, (c) steel, and (d) timber.

(iii) State two important effects of fire on RCC structures.
(iv) When do you use rapid hardening cement?

(v) Draw typical sections of rolled steel used in buildings.

(vi) How can you prevent process of segregation in concrete?

(vii) What are the methods for using the fly ash in concrete?

(viii) How does a typical turnkey contract operate?

(ix) List four essential features of a tender document.

(x) Write down the specification for a typical 'stepped footing construction'.

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W'08 : 4 FN : CV 403 (1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours

Maximum Marks : 100

Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) Define the following terms : (i) Density, (ii) Strength, (iii) Hardness, and (iv) Durability. 2 x 4

(b) Mention the characteristics of good building stones. 6

(c) Explain the Bessemer process and Lintz and Donawitz (L.D.) process of manufacturing of steel. 6

1. (a) Briefly explain the classification of reinforcing steel bars. 6
(b) Explain the wet process of manufacture of cement. 7
(c) What is the method used to test the soundness of cement? Explain. 7

3. (a) Briefly explain how aggregate impact value can be determined in laboratory. 8
(b) Explain the various methods of curing concrete. 6
(c) State the importance of w.c. ratio. 6

4. (a) Explain the various defects in concrete. 8
(b) What is called corrosion? State the factors influencing reinforcement corrosion. 6
(c) How can alkali-aggregate reaction be controlled? 6

Group B

5. (a) Mention the functions of ingredients magnesia and iron oxide in brick. 8
(b) Explain about the role of additives fly ash and rice husk ash used in the manufacture of bricks. 6
(c) What is called weathering in the preparation of brick earth? 6

6. (a) Explain the various defects in bricks. 8
(b) State the major items requiring quality control at site. Explain any two of them. 6
(c) Explain the responsibility of architects and construction managers in building construction. 6

7. (a) Explain the various methods of estimation of rough cost. 8
(b) What is tender? State the contents of a typical contract. 6
(c) State the merits of cost plus percentage contract. 6

8. (a) What is a turnkey project? Explain briefly. 6
(b) Write a short note on fire-resisting materials. 6
(c) State any five advantages of network analysis. 8

Group C

9. Answer the following: 2 x 10

(i) State physical properties of Portland cement.
(ii) Mention the factors affecting proportion of concrete.
(iii) What are the ingredients of good brick earth?
(iv) Briefly explain about the shortcomings of bar charts.
(v) What is seasoning of timber?
(vi) What are the demerits of piecework contract?
(vii) State various types of payments made to contractors.

(viii) What is quick lime?

(ix) Define 'Latest Allowable Occurrence Time'.

(x) What is grading of aggregate? Stress its importance.
S'09 : 4FN : CV 403 (1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours

Maximum Marks : 100

Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answer may result in loss of marks.

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Group A

1. (a) Define the terms (i) flexural strength, (ii) specific gravity, (iii) toughness index, and (iv) modulus of elasticity. 2 x 4

(b) Explain various effects of environment on engineering materials. 6

(c) Explain various properties of mild steel and hard steel. 6

1. (a) Explain the functions of cement ingredients? 7

(Turn Over)
(b) Explain dry process of manufacture of cement. 7
(c) Briefly explain the process of open hearth process of manufacturing of steel. 6

3. (a) Define and explain workability of cement concrete. 5
(b) What is meant by curing and proportioning of concrete? 5
(c) Define the term 'cement concrete'. Explain the process of increasing the setting time in cement concrete. 6
(d) What do you mean by fresh concrete and segregation in concrete? 4

4. (a) What is slump test of concrete? How is it carried out? Mention recommended slump of concrete for different purposes. 8
(b) Explain what do you mean by quality control of concrete. 6
(c) Explain briefly how aggregate crushing test is determined in laboratory. 6

Group B

5. (a) What are the constituents of good brick earth? State some harmful ingredients in brick earth. 6
(b) With a neat sketch, explain the working of Holman's kiln for the burning of bricks. 8
(c) State the harmful ingredients in brick earth. 6

6. (a) Enumerate the qualities of good brick. 6

(b) Discuss various methods adopted to prevent the corrosion of ferrous metals. 7
(c) Explain various classifications of bricks and mention its standards relevant to Indian condition. 7

7. (a) Define the term 'project management' and explain the terms CPM and PERT. 6
(b) Define the term 'contract'. Explain various types of contracts in brief. 8
(c) Describe briefly how a non-destructive test is performed on an RCC column for estimating its strength. 6

8. (a) Define the term 'tender and tender document'. List various types of tenders. 4
(b) Define the term 'estimation' and explain various methods of estimation in building construction. 8
(c) Explain the terms (i) depreciation, (ii) escalation, (iii) lump-sum contract, and (iv) unit rate method. 2 x 4

Group C

9. Answer the following in brief: 2 x 10

(i) Define the term 'creep'? How do you measure the creep in cement concrete?
(ii) Mention how to prevent corrosion of steel in concrete.
(iii) What are the various steel sections available in the market?
(iv) What is meant by rapid hardening of cement?
(v) What are the safety precautions to be considered in construction?
(vi) What is the purpose of pie charts and bar diagrams?
(vii) Classify different types of rocks used in construction.
(viii) How do you test brick?
(ix) Classify different types of wood.
(x) What is meant by dressing of a stone?
W'09 : 4 FN : CV 403 (1429)

CIVIL ENGINEERING MATERIALS AND
CONSTRUCTION PRACTICES

Time : Three hours

Maximum Marks : 100

Answer FIVE questions, taking ANY TWO from Group A,
ANY TWO from Group B and ALL from Group C.

All parts of a question (a, b, etc.) should
be answered at one place.

Answer should be brief and to-the-point and be supplemented
with neat sketches. Unnecessary long answers may
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proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) When does creep occur? 4

(b) Write the compound composition limits of portland
cement. 5

(c) Describe ‘shortcreting’ and its application. 6

(d) Differentiate between blending and segregation of
concrete. 5

2. (a) Define modulus of elasticity. 3
(b) Define the requirements of stone to be used for structural purposes. 6

(c) Differentiate between mild steel rods and high yield strength deformed bars. 6

(d) List the steps involved in the manufacture of cement through ‘dry process’. 5

1. (a) How do you determine the fineness modulus of fine aggregate? How is this value used in mix design? 5

(b) Define compacting factor? When do you use compacting factor test instead of slump test? 5

(c) Define carbonation of concrete. 5

(d) How is fire-resistance of material tested? 5

2. (a) Illustrate different market forms of rolled steel sections. 6

(b) Define ‘53 grade’ cement. What test will you perform to certify that a cement conforms to ‘53 grade’? 5

(c) Highlight three types of admixtures used in concrete with its functions. 4

(d) Write a short note on ‘alkali-aggregate reaction’. 5

Group B

5. (a) Why is dimensional tolerance of bricks important? How is it tested? 5

(b) Write the specification you would lay down for brickwork in respect of wall construction. 5

(c) How would you take care of ‘escalation’ in a contract? 5

(d) Discuss the role of management in project execution. 5

6. (a) Describe the method of sampling of bricks as per BIS. 5

(b) Explain non-destructive evaluation. 5

(c) Differentiate between an unit rate contract and turnkey contract. 5

(d) What are the shortcomings of a bar chart? 5

7. (a) Describe various phases of project management. 5

(b) How do you estimate the strength of concrete non-destructively? 5

(c) How do you ensure quality control of concreting work at site? 5

(d) List the break-up of items of work involved in the construction of stepped footing. 5

8. (a) How do you estimate the time required for an item of work? 5

(b) List the safety precautions to be adopted during formwork preparation. 5

(c) How will you sample concrete at site for determination of compressive strength as per IS 456? 5

(d) Define the terms PERT and CPM. 5
Group C

9. Choose the correct answer for the following: \( 1 \times 20 \)

(i) Metals and alloys, which are deformed when cold (cold working) becomes

(a) soften, weaker and more ductile

(b) harder, stronger and same ductility

(c) softer, weaker and less ductile

(d) harder, stronger and less ductile.

(ii) In a PERT network, if \( t_s \) is the optimistic time, \( t_m \), the most likely time, and \( t_p \), the pessimistic time, then the standard deviation is given by

(a) \( (t_s + t_m + t_p)/6 \)

(b) \( (t_m - t_s)/6 \)

(c) \( (t_p - t_s)/6 \)

(d) \( (t_p - t_m)/6 \).

(iii) Find out the free float for the following activity:

\[ \text{EET} = 40 \] \[ \text{[Early expected time (EET)]} = 68 \]

Activity \( a \rightarrow b \)

\[ \text{Duration} = 15 \text{ days} \]

\[ \text{LET} = 40 \] \[ \text{[Late expected time (LET)]} = 69 \]

(a) 28 days

(b) 29 days

(c) 1 day

(d) 39 days.

(iv) In the analysis of rate for estimating, the following items are taken into account:

(a) labour + material + profit

(b) labour + material + construction cost

(c) labour + material + equipment + overhead

(d) labour + material + equipment + idling cost.

(v) The costs attributable to project work items like labour and materials, which are usually non-linear, is known as

(a) overhead costs

(b) crash cost

(c) direct cost

(d) indirect cost.

(vi) In a construction contract, the clause that is used in order to compensate a contractor due to unforeseen situation such as floods, political strike, etc., is known as

(a) deviation

(b) arbitration

(c) liquified damages

(d) force major.

(vii) A concrete cylinder of size 150 mm diameter and 300 mm long tested for split tension test, failed at 100 kN. Then the split tensile strength is

(a) 0.35
(b) 0.71
(c) 1.42
(d) 2.83.

(viii) In network analysis, an ‘event’
   (a) acts as an end point of project
   (b) refers to progress of an activity
   (c) refers to an activity requiring help of another activity
   (d) requires resources or time to complete it.

(ix) Ultrasonic pulse velocity tester is used to determine
   (a) compressive strength of concrete
   (b) impact resistance of concrete
   (c) crushing value of concrete
   (d) quality of concrete (uniform compaction).

(x) Reinforcement corrosion can be reduced by
   (a) increasing water-cement ratio
   (b) reducing permeability of concrete
   (c) increasing maximum size of aggregate
   (d) reducing the coarse aggregate content.

(xi) High early strength cement is used for
   (a) hot weather concreting
   (b) mass concreting

(c) cold-weather concreting
(d) warm-humid weather concreting.

(xii) The term ‘bark’ in timber refers to
   (a) sapwood
   (b) outermost layer
   (c) cambium
   (d) medulla.

(xiii) Air-entrainment is done in concrete for
   (a) reducing density significantly
   (b) ensuring better performance under freezing and thawing
   (c) reducing workability significantly
   (d) reducing cement content.

(xiv) Rebe time workability test is useful for concrete which is
   (a) flowing
   (b) self-compacting
   (c) very stiff
   (d) ready mix.

(xv) Flyash is a
   (a) pottolonic material
   (b) cementitious material
S'10:4FN:CV 403(1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours

Maximum Marks : 100

Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.

All parts of a question (a,b,etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

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Figures on the right-hand side margin indicate full marks.

Group A

1. Describe in brief the properties and uses of the following: 4 x 5

(a) Supersulphated cement
(b) Blast furnace slag cement
(c) Rapid hardening cement
(d) Ordinary portland cement
(e) White cement.

2. (a) What are the various engineering properties of materials? 4
(b) How are rocks physically and chemically classified? What are rock forming minerals?

(c) What are the qualities of a good building stone? What is meant by dressing of a stone? Describe its various varieties.

(d) What are the forces responsible for causing natural defects in timber? Discuss the methods adopted for preservation of timber.

3. (a) Explain the procedure of civil engineering structures to be constructed under water condition.

(b) Describe some special features of building construction in earthquake-prone zone.

(c) Explain about fibre reinforced concrete in brief.

4. (a) What is meant by proportioning of concrete? Discuss the theory of formation of concrete. Explain the workability of concrete as well.

(b) What are the factors which affect physical properties of steel? Explain various processes adopted to manufacture of steel.

(c) Mention the classification of steel and explain the properties of hard steel and mild steel.

5. (a) Describe the procedure of manufacture of bricks of Hoffman’s kiln with the help of a neat sketch.

(b) Mention different methods of manufacture of steel.

6. (a) Explain the various standardization and standards needed for manufacturing of bricks nationally and internationally.

(b) How is the quality of brick evaluated? Explain various non-destructive testing and evaluation processes of bricks.

(c) Differentiate between Bullnose brick and Cownose brick.

7. (a) Compare between item rate contracts and lumpsum contracts.

(b) How is progress of work monitored by pie diagram and bar chart?

(c) Explain the applications of PERT in project management.

8. (a) State the main objectives of construction management and explain its six major functions.

(b) Explain the procedure for calling a tender. How are tenders scrutinised and compared before selection of the tender? How is a tender to be chosen?

9. Choose the correct answer for the following: 2 x 10

(i) Maximum quantity of water needed per 50 kg of cement for M15 grade of concrete is

(a) 34 litres
(b) 32 litres
(c) 30 litres
(ii) The slenderness ratio for masonry walls should not be more than
(a) 40
(b) 30
(c) 20
(d) 10.

(iii) Number of bricks required for one cubic meter of brick masonry is
(a) 550
(b) 450
(c) 500
(d) 400.

(iv) The main ingredients of Portland cement are
(a) lime and alumina
(b) lime and silica
(c) lime and iron
(d) silica and alumina.

(v) Hard wood is yielded from the
(a) pine tree
(b) shishum tree
(c) deodar tree
(d) chir tree.

(vi) The size of modular bricks should be
(a) 7.5 cm × 12.5 cm × 25.0 cm
(b) 5 cm × 10 cm × 15 cm
(c) 10 cm × 10 cm × 20 cm
(d) None of the above.

(vii) In mild steel, iron content is about
(a) 50%
(b) 80%
(c) 90%
(d) 99%.

(viii) The ultimate tensile strength of mild steel is
(a) 1400 kg/cm²
(b) 4000 kg/cm²
(c) 6000 kg/cm²
(d) 10000 kg/cm².

(ix) Cement and sand required for 25 mm thick (1:6) cement plaster (in m³) for 100 m² surface area are
(a) 0.884 and 2.65
(b) 0.71 and 2.84
(c) 0.472 and 2.84
(d) 1.0 and 6.0.

(x) For 4:2:1 cement concrete, 1 m³ concrete will require
(a) 1 m³ chips, 0.5 m³ sand and 0.25 m³ cement.
(b) 0.88 m³ chips, 0.44 m³ sand and 0.22 m³ cement.
(c) 0.7 m³ chips, 0.35 m³ sand and 0.18 m³ cement.
(d) None of the above.
W'10:4 FN:CV 403 (1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time: Three hours

Maximum Marks: 100

Answer five questions, taking any two from Group A, any two from Group B and all from Group C.

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Group A

1. (a) Classify any five types of properties of civil engineering materials and state any five mechanical properties.
   
   (b) State any five methods of manufacturing different grades of steels and explain the crucible method.

   (c) Compare wet and dry process of manufacture of cement.

   (d) Describe the difference between setting and hardening of cement.
2. (a) Explain relation between water-cement ratio and compressive strength of concrete with help of a graph. 6
(b) Differentiate between mild steel, Fe 415, Fe 500, T.M.T, and D 500. 5
(c) Differentiate between high early strength cement, low alkali cement, and ordinary portland cement. 9

3. (a) Explain phenomenon of deterioration of concrete. State any three types of deterioration. Describe any three measures to avoid deterioration of concrete. 9
(b) Synthesize the process of alkali-aggregate reaction in concrete. 6
(c) Discriminate between thermoplastic and thermo-setting materials. 5

4. (a) Explain the effect of environment on civil engineering materials with the help of examples. 5
(b) State the care to be taken while casting the concrete in underwater situations. 5
(c) State concept, method and applications of shotcrete concrete. 5
(d) What is carbonation? How it takes place? What are its ill-effects? 5

Group B

5. (a) Compare between Bull's trench kiln and Hoffman's kiln. 6
(b) Differentiate between project planning, scheduling and controlling. 9
(c) Describe any five conditions when termination of contract can be done. 5

6. (a) State classification of bricks and the characteristics of bricks. 6
(b) Differentiate between natural drying and artificial drying of bricks. 6
(c) What are different types of non-destructive tests? Explain any one in detail with the help of a neat sketch. 8

7. (a) State Indian quality standards for bricks for their soundness, strength, efflorescence, water absorption, and size. 5
(b) Explain four steps of brick manufacturing. 8
(c) Explain the concept of dummy activity. X, Y and Z represent the shuttering operation of construction of 3 bays of continuous slab and L, M and N represent corresponding concreting operations. In each case, the shuttering has to precede concreting and only one team of shuttering and one team of concreting is available. Draw the network using dummy activity. 7

8. (a) Define (i) Deviation, (ii) variance, (iii) standard deviation, and (iv) mean. 4 x 1
(b) State and explain any five types of tenders. 5
(c) What is depreciation? What are different methods of determining the depreciation?

(d) Determine the present value of a C.D. work constructed before 50 years at Rs. 50,000. The estimated life of C.D. work is 75 years at the end of which it will have 8% scrap value of its cost of construction.

Group C

Choose the correct answer for the following:

(i) Stepping is a method of treatment of wood in which wood is
   (a) painted by brush.
   (b) dipped in brine solution.
   (c) spray painted.
   (d) dipped alternately.

(ii) The slump test of concrete is used to measure its
    (a) consistency.
    (b) homogeneity.
    (c) tensile strength.
    (d) impact value.

(iii) The average value of creep coefficient of concrete is
     (a) 1.0
     (b) 2.0

(iv) Initial setting time of quick setting cement is
    (a) 5 min
    (b) 10 min
    (c) 30 min
    (d) 50 min.

(v) Le Chatelier's method is used to determine
    (a) fineness of cement.
    (b) soundness of cement.
    (c) setting time of cement.
    (d) compressive strength of cement.

(vi) Smith's test is performed on stones for checking
    (a) durability.
    (b) water absorption.
    (c) solvable matter.
    (d) hardness.

(vii) Laterite is a ———— rock.
     (a) calcareous.
     (b) argillaceous.
     (c) volcanic.
     (d) silicious.

(viii) PVC stands for
       (a) polyvinyl chloride
       (b) polythene vinyl chloride
(ix) A bull nose brick is not used in
   (a) walls.
   (b) arches.
   (c) pillars.
   (d) rounding of sharp corners.

(x) Asbestos is
    (a) mineral fibre.
    (b) animal fibre.
    (c) vegetable fibre.
    (d) metal fibre.
CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours
Maximum Marks : 100

Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.

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Group A

1. (a) Elaborately discuss the engineering properties of civil engineering materials such as concrete, steel, stone and timber that are considered for selecting these materials.

(b) Describe the classifications, properties and uses of five important types of stone employed in civil engineering work.

2. (a) Name different processes of manufacture of steel and describe one process in detail with the help of a flow-chart.
(b) Describe different rolled sections of structural steel with neat sketches and state their uses. 5

(c) What are the hot-weather problems associated with large concrete volumes in the fresh state and what should be the precautions taken? 5

3. (a) Describe, with the help of flow-sheet, manufacturing of cement by dry process. Why is dry process preferred to wet process? 10

(b) Describe briefly, with applications, (i) high early strength cement, (ii) low alkali cement, and (iii) rapid hardening cement. 3 x 2

(c) How do you propose to make timber structures more fire-resistant? 4

4. (a) Describe desirable properties and functions of different constituents of concrete. 10

(b) Describe different admixtures used in concrete for improving some specific qualities by them. 6

(c) Write a short note on properties and applications of fibre reinforced concrete. 4

Group B

5. (a) What are the required qualities of good brick earth? 5

(b) Describe the properties of class I type of bricks. 5

(c) Explain, with the help of neat sketches, the manufacture of bricks by Bull's trench kiln. 10

6. (a) Briefly describe any three methods of non-destructive tests for concrete. 7

(b) What are the measures taken to prevent deterioration and for increasing the durability of civil engineering structures? 7

(c) What are the safety measures taken during construction of major civil engineering projects? 6

7. (a) Describe the methods of assessing the quantities of materials and estimating procedure of a civil engineering project. 10

(b) Describe the method of preparation of a tender document. 10

8. (a) Describe in detail about (i) unit rate contract, (ii) lumpsum contract, and (iii) turnkey contract. 10

(b) Describe how to apply the techniques (i) CPM, (ii) bar charts, and (iii) pie diagram for managing the construction schedule of a civil engineering project. 10

Group C

9. Choose the correct answer for the following: 20 x 1

(i) Seasoning of timber is required to
(a) soften the timber.
(b) harden the timber.
(c) straighten the timber.
(d) remove sap.

(ii) The drawback of electric seasoning of timber is
(a) checks.
(b) splitting.
(c) cracks.
(d) reduced strength.
(iii) Marble is quarried by
   (a) blasting.
   (b) excavating.
   (c) heating.
   (d) wedging.

(iv) Which one of the following is the hardest mineral?
   (a) Quartz
   (b) Feldspar
   (c) Garnet
   (d) Talc

(v) Soundness test of cement is performed by
   (a) Vicat's Apts
   (b) Le Chatelier's Apts
   (c) Nurse and Blains Apt
   (d) All of the above.

(vi) To produce low heat cement, it is necessary to reduce the compound
   (a) $C_3S$
   (b) $C_2S$
   (c) $C_3A$
   (d) $C_4AF$

(vii) If $p$ is the standard consistency of cement, the amount of water used in conducting the initial setting time test on cement is
   (a) $0.65p$
   (b) $0.85p$
   (c) $0.6p$
   (d) $0.8p$

(viii) For marine works, the best suited cement is
   (a) low heat portland cement.
   (b) rapid hardening cement.
   (c) ordinary portland cement.
   (d) blast furnace slag cement.

(ix) Which one of the following aggregates gives maximum strength in concrete?
   (a) Rounded aggregate
   (b) Elongated aggregate
   (c) Flaky aggregate
   (d) Cubical aggregate

(x) The maximum bulking of sand is likely to occur at a moisture content of
   (a) 5%
   (b) 8%
   (c) 11%
   (d) 14%

(xi) Which one of the following is caustic lime?
   (a) Quick lime
   (b) Fat lime
   (c) Milk of lime
   (d) Hydraulic lime.

(xii) Hydraulic lime is obtained by burning
   (a) oölitic lime
   (b) kankar
   (c) marble
   (d) tufa.
(xiii) The best application of puzzolana cement in concrete is
   (a) dams.
   (b) bridges.
   (c) RCC slab.
   (d) domes.

(xiv) The approximate ratio between the strengths of cement concrete at 7 days and 28 days is
   (a) 3/4
   (b) 2/3
   (c) 1/2
   (d) 1/3

(xv) The minimum mixing time of cement concrete (in min) should be
   (a) 2
   (b) 4
   (c) 6
   (d) 10

(xvi) To make one cubic metre of 1:2:4 by volume concrete, the volume of coarse aggregate required is
   (a) 0.94 m³
   (b) 0.85 m³
   (c) 0.75 m³
   (d) 0.65 m³

(xvii) With the same W/C ratio, the lower the maximum size of aggregate, the strength of concrete
   (a) increases.
   (b) decreases.
   (c) remains same.
   (d) cannot say.

(xviii) The ultimate tensile strength of high carbon steel (in N/mm²) is
   (a) 600
   (b) 1000
   (c) 1500
   (d) 2000

(xix) Which constituent helps brick to maintain its shape?
   (a) Silica
   (b) Lime
   (c) Alumina
   (d) Magnesia

(xx) Operation takes place in pug mill is
    (a) weathering.
    (b) blending.
    (c) tempering.
    (d) burning.
W’11: 4FN: CV 403 (1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time: Three hours
Maximum Marks: 100

Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) Explain the manufacturing process of thermomechanically treated (TMT) steel. 5
   (b) Describe the process of hydration of cement and state its significance in mass concreting. 5
   (c) What are admixtures? Why are they used in concrete? 5
   (d) Define following properties of materials: (i) creep, (ii) elasticity, (iii) ductility, (iv) density, (v) flexibility. 5

2. (a) Differentiate between cast iron and stainless steel. 5
   (b) State different components of cement alongwith their chemical composition. 5

(Turn Over)
(c) Define workability of concrete and explain its significance. 5

(d) What is honeycombing? How can it be avoided? 5

3. (a) What are different forms of structural steel and explain any one of them? 5

(b) Explain different types of cements. 5

(c) State and explain factors affecting durability of concrete. 5

(d) Define (i) fatigue, (ii) impact strength, (iii) toughness, (iv) thermal conductivity, and (v) malleability. 5 × 1

4. (a) State the properties of steel for prestressed concrete. 5

(b) With the help of flow-chart, explain the wet process of manufacture of cement. 5

(c) Differentiate between mineral and chemical admixtures. 5

(d) State any three physical and two chemical properties of cement. 5

Group B

5. (a) Explain the working of vertical shaft brick kiln. 5

(b) What is depreciation? Explain types of depreciation. 5

(c) In a retaining wall construction, A, B, and C represent shuttering operations for three bays of wall and P, Q and R represent corresponding and concreting operations. Assume that, in each case, shuttering has to precede concreting. Only one crew for formwork and one for concreting operation is available. Show dummies in the CPM network, representing the restraints and the consequent interdependence. 10

6. (a) Explain classification of bricks as per IS 1077-1992. 5

(b) State any two devices of non-destructive testing and explain their principle. 5

(c) State any four methods of depreciation. A civil engineering structure was constructed at the cost of ₹ 50,000 before 40 years. If the estimated life of the structure is 90 years, determine the present value of structure. Consider the scrap value as 15% of cost of construction. 10

7. (a) State any five desirable properties of good bricks. 5

(b) What is tender? State any four types of tender and explain any one of them. 5

(c) What is the concept of quality? State any three stages of quality control. Explain any three basic elements of quality. 3 + 3 + 4

8. (a) With the help of a sketch, explain Gantt bar chart. What are shortcomings of a Gantt bar chart? 5

(b) Define the following:

(i) Optimum time estimation

(ii) Most likely time estimation

(iii) Pessimistic time estimation

(iv) Expected time estimation

(v) Critical path.

(c) State any five measures to be taken for quality control for improving engineering properties of bricks. 10
9. Choose the correct answer for the following: \(10 \times 2\)

(i) The metamorphic rocks are structurally changed forms of
   (a) sedimentary rocks.
   (b) sandstones.
   (c) mud.
   (d) organic matter.

(ii) Silica, in brick, provides
   (a) colour to brick.
   (b) hardness and durability to brick.
   (c) shrinkage to brick.
   (d) cracks to brick.

(iii) Quicklime is produced through the process of
   (a) oxidation.
   (b) decomposition.
   (c) calcination.
   (d) heat of hydration.

(iv) Soundness of cement is related to
   (a) strength of cement.
   (b) pollution of cement.
   (c) thermal expansion of cement.
   (d) water-cement ratio.

(v) Heat of hydration is a process in which
   (a) heat is generated.
   (b) heat is reflected.
   (c) heat is absorbed.
   (d) heat is converted.

(vi) Mortar is prepared using
   (a) cement and coarse aggregate.
   (b) cement and fine aggregate.
   (c) coarse and fine aggregate.
   (d) cement and water.

(vii) Separation of cement paste from the mix in case of lean and wet mix is known as
   (a) segregation.
   (b) honeycombing.
   (c) weeping.
   (d) bleeding.

(viii) Tensile strength of concrete is determined by
   (a) impact test.
   (b) compression test.
   (c) splitting test.
   (d) slump test.

(ix) Corrosion of steel reinforcement in concrete can be avoided by
    (a) providing colour to concrete.
    (b) providing formwork.
(c) providing cover.
(d) providing fibres.

(e) N.D.T. is used for determining
(a) strength of concrete.
(b) impact resistance of concrete.
(c) creep of concrete.
(d) workability of concrete.
CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours
Maximum Marks : 100

Answer FIVE questions, taking ANY TWO from Group A,
ANY TWO from Group B and ALL from Group C.

All parts of a question (a, b, etc.) should be answered at one place.

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Group A

1. (a) Explain the method and procedure of durability test which would be conducted to determine the following durability aspect of stone: 3 + 3 + 4

(i) Resistance to wear
(ii) Coefficient of hardness
(iii) Toughness of the stone.

(b) How are engineering materials classified? Discuss in detail the mechanical and engineering properties of the material stating its significance.

(Turn Over)
2. (a) What is the effect of adding the following elements in iron?  
   (i) Nickel, (ii) copper, (iii) tungsten, and (iv) carbon.  
   (b) What do you mean by allotropy? What is its purpose?  
   (c) Classify steel according to its use? Discuss in brief the use of TMT bar in RCC constructions.

3. (a) What are the various ingredients of ordinary portland cement? Discuss the function played by each in imparting specific properties to the cement.  
   (b) What is cement hydration? Why is it important? Critically review the Bogue compounds and their properties.

4. (a) What is the specific need of fiber reinforced concrete? Brief different types of fibers used in concrete. Also, mention their properties, advantages, limitations, and applications.  
   (b) What is pozzolona? How is it classified? Comment about the use of different types of pozzolona in concrete.

5. (a) What should be the length and breadth of a brick? Why is this proportion important in masonry construction?  
   (b) What are the field tests to judge the qualities of brick? Explain in brief.  
   (c) Why is sand added to brick earth?  
   (d) Differentiate between the following terms: (i) Country brick, (ii) modular brick, (iii) table moulded brick, and (iv) wire cut brick.

6. What type of non-destructive test you would recommend in the following situations and why? Also, discuss the procedure to determine the test:  
   (i) To check the specification compliance involving aggregate-cement ratio.  
   (ii) To measure the concrete uniformity after placing the concrete.  
   Support your answer with simple and a neat sketch.

7. (a) What are the shortcomings of bar charts? How can these be removed? Explain in detail. Support your answer with simple and neat sketches.  
   (b) Draw a typical cost-duration curve and show optimum duration and minimum cost — explain.

8. (a) Write short notes on the following:  
   (i) Value engineering  
   (ii) Breach of contract  
   (b) Explain the concept of quality control of concrete at site. How can it be achieved?  
   (c) Give reason for the following:  
      (i) Security money cannot be refunded to the contractor immediately after handing over the building.  
      (ii) Sinking fund calculation is applied for building but not for land.  
      (iii) Lowest tender can be rejected even if adequate competition and lowest rates are available.
Group C

9. Choose the correct answer for the following: 10 × 2

(i) Water ___ is defined as capacity of a material to permit water to pass through it under pressure.
   (a) porosity
   (b) permeability
   (c) hygroscopicity
   (d) density index

(ii) In a stone masonry, the direction of the pressure line is
   (a) Inclined to natural bed at 30°.
   (b) Inclined to natural bed at 45°.
   (c) Inclined to natural bed at 60°.
   (d) perpendicular to natural bed.

(iii) Swollen structure and white patches will be found in bricks due to
   (a) carbon.
   (b) bituminous matter.
   (c) organic matter.
   (d) sulphur.

(iv) Which one of the following is not an objective of seasoning timber?
   (a) Reduction in shrinkage and warping.
   (b) Reduction of weight.
   (c) Reduction of natural defects in timber.
   (d) Increase in strength and durability.

(v) For complete hydration of cement, the water/cement ratio needed is
   (a) more than 0.35 but less than 0.45.
   (b) more than 0.45 but less than 0.50.
   (c) more than 0.45 but less than 0.60.
   (d) less than 0.25.

(vi) Blast furnace slag has approximately
   (a) 50% alumina and about 20% calcium oxide.
   (b) 45% calcium oxide and about 35% silica.
   (c) 25% magnesia and 15% alumina.
   (d) 25% calcium oxide and about 35% silica.

(vii) Consider the following statements:
   The effect of air entrainment in concrete is to
   1. increase resistance to freezing and thawing.
   2. improve workability.
   3. decrease strength.
   Which one of the above statements is/are correct?
   (a) 1, 2 and 3
   (b) 1 and 2
   (c) 1 only
   (d) 2 only.

(viii) IS: 1664-1982 refers to
   (a) safety measure for excavation.
   (b) safety measure for fire.
   (c) fire safety of electrical installation.
   (d) safety measure of demolition.
(ix) Earnest money deposit is to be remitted while
    (a) offering the tender schedule.
    (b) during work execution.
    (c) getting completion of certificate.
    (d) award of work.

(x) Need of approximate estimate of the project is to assess the
    (a) approximate cost of the project.
    (b) material required for the project.
    (c) time required for completion of the project.
    (d) viability of the project.
CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time: Three hours
Maximum Marks: 100

Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.

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**Group A**

1. (a) Describe important characteristics, features and uses of the following rocks: (i) Granite, (ii) sandstone, (iii) marble, (iv) shale, and (v) basalt. 5 x 2

(b) Explain the following: (i) Modulus of elasticity, (ii) fatigue limit, (iii) creep, and (iv) shrinkage. 3 + 3 + 2 + 2

2. (a) Describe the manufacture of cement with the help of a line diagram by wet process. 11

(b) Explain the preparation and uses of the following types of concrete: 3 x 3

(i) High early strength concrete
(ii) Low alkali concrete
(iii) Rapid hardening concrete.
3. (a) How has steel been classified by ISI? State with illustrations.  
(b) What are the environmental factors affect various engineering materials? Describe their effects in detail.

4. (a) What are the major constituents of a concrete? Describe the functions of each. How is controlled concrete manufactured?  
(b) For what purposes admixers are used in concrete? Name five admixers popularly used in concrete, stating the functions of each.

5. (a) Describe, with the help of a neat sketch, the manufacturing process of bricks by Bull’s trench method.  
(b) Explain the desirable qualities of good earth required for manufacture of bricks.  
(c) Discuss the properties of A-class bricks.

6. (a) Describe the methods of evaluation of civil engineering structures.  
(b) Explain various methods of non-destructive tests of materials.  
(c) Make a comparison between Bull’s trench method and Hoffmann’s method.

7. (a) How can best workmanship be achieved during concrete construction?  
(b) Describe the methods of safety measures taken during construction of a multistoreyed building in a congested place.  
(c) Describe different types of contracts used in practice.

8. During construction of a multistoreyed building, duration of various activities for each floor is given below:  
   (A) Building planning and design  7 days  
   (B) Layout  2 days  
   (C) Construction of foundation  20 days  
   (D) Superstructure (walls and columns) up to roof level  30 days  
   (E) Door/window frame fixing  7 days  
   (F) Roof construction  40 days  
   (G) Electrical conduit  7 days  
   (H) Laying drainage pipes  7 days  
   (I) Laying water pipes  7 days  
   (J) Plastering work  15 days  
   (K) Paros work  10 days  
   (L) Laying electrical wiring/fittings  10 days  
   (M) Fixing sanitary/water fittings  7 days  
   (N) Finishing/colour washing/roof treatment/flooring  16 days  

Choose the activities in a proper sequence and prepare the CPM network and then determine the total project duration for a six-storeyed building.
Group C

9. Answer the following in brief: 10 x 2

(i) State the geological classification of rocks.

(ii) What are two major groups of plastics?

(iii) Soundness of cement is generally carried out by which apparatus?

(iv) Initial setting time, final setting time and consistency tests of cement are generally carried out by which apparatus?

(v) In a plywood board, the number of plys that should be acceptable is

   (a) 6
   (b) 7
   (c) 8

(vi) Define 'shotcrete' in brief.

(vii) What do you understand by sinking fund?

(viii) What do you understand by earnest money?

(ix) What do you understand by security deposit?

(x) Mention the respective dimension of (a) standard bricks, and (b) modular bricks.
CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time : Three hours
Maximum Marks : 100

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Group A

1. (a) Name different physical properties of building materials with brief explanation of each of them. 6

(b) What are the chemical compounds formed during setting action of cement? For quick hardening of cement concrete, which one of such compounds will be responsible? 3 + 1

(c) What are the steps in manufacturing normal setting ordinary cement? Explain the dry and wet processes involved in such manufacturing with the help of flow diagrams. 4 + 6

2. (a) Explain different types of defects in timber. What should be the qualities for good timber? 3 + 3
(b) What are the differences between wrought iron and steel? Explain various factors affecting physical properties of steel.

(c) Explain the differences between reinforced concrete and prestressed concrete. What are the reasons for losses in prestress?

3. (a) What are meant by water-cement ratio and workability of fresh concrete? Describe slump test and indicate values of slump for various types of works. 

(b) State the purposes of using admixtures in concrete. Explain the care that should be taken during placing concrete.

(c) What is meant by fibre-reinforced concrete? What are the advantages and disadvantages of such concrete?

4. (a) Name some of the methods used for non-destructive testing in fresh concrete and hardened concrete. What are the advantages of such testings?

(b) Explain the terms (i) mild steel, (ii) high carbon steel, and (iii) high tensile steel.

(c) Write short notes on the following:

(i) Cold twisted deformed bars

(ii) Thermo-mechanically treated bars

Group B

5. (a) What are the requirements for good brick earth?

(b) How are burnt bricks classified? State the uses of each such classified bricks.

6. (a) What are common rock-forming minerals? Describe the characteristics of the good building stones. Explain fire-resistance test for stone.

(b) Name important usages of geosynthetic fabrics in civil engineering constructions. State the advantages of such applications.

7. (a) Write short notes on any two of the following:

(i) Bill of quantities contract

(ii) Contract document

(iii) Calling tender.

(b) What are the advantages of network diagram?

(c) A construction company has to submit a bid for construction of a building. From specification, PERT network along with three time estimates (in weeks) were made and shown in Fig. 1. Determine the critical path and its standard variation.

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8. (a) Describe briefly the general safety programme for construction. What are the protective equipment provided to workers for safety during construction. 6 + 2

(b) State the advantages of reinforced brick works. 3

(c) Explain the causes of dampness in masonry construction. 4

(d) What are the reasons for preparation of surface for plastering? Name some common types of plaster. 3 + 2

9. Choose the correct answer for the following: 20 × 1

(i) Loss of stress with time at constant strain in steel is called
   (a) relaxation.
   (b) creep.
   (c) shrinkage.
   (d) ductility.

(ii) The compressive strength of concrete determined from 150 mm × 150 mm cylinder as compared to that determined from 150 mm × 300 mm cylinder is
   (a) more.
   (b) less.
   (c) equal.
   (d) uncertain.

(iii) The diameter of the needle used in Vicat’s apparatus for determination of initial setting time is prescribed as
   (a) 0.5 mm
   (b) 1 mm
   (c) 5 mm
   (d) 10 mm

(iv) As compared to ordinary portland cement, high alumina cement has
   (a) higher initial setting time but lower final setting time.
   (b) lower initial setting time but higher final setting time.
   (c) higher initial and final setting times.
   (d) lower initial and final setting times.

(v) Upper yield point in the stress-strain curve in structural steel can be avoided by
   (a) cold working.
   (b) hot working.
   (c) quenching.
   (d) galvanizing.

(vi) For isotropic homogeneous elastic materials obeying Hooke’s law, number of independent elastic constants is
   (a) 2
   (b) 3
   (c) 9
   (d) 36

(vii) The role of superplasticizer in a cement paste is to
   (a) disperse the particles.
   (b) disperse the particles and to remove air bubbles.
   (c) disperse the particles to remove the air bubbles and to retard setting.
   (d) retard setting.
(viii) Electrostatic precipitators are used as pollution control device for separation of
(a) $\text{SO}_2$
(b) $\text{NO}_2$
(c) hydrocarbon.
(d) particulate matter.

(ix) Efflorescence of bricks is due to
(a) soluble salts present in clay for making bricks.
(b) high porosity of bricks.
(c) high silt content in brick earth.
(d) excessive burning of bricks.

(x) The specific gravity of most of stones lie between
(a) 1.8 and 2.2
(b) 2.5 and 3.0
(c) 3.0 and 3.5
(d) 3.5 and 4.5

(xi) Which one of the following aggregates gives maximum strength in concrete?
(a) Rounded aggregates.
(b) Elongated aggregates.
(c) Flaky aggregates.
(d) Cubical aggregates.

(xii) The upper limit of suspended particles in water for preparation of concrete is
(a) 200 ppm
(b) 2000 ppm
(c) 5000 ppm
(d) 10,000 ppm

(xiii) Ultrasonic pulse velocity method is used to determine
(a) compressive strength of concrete.
(b) impact resistance of concrete.
(c) tensile strength of concrete.
(d) quality of concrete.

(xiv) Crudest form of iron is
(a) mild steel.
(b) pig iron.
(c) wrought iron.
(d) cast iron.

(xv) In mild steel, the iron content is about
(a) 50%
(b) 80%
(c) 95%
(d) 99%

(xvi) Polyvinyl chloride (PVC) is a
(a) thermosetting material.
(b) thermoplastic material.
(c) elastoplastic material.
(d) rigid plastic material.

(xvii) In the time cost optimisation using CPM method of network analysis, the crushing of the activities along the critical path is done starting with activity having
(a) longest duration.
(b) highest cost slope.
(c) least cost slope.
(d) shortest duration.
(xviii) Sinking fund is
(a) the fund for rebuilding a structure when its economic life is over.
(b) raised to meet maintenance costs.
(c) the total sum to be paid to the municipal authority by the tenants.
(d) part of money kept in reserve for providing additional structural modifications.

(xix) Property of steel due to which it can withstand the blow of hammers is
(a) hardness.
(b) toughness.
(c) malleability.
(d) plasticity.

(xx) Galvanizing is done with a thin layer of
(a) copper.
(b) zinc.
(c) lead.
(d) cadmium.
W'13:4FN: CV403 (1429)

CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICES

Time: Three hours

Maximum Marks: 100

Answer five questions, taking any two from Group A, any two from Group B and all from Group C.

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Group A

1. (a) Discuss in brief and in comparative manner any five of the following properties of steel and concrete from civil engineering point of view: 5 x 2

(i) Density
(ii) Creep
(iii) Modulus of elasticity
(iv) Fire-resistance
(v) Shrinkage
(vi) Ductility
(vii) Compressive strength
(viii) Tensile strength
2. (a) What do you mean by proportioning of concrete? Discuss in brief various methods of determining the volumetric proportion of various ingredients of concrete.

(b) Discuss about the impact of any five of the following in cement concrete:

(i) Curing
(ii) Temperature
(iii) Grading of aggregate
(iv) Type (quality) of cement
(v) Water cement ratio
(vi) Admixtures

3. (a) Discuss in brief any three steel sections available in market and widely used in building construction works.

(b) Differentiate between dry and wet processes of cement manufacturing. In your view which method is better and why?

4. (a) Discuss any two of the following in brief:

(i) Various tests in stone to access the impact of environment and wear and tear
(ii) Main process of heat treatment in steel
(iii) Natural and artificial seasoning of timber
(iv) Types of cements used in concrete

(b) Why is there need of reinforcement in concrete? What impact does it make towards the strength of structure of any two of the following:

(i) Use of different types of steel
(ii) Use of different steel section
(iii) Use of reinforcements (e.g. steel) at different places (locations) in concrete structure.

Group B

5. (a) Discuss main constituents of a good quality brick. Also, give emphasis on the main properties of materials which are harmful for brick.

(b) Explain, with reasonable viewpoints, the importance of size, shape and weight of a brick for civil engineering construction works.

(c) Compare clamp burning bricks and kiln burning bricks?

(d) Explain the properties of bricks which need to be improved in superior quality and high strength civil engineering construction works.

6. (a) Discuss different types of contract systems and general conditions of a civil engineering work contract.

(b) Clearly classify various types of defects in timber.

(c) What is the importance of use of proper bedding and dressing in stone works.

Estimate the yield of concrete per bag of cement concrete mix 1:3:6 and water cement ratio = 0.6. Use the following data for calculation:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Cement</th>
<th>Sand</th>
<th>Aggregate</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity</td>
<td>3.15</td>
<td>2.65</td>
<td>2.8</td>
<td>1</td>
</tr>
<tr>
<td>Unit weight</td>
<td>0.035 m³/50 kg</td>
<td>1600 kg/m³</td>
<td>1500 kg/m³</td>
<td>1000 kg/m³</td>
</tr>
</tbody>
</table>
(b) Describe briefly any five of the following terms with suitable examples: 5 × 2
(i) Annuity
(ii) Outgoings
(iii) Scrap value
(iv) Escalation
(v) Obsolescence
(vi) Salvage value
(vii) Sinking fund

7. (a) Briefly explain different types of estimates. Give an example of most suitable civil engineering work associated with that particular type of estimate. 10
(b) Differentiate between destructive and non-destructive testing. Explain in brief any two non-destructive testing methods used in civil engineering. 10

8. (a) Differentiate between unit rate contract, lump sum contract and turnkey projects. 5
(b) What are different methods of time scheduling in civil engineering construction activities? What were the limitations of bar charts that led to development of critical path method and network methods? 5
(c) Why is there need of standards to be fixed for civil engineering works? Discuss in brief about the Indian Standard code for concrete and . 5
(d) What are the general principles of inspection of civil engineering works and what are the main items requiring quality control? 5

9. Group C
Answer the following in brief: 10 × 2
(i) Classify the rock types according to their geological origin. Also, give names of at least two stones associated with them.
(ii) Discuss different types of lime used in civil engineering applications.
(iii) Classify various types of mortar.
(iv) Define corrosion of steel and give its causes.
(v) What is tender? Name different types of tenders.
(vi) What are the safety measures taken during the construction of a multistoried building?
(vii) What is carbonation of concrete? State its ill effects?
(viii) What measures will you adopt to prevent deterioration of a building having its structural members (items) made of concrete, brick, timber, steel, etc.
(ix) What is FIDIC document?
(x) What do you know about AASHTO and IRC codes?

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