S.E. (Civil) EXAMINATION, 2012
STRENGHT OF MATERIALS
(2008 PATTERN)

No of Questions 12 **No of Pages:- 11**

Time : 3 Hours **Maximum Marks : 100**

Instructions :

1) Answers to the two sections should be written in separate answer-book.
2) Neat diagrams must be must be drawn wherever necessary.
3) Figures to the right indicate full marks.
4) Use of electronic pocket calculator is allowed.
5) Assume suitable data, if necessary.
6) Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No.4, Q. No. 5 or Q. No. 6 from section I and Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10 and Q. No. 11 or Q. No. 12 from Section II.

SECTION I

Q1) (a) A bar ABCD of uniform cross section 20mm in diameter is subjected to loads as shown in the figure 1.a. Find the total elongation of the bar, axial force diagram and the maximum stress in each portion of the bar assume Modulus of Elasticity to be E=200GPa. [8]

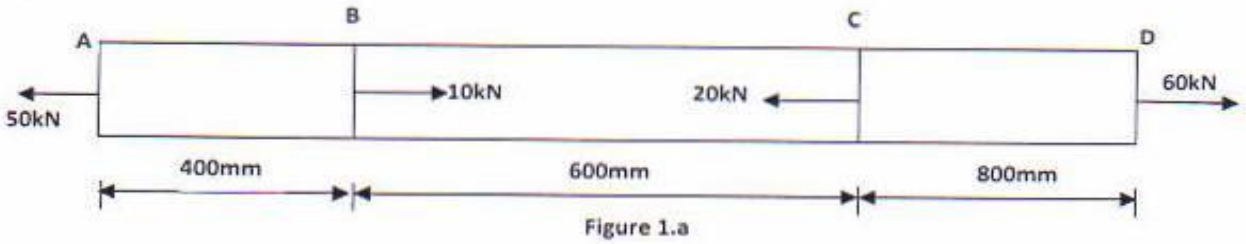


Figure 1.a

(b) A compound tube consisting of steel tube 150mm internal diameter and 10mm thickness is enclosed in a brass tube of 170mm internal diameter and 10mm thickness. These tubes are rigidly fixed at the ends and carriers an axial load of 1000kN. Find the stresses and load carried by each tube also determine the amount of deformation in each tube. [10]

(OR)

Q2) (a) A bar of steel is 40mm x 40mm in cross section and is 120mm long. It is subjected to a tensile load of 200kN along the longitudinal axis and tensile loads of 500kN and 400kN on lateral faces as shown in the figure 2.a. find (a) the change in dimension of the bar and change in volume. (b) Axial tensile longitudinal load acting alone can produce same longitudinal strain. [08]

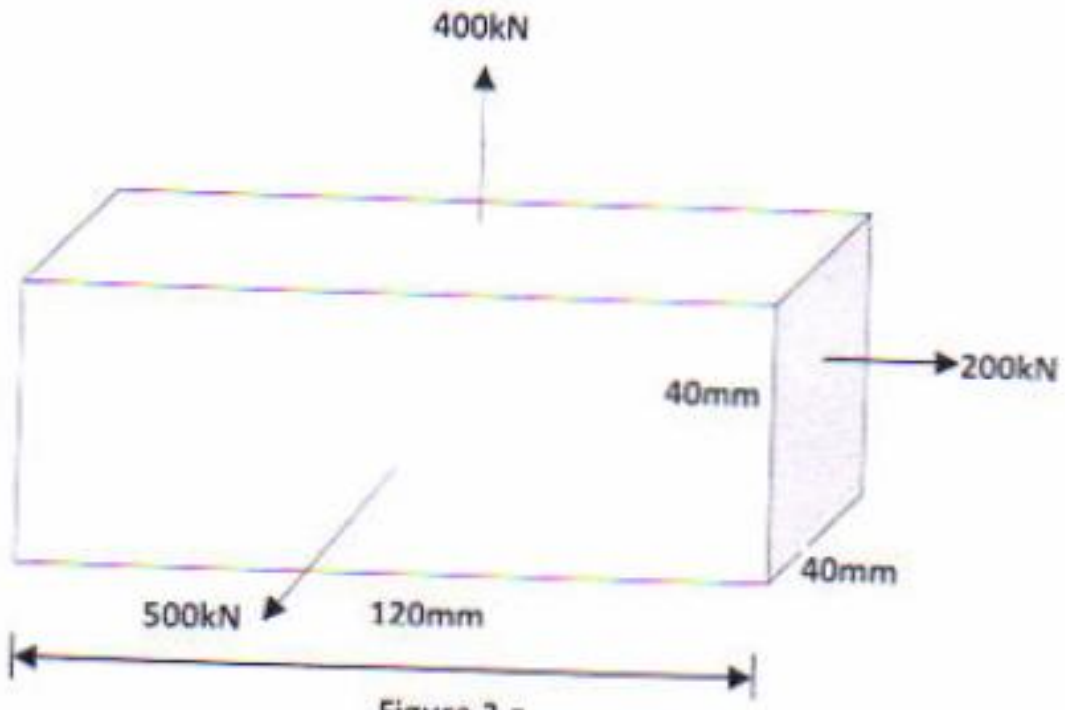


Figure 2.a

(b) The composite bar made up of Steel and Aluminum component is shown in the figure 2.b is connected to grips at its end at a temperature of 60°C. Find the stresses in both the components when the temperature falls to 20°C if, 1) The ends do not yield 2) The ends yield by 0.25mm. Take E for Aluminum and Steel as 0.7×10^5 N/mm^2 and 2×10^5 N/mm^2 respectively and coefficient of expansions for Aluminum and Steel as 2.34×10^{-5} per °C and 1.17×10^{-5} per °C respectively. [10]

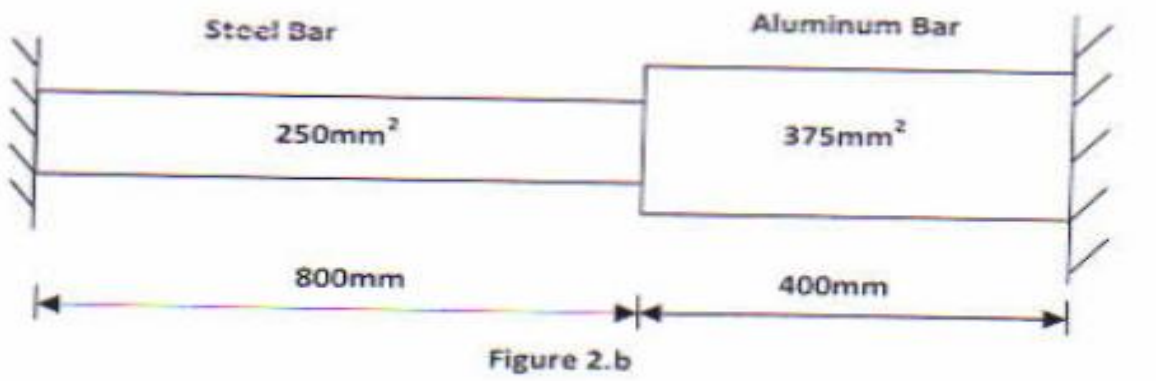


Figure 2.b

Q3) (a) Draw shear force and bending moment diagram for beam loaded and supported as shown in the figure 3.a. [08]

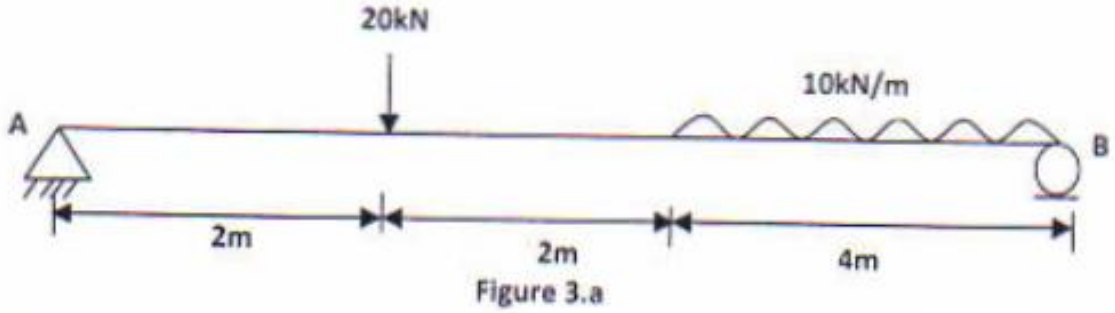


Figure 3.a

(b) The shear force diagram of a simply supported beam is as shown in the figure 3.b. Draw the loading diagram and bending moment diagram for the beam. [8]

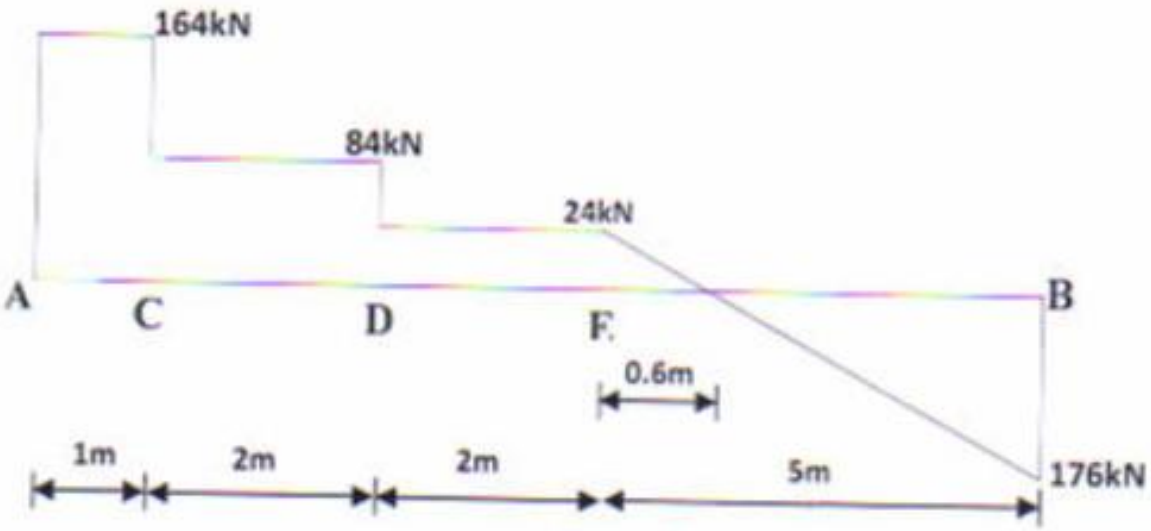
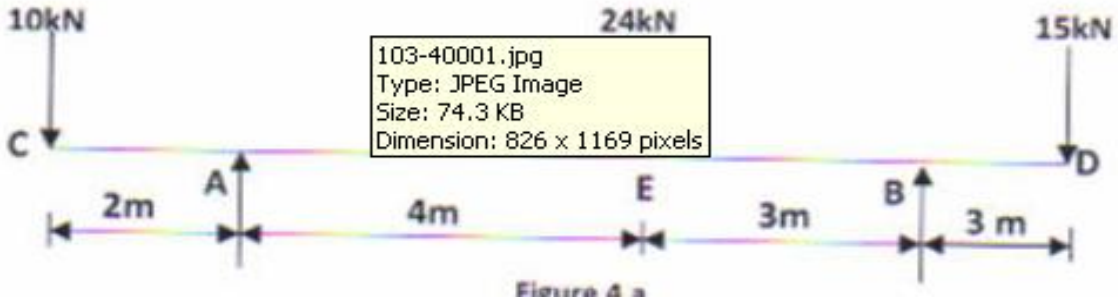


Figure 3.b

(OR)

Q (4) a) For a overhanging beam show in the figure 4.a. Determine the support reactions at A and B and draw shear force and bending moment diagrams. Determine the points of contra flexure with in the span AB. [08]



(b) Draw shear force bending moment diagrams for the beam supported and loaded as shown in the figure 4.b. [08]

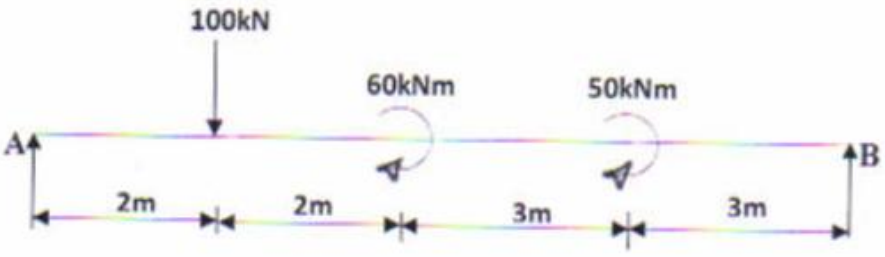


Figure 4.b

Q5) (a) A cast iron beam I section with top flange 80mmx20mm thick, bottom flange of 160mmx40mm thick. The beam is freely supported on a span of 5meters. If tensile stress is not exceed 20N/mm^2. Find the safe uniformly distributed load which the beam can carry. Find also the maximum compressive stress. [8]

(b) A steel beam of I section, 500mm deep and 190mm wide has 25mm thick flanges and 15mm thick web. The beam is subjected to a shear force of 400kN. Calculate the maximum intensity of shear stress in the section assuming the moment of inertia to be 6.45x 10^8mm$^{4.}$ Also calculate the total shear force carried by the web and sketch the shear stress distribution across the section. [8]

(OR)

Q6) (a) A flitched beam consist of two wooden joist 100mm wide and 200mm deep with steel plate 140mm deep and 10mm thick placed symmetrically between them as shown in the figure 6.a. If the maximum stress in the wooden joist be $7N/mm^2$, find the corresponding maximum stress reached in the steel. Also determine the moment of resistance of the section. Take $Es=20E_w$. [8]

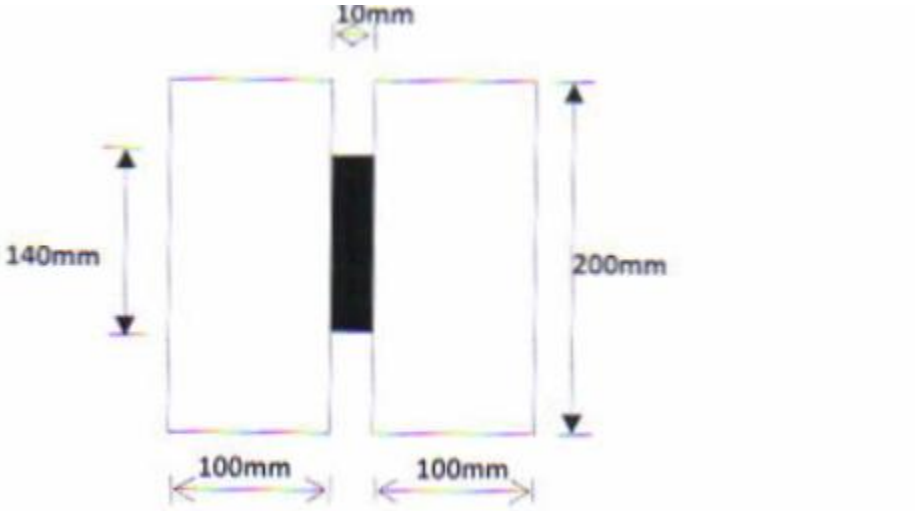


Figure 6.a

(b) A built up section consisting of two ISBM 125 joist are connected by 12mm diameter rivets as shown in the figure6.b. The beam is simply supported on a span of 2m and carries a uniformly distributed load of such intensity that maximum bending stress reached is $165N/mm^2$. Find the intensity of loading on the beam and the spacing of rivets near the support. Take safe average shear stress of the rivets as $100N/mm^2$. Take for each joist ISMB 125 Area=$1660mm^2$, Ixx=$449x10^4$ mm^4 [8]

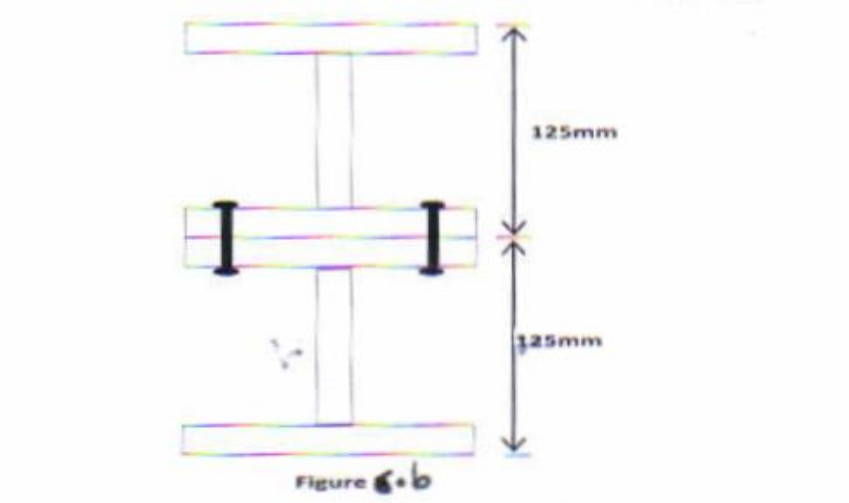


Figure 6.b

SECTION II

Q7) (a) A solid circular shaft 200mm in diameter is to be replaced by a hollow shaft, the ratio of external diameter to internal diameter being 5/3. Determine the size of hollow shaft if maximum shear stress is to be the same as that of a solid shaft. Also find the percentage economy achieved in weight. [09]

(b) A vertical steel rod, 1300mm long is rigidly fixed at its upper end and a weight of 80N is allowed to slide freely on through a distance of 100m, on to the collar at the lower end. The upper 700mm length of the rod has a diameter of 20mm while the lower 600mm length is 16mm in diameter as shown in the figure 7.a. Calculate the maximum Instantaneous stress induced in the bar. Take $E=2x10^5 N/mm^2$. [09]

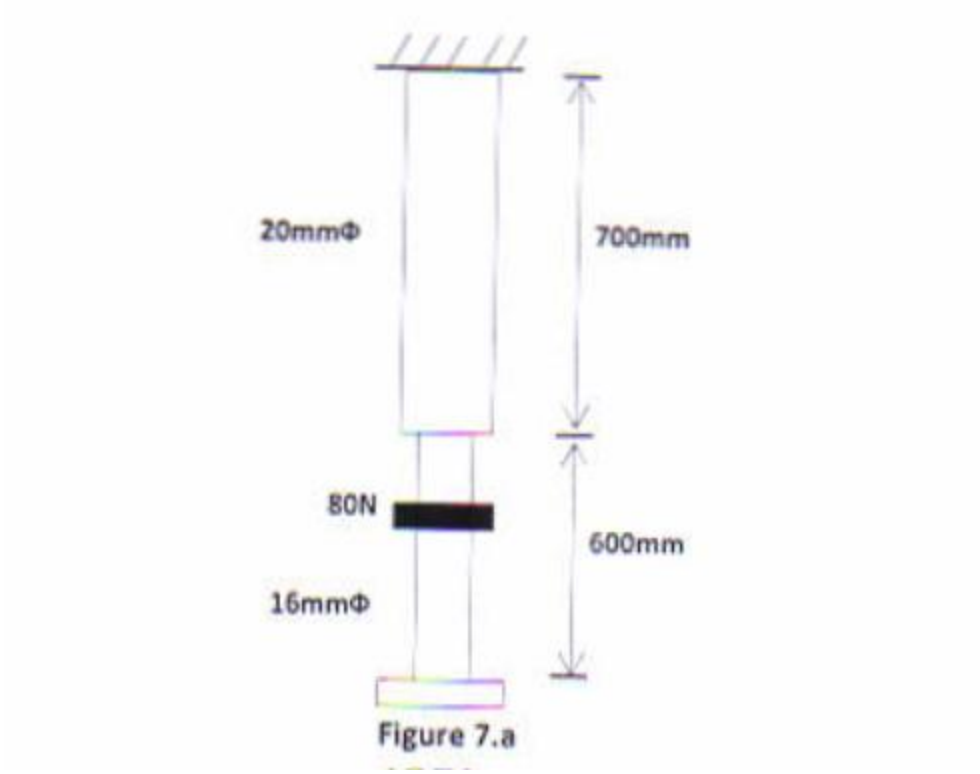


Figure 7.a

Q8) (a) A hollow shaft having internal to external diameter ratio 3:5 is required to transmit 450kW at 120rpm with a uniform twisting moment. The shearing stress in the shaft must not exceed 60N/mm^2 and the twist in a length of 2.5m must not exceed 1°. Calculate the minimum external diameter of the shaft satisfying these conditions. Take the modulus of rigidity G=8x10^{4}N/ mm^2. [09]

(b) Two bars each of length L and of the same material are each subjected to the same axial tensile force P. The first bar has a uniform diameter '2d'. The second bar has a diameter 'd' for a length L/3 and a diameter '2d' for the remaining length. Compare the strain energies of the two bars [09]

Q9) (a) A rectangular block of material is subjected to a tensile stress of 100N/mm^2 on one plane and a tensile of 50 N/mm^2 on a plane at right angles, together with shear stress of 60 N/mm^2 on the same planes. Find, 1) Magnitude of principal stress 2) Direction of Principal planes 3) Magnitude of greatest shear stress [08]

(b) If a shaft having diameter of 100mm is subjected to a behind moment of 6.25kN-m in addition to the torque which it transmits, find the maximum allowable torque, if the direct stress is shaft is not to exceed 80 N/mm^2 and the shearing is not to exceed 50 Nn/mm^2 . state which of the two limiting stress is reached and determine the maximum value of other stress [08]

(OR)

Q10) (a) At a point in a strained material, the values of normal stress across two right angles to each other are 80 MPa and 32 MPa, both tensile and there is a shear stress of 32MPa as shown in the figure 10.a Determine, 1) Stress component on the plane at 30° anticlockwise 2) The Principal stress and their directions 3) The maximum shear stress [08]

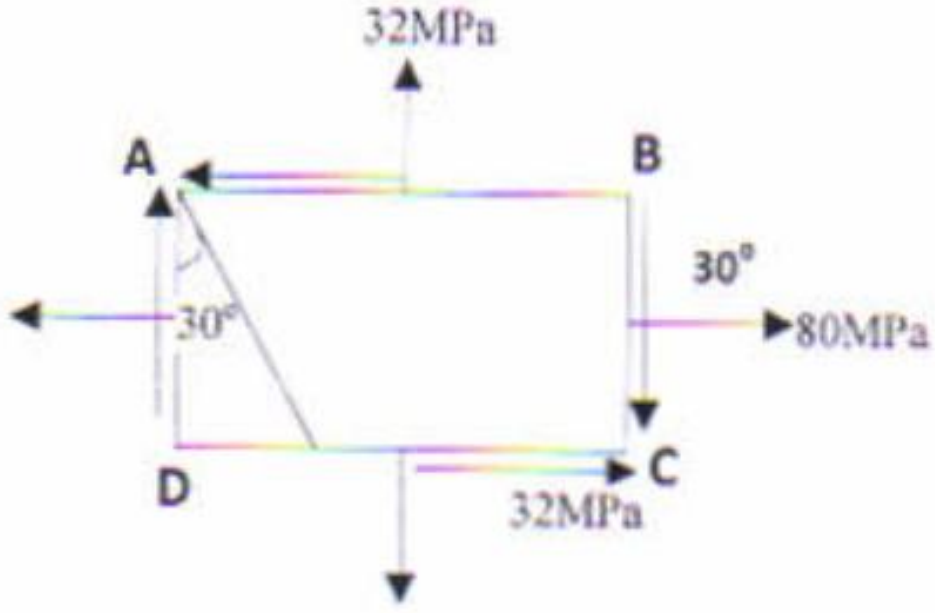


Figure No. 10.a

(b) Find the diameter of a hollow steel shaft whose diameter is 0.6 times of external diameter to transmit 150kW at a speed of 250 rpm, if the shearing stress is not to exceed $70N/mm^2$. If a bending moment of 2720Nm is now applied to the shaft, find the speed at which it must be driven to transmit the same power for the same value of maximum shearing stress. [08]

Q11) (a) State assumptions of Euler's theory for long columns and show effective length, various end conditions of column with proper diagrams showing corresponding values. [08]

(b) A short masonry pillar is 600mm x 600mm in cross section. The pillar carries a point load of 1000 kN acting on centroidal axis of the section and at an eccentricity of 80 mm from the longitudinal axis as shown in the figure 11.a. Find maximum and minimum stress on the section. [08]

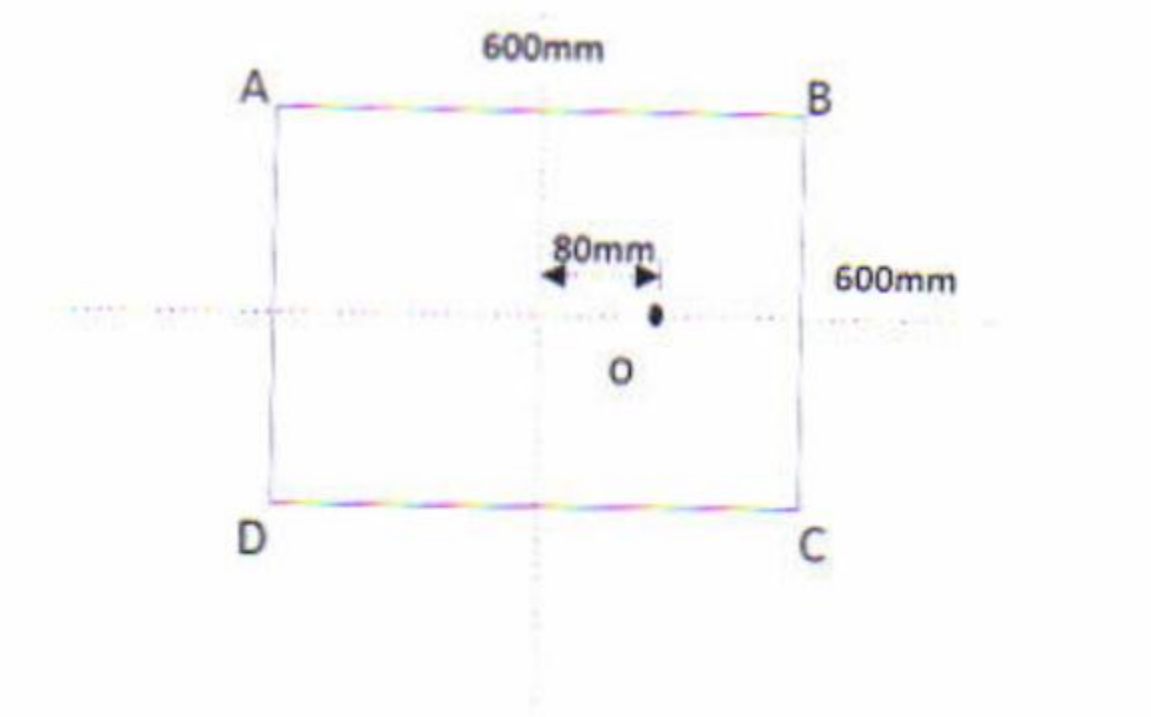


Figure 11.a

(OR)

Q12) (a) A hollow cast iron column 4m long is fixed at both ends and has an internal diameter of 0.8 times the external diameter. The column supports an axial load of 250kN. Find the internal and external diameter of the column adopting factor of safety of 5 . Assuming $f_c = 550N/mm^2$ and $\alpha = 1/1600$. [08]

(b)A cross section of column carries a load of 120kN acting at E on the diagonal of the section at a distance of 50mm from the centre as shown in the figure 12.a. Find the stresses at the four corners of the section.

[08]

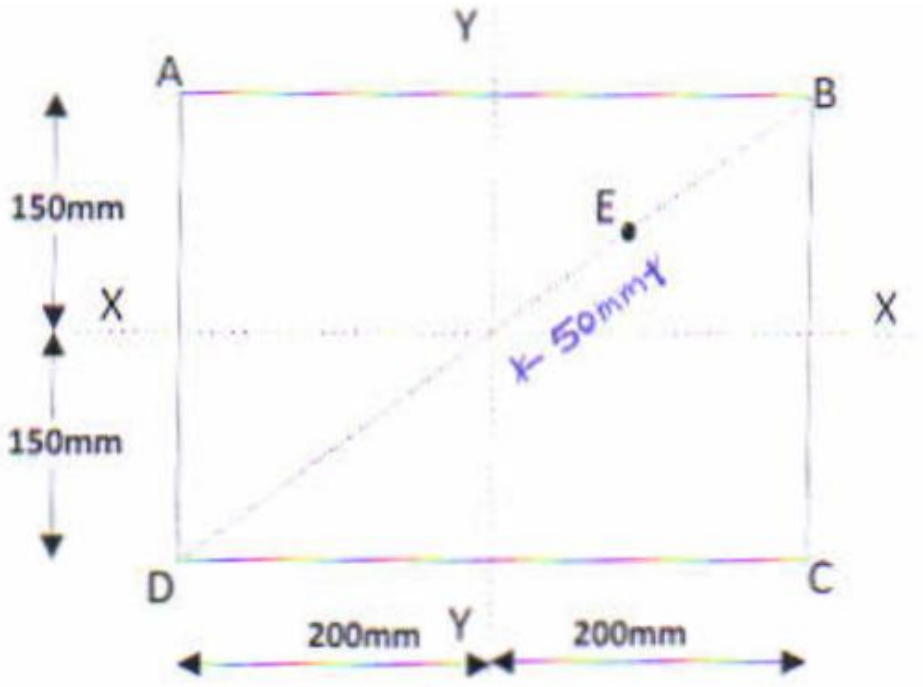


Figure 12.a

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Total No. of Questions : 9 **[Total No. of Printed Pages :6]**

[4362]-107

S. E. [CIVIL] Examination – 2013

Building Planning (2008 Pattern)

[Time : 4 Hours] **[Max. Marks : 100]**

N. B :

i) All questions are compulsory.

ii) Answer to the two sections should be written in separate answer books.

iii) Draw neat sketches wherever necessary.

iv) Section two should be drawn on drawing sheet only.

v) Figures to the right indicate full marks.

vi) There will be no internal option for questions in section II.

vii) Assume suitable data if required

SECTION-I

Q.1 a) What is Green Building? State the Factors considered in Green Building Design [6]

b) Explain with neat sketch the importance of rain water harvesting. [6]

c) What are the requirements of industrial Zone in Town Planning? [6]

Or

Q.2 a) Write a short note on Land use zoning and mention the requirement of each of them? [6]

b) Write short notes on Eco friendly and cost effective building. [5]

c) Explain how Architectural planning principles helps Architectural composition. [7]

Q3. a) What is F.A.R? What are the areas exempted while calculating F.A.R.? [5]

b) State the byelaws regarding road width and height of the building. [4]

c) What do you understand by 'Transferable development right'? [7]

Or

Q.4 a) Explain the necessity of Building Bye laws. [5]

b) Differentiate between the summer and winter conditioning [5]

c) Explain the importance of Day lighting and state the factors influencing it. [6]

Q.5 a) Explain in detail any two constructional measures for noise control. [6]

b) What are the general fire safety requirements for buildings? [4]

c) What are different acoustical defects? Explain any one detail. [6]

Or

Q.6 a) Explain the following terms: [6]

(i) Fire load

(ii) Evacuation time

(iii) Travel distance.

b) Explain in brief ‘Thermal conductivity’. [4]

c) State the guidelines to be followed while designing sanitary and water supply arrangements? [6]

SECTION-II

Q.7 A line plan for a residential building is shown in fig. 1. Draw detailed floor plan with 1:50 or suitable. Use following data: [15]

a) All external walls are of 230 mm thick.

b) All partition walls are of 115 mm thick.

c) RCC frame structure.

d) Beam sizes = 0.23 x 0.45.

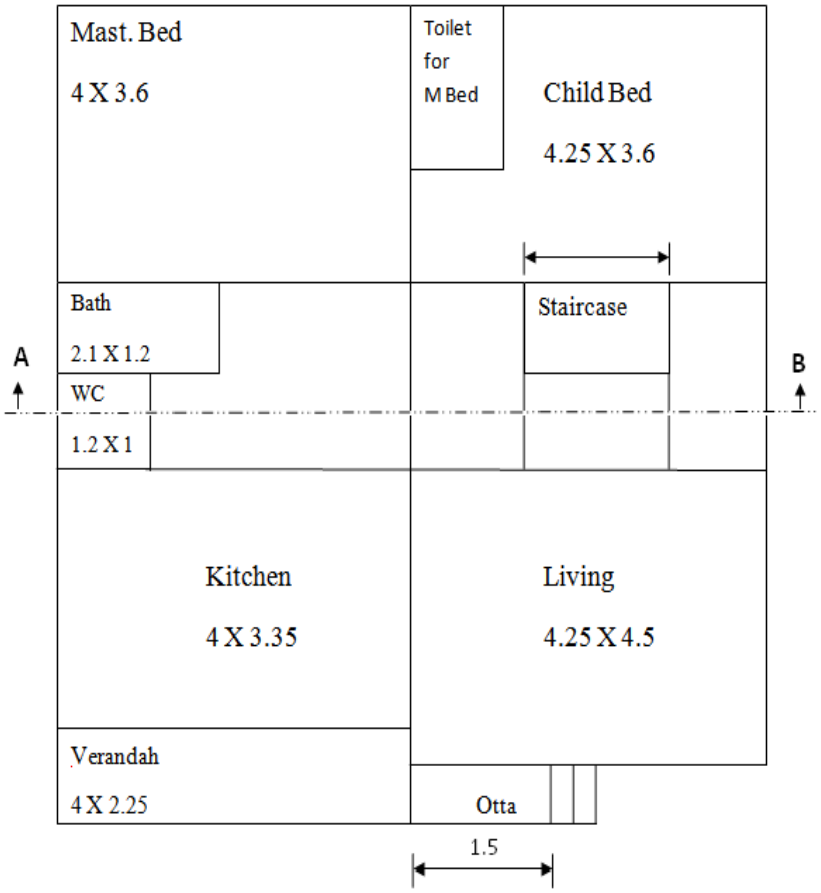
e) Column sizes = 0.23 x 0.45.

f) Floor to floor height = 3.0

g) Plinth height = 0.6

j) Toilet for M. Bed = 1.2 x 2.5

k) All dimensions are in meters.



Q8. a) Draw a detailed sectional elevation along section line AB for the line plan of Fig. 1, the depth of hard strata is 1.6m below ground level. [10]

b) Draw a one point perspective view (Fig. 2) to a scale 1:100 or suitable. Eye level positioned at 2.5 m above ground level. Retain all construction line. [10]

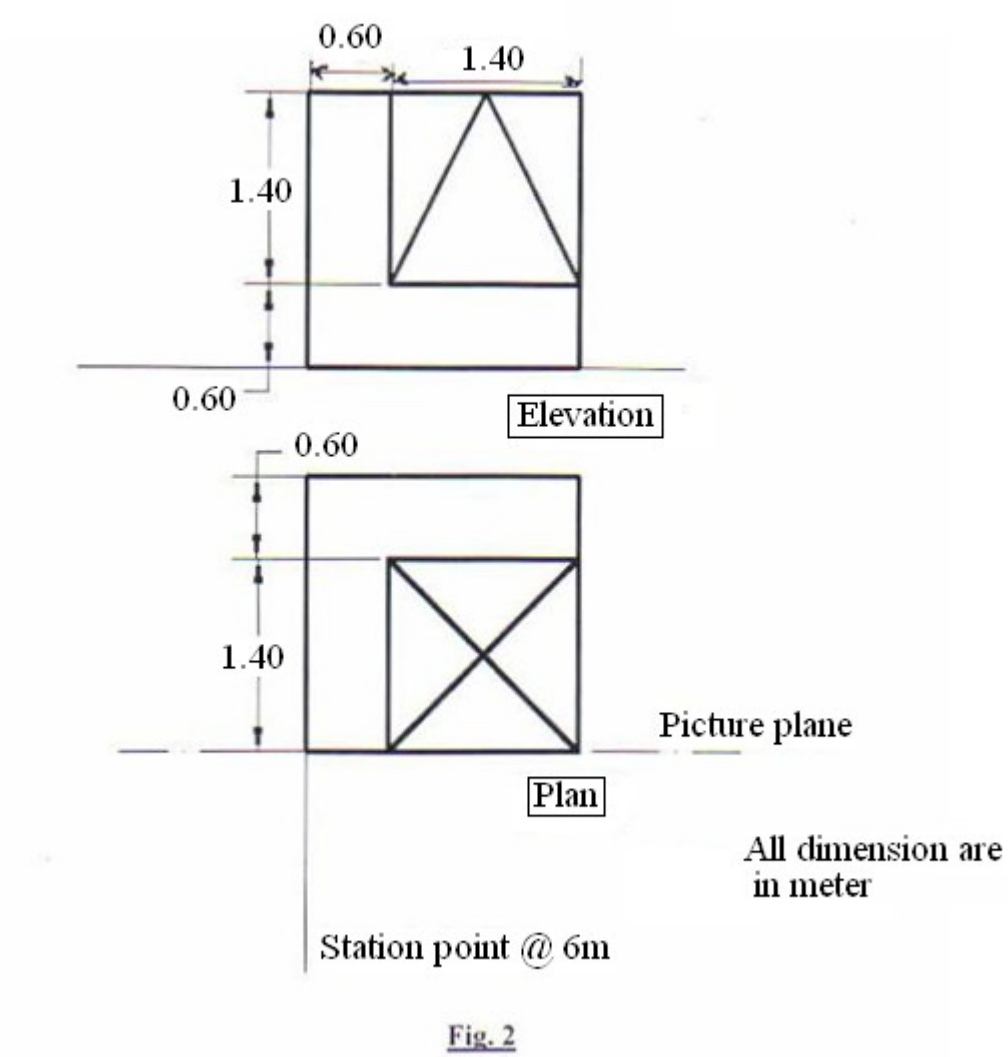


Fig. 2

Q9. Design a primary school for 6 classrooms, the building is single – storied and is RCC framed structure. Following units are to be provided.

1. Primary class room = 45 sq. m
2. Museum = 16 sq. m
3. Art room = 68 sq. m
4. Craft room = 68 sq. m
5. Head master’s room = 15 sq. m

6. Administrative office = 30 sq. m
7. Common staff room = 60 sq. m
8. Medical unit = 30 sq. m
9. Book store = 15 sq. m

Draw to scale 1:50 or suitable

a) Line plan showing locations of doors and window. [12]

b) Show line sketches of furniture arrangements in a class room [03]

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SE (Civil), Examination, 2013

Building Materials & Construction

[2008 Course]

[Total No. of Questions :12] **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

INSTRUCTONS:

1. Answer 03 questions from each section.
2. Answer to the two sections should be written in separate books.
3. Neat diagrams must be drawn wherever necessary.
4. Black figurers to the right indicate full marks.
5. Assume suitable data, is necessary.

SECTION-1

Q.1 a) Explain with neat sketch, the setting out operation for RCC framed structure building. [6]

b)How will you provide foundation on block cotton soil? [6]

c) Draw a neat sketch of precast concrete pile. [4]

OR

Q.2 a) Explain with neat sketch, under-reamed pile foundation. [6]

b) State the advantage of dressing of stones; Explain with neat sketch, the Boasted finish and Reticulated finish? [6]

c) What is pointing? What are the different types of pointing? Explain any 2 in detailed? [6]

Q.3 a)What is the necessity and importance of joints in concrete work? [6] Explain the expansion and contraction joint in concrete work?

b) What is curing? How will you achieve curing of RCC slab, column and footings? [6]

c) Write a short note on precast construction [4]

OR

Q. [4] a) Draw a neat sketch of formwork for 'RCC Column' and 'RCC Footing'. [6]

b) Explain in detailed the construction of cavity wall. [6]

c) What are the advantage of 'Reinforced brick masonry'? [4]

Q.5 a) Explain with neat sketch, the 'Jack arch floor'? [6]

b) Explain the terms: [2*3]

i. Principal rafter.
ii. Purlin.
iii. Truss.

c) Draw neat sketches (line diagram) of any five different types of trusses. [6]

OR

Q.[6] a) State the functional requirements of flooring [6]

b) Draw neat sketch showing fixing details of 'AC sheets' [6]

c) Write short notes on: [3*2]

i. Rubber Flooring.
ii. Stone flooring.

SECTION-2

Q. 7 A) Define door Write down any four types of doors. Explain any one with sketch. [6]

B) Define arch Give detailed sketch of lintel with weal hershed [6]

C) State different building finishes. Explain defects in painting. [6]

OR

Q.8 A) Draw neat and labeled sketch of panelled door. Show any four parts with dimensions. [6]

B) Explain Dormer window with sketch. [6]

C) What is painting? State defects in plastering. [6]

Q.9 A) Explain various considerations that are made in planning of staircase. [6]

B) State safety measures to be adopted in demolition of high rise structure. [4]

C) Explain the following technical terms with sketches. [6]

i. Winder
ii. Newel post
iii. Baluster

OR

Q.10 A) State different method for vertical circulation state with reason when they are preferred. [6]

B) Discuss the different factors leading to accidents at constructions project. [6]

C) State the types of shorting. Describe needle beam method. [4]

Q.11 A) Define timber. Explain defects in timber with sketches. [6]

B) Write short notes on [6]

i. Glass cladding as a Elevation

ii. Gypsum as a interior maternal

C) Write down engineering properties of [4]

i. Plaster of Paris

ii. Plastic

OR

Q.12 A) Define seasoning of timber. Explain any one method in detail. [6]

B) State any four types of building materials. Write down their advantage and disadvantage. [6]

C) Write down short notes on [4]

i. Ceramic product

ii. Eco friendly materials

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(4362)- 104
SE Civil (2008 Course)
Engineering Geology

[Total No. of Questions:6] **[Total No. of Printed pages :2]**
[Time : 3 Hours] **[Max. Marks : 100]**

INSTRUCTIONS

1) Answers to the two sections should be written in separate books.
2) Neat diagrams must be drawn wherever necessary.
3) Black figures to the right indicate full marks.

SECTION I

Q.1) a) What are igneous rocks? Explain their mode of formation and textures in detail. (12)

b)Explain cataclastic and Thermal metamorphism (4)

OR

Q.1) a) Give detailed notes on Residual and sedimentary deposits (12)

b) Write note on schistose structures in detail (4)

Q.2) Write notes on

a) Base level of erosion and Graded profile (6)
b) Hiatus of Regional unconformity (4)
c) Geological Time scale (6)

OR

Q 2) a) Any two features developed due to river deposition (6)
b) Rock types in Deccan Trap Area (6)
c) Peninsular division of India (4)

Q.3) a)Explain Angular and Nonconformity type of unconformity with sketches (6)

b) Explain various parts & types of faults with neat sketches (12)

OR

Q.3) a) How folds are developed? Explain in detail various types of folds (12)

b) Explain Inliers and outliers (6)

Section-II

Q.4) a) G. I. S. is an important tool for civil Engineering Projects. Explain in detail (4)

b) Write detailed note on Preliminary Geological Explorahons at Engineering projects (12)

OR

Q.4) Write detailed notes on

a) Coring and Indexing of cores (4)

b) Angle holes (4)

c) Preservation of Tachglytic basalts and other related rocks (4)

d) Drill water (4)

Q.5) a) What is and earthquake? Explain seismic waves in detail (6)

b) Explain in brief the geological work done by groundwater (10)

OR

Q.5) a) how landslides can be prevented? Explain (6)

b) Describe with neat sketches different geological conditions promoting natural discharge of water (10)

Q 6) a) Tunnelling through folded and faulted strata (8)

b) Relationship between type of dam and local geology (6)

c) Pilot cut along dam alignment (4)

OR

Q 6) a) Dams in tectonic areas (8)

b) Geological studies to be carried out in reservoir sites (6)

c) Difficulties to be faced while tunnelling along and across the strike direction of beds (4)

[Total No. of Questions:12] **[Total No. of Printed Pages: 7]**

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UNIVERSITY OF PUNE

S.E. (Civil) (Semester-II) Examination, 2013

STRUCTURAL ANALYSIS-I

[2008 Course]

Time: 3 Hours **Max. Marks: 100**

Note:

1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.
2) Answer to the two Sections should be written in separate Answer books.
3) Neat sketches must be drawn wherever necessary.
4) Figures to the right indicate full marks.
5) Use of Non-Programmable Electronic Scientific calculator is allowed.
6) Use of cell Phone is not allowed.
7) Assume suitable data, if necessary.

SECTION-1

Q. No. 1 a) Explain relation between actual beam and conjugate beam. (4)

b) A simply supported beam of span 3 m is carrying a uniformly distributed load 10 kN/m. Find the values of maximum slope and deflation of the beam. Take modulus of rigidity of the beam as 10 X 10^9 N.mm^2. The flexural rigidity is same through the span. Use Conjugate Beam Method. (7)

c) Determine deflection at point 'C' and 'D' for an overhanging beam ABC loaded as shown in Figure 1.1 Assume EI Constant. (7)

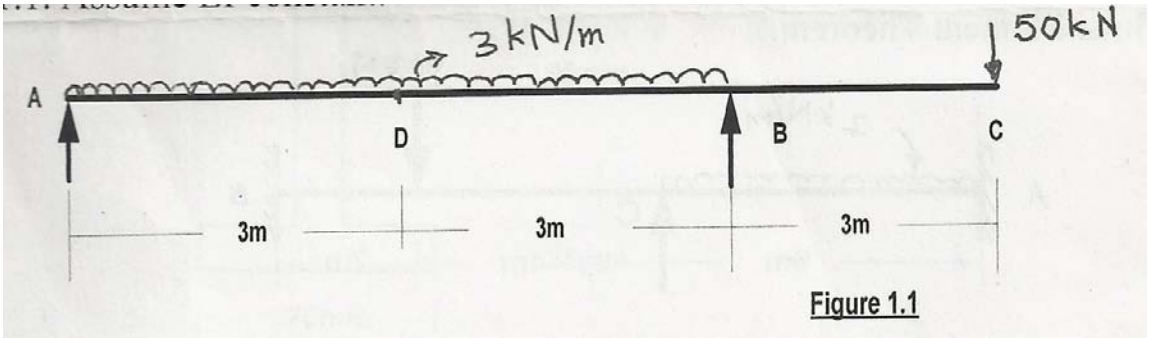

Figure 1.1

Figure 1.1

OR

Q. No. 2 a) State Castigliano's First Theorem and its use in structural analysis. (4)

b) A simply supported beam of 3 m span is subjected to central point load of 15kN. Determine the maximum slope and deflection of the beam. (7)

Take EI=6X 10^{10} N.mm^2.

c) Using Castigliano's first theorem, find deflection at free and of the beam shown in figure 2.1 (7)

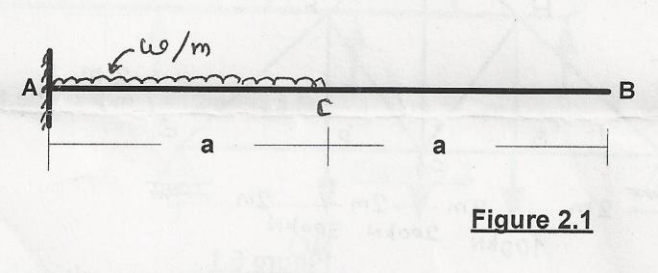

Figure 2.1

Q. No. 3 a) Using first principle approach, draw S.F.D. and B.M.D. for the fixed beam loaded as shown in Figure 3.1. (8)

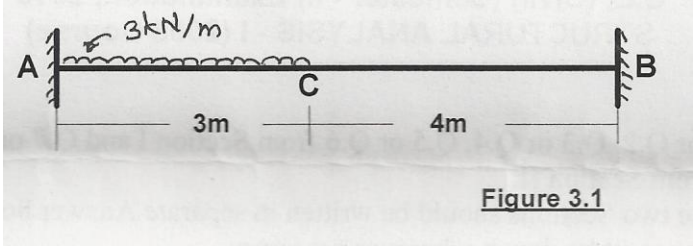

Figure 3.1

b) Analyze the beam loaded and supported as shown in Figure 3.2 if the support 'B' sinks by 5mm. Assume EI constant. Take E=200GPa, I=332 X 10^6. mm^4. Use Three Moment Theorem. (8)

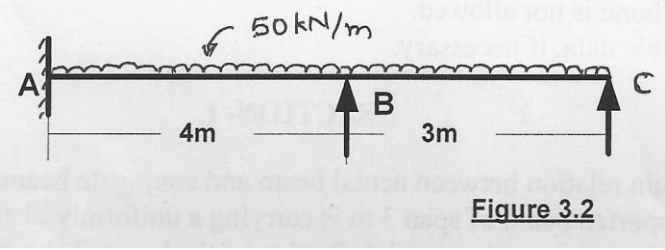

Figure 3.2

OR

Q. No. 4 a) Analyze the prop cantilever beam of span 7m subjected to u.d.l. of 10kN/m throughout the span. Also draw S.F.D. and B.M.D. (8)

b) Analyze the beam loaded and supported as shown in Figure 4.2. Plot S.F.D. and B.M.D. Use Three Moment Theorem. (8)

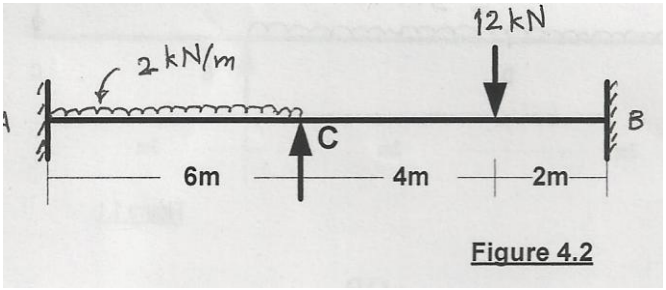

Figure 4.2

Figure 4.2

Q. No. 5: Find deflection at point 'B' for the truss loaded and supported as shown in Figure 5.1 (16)

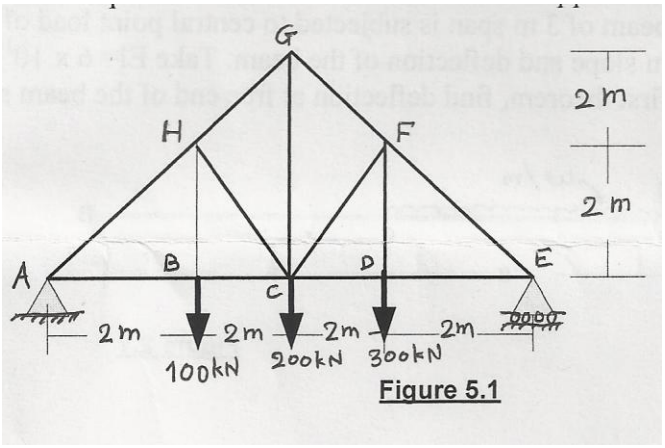

Figure 5.1

Figure 5.1

OR

Q. No. 6: Find the forces in the members of the truss loaded and supported as shown in Figure 6.1. (16)

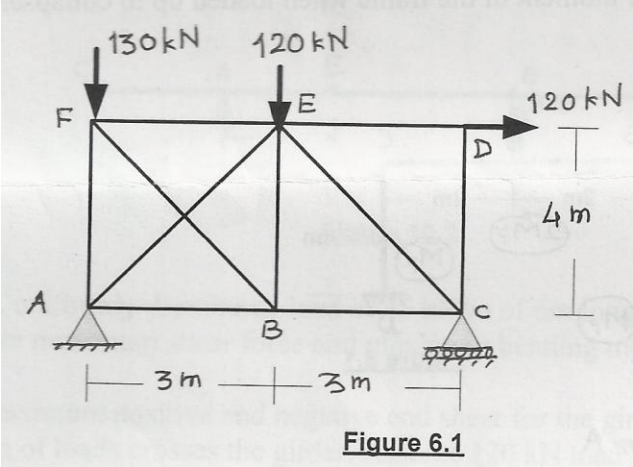

Figure 6.1

SECTION-II

Q. No. 7: a) What are the assumptions made in theory of plastic analysis? (4)

b) Find shape factor for an unsymmetrical I section as shown in Figure 7.1. (7)

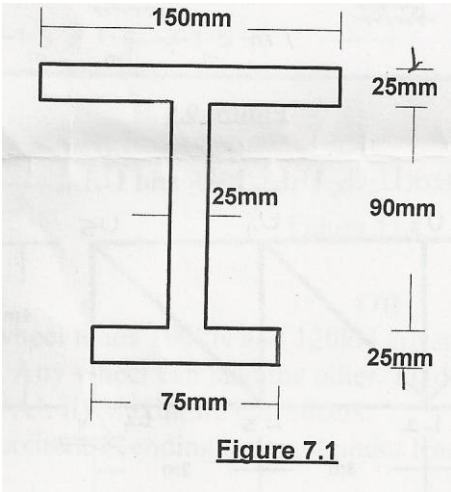

Figure 7.1

c) A continuous beam ABCD is loaded as shown in Figure 7.2. Find the collapse load. (7)

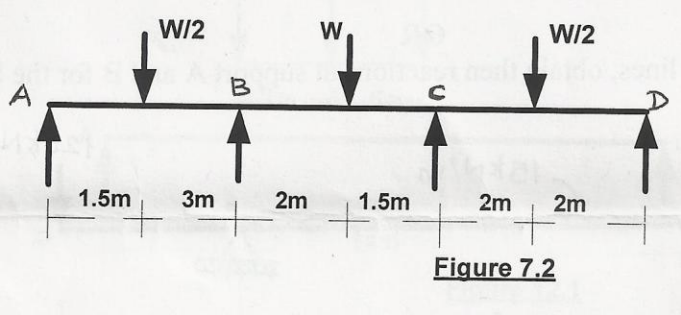

Figure 7.2

OR

Q. No. 8: a) State and explain the concept of plastic hinge. Explain step by step, how plastic hinge is Developed in beams under gradually applied load. Draw various shapes of stress diagram. (9)

b) Determine the values of plastic moment of the frame when loaded up to collapse. Refer Figure 8.1. (9)

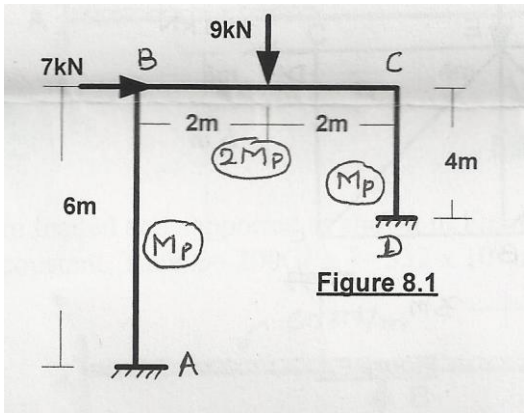

Figure 8.1

Q. No. 9: a) Draw ILD for the reaction at A, B and C. Also draw ILD for shear force at midpoint of ABC for the beam shown in Figure 9.1. (8)

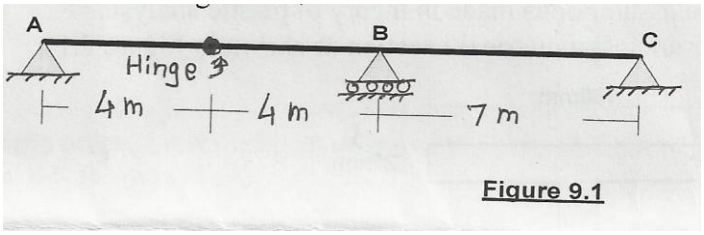

Figure 9.1

b) Construct ILD for the forces in the members U_2U_3, U_3L_2, L_2L_3 and U_1L_1. (8)

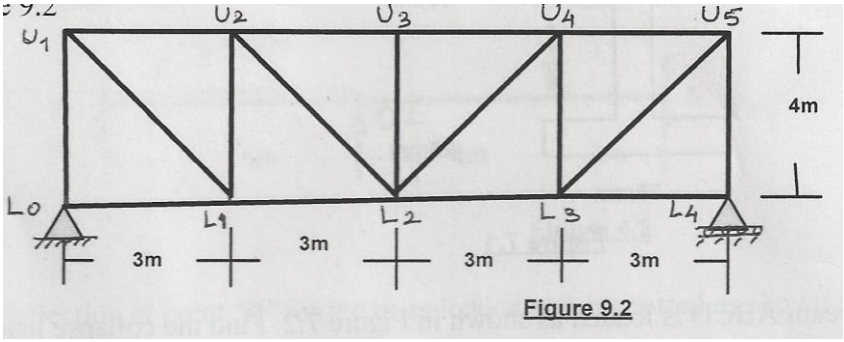

Figure 9.2

Figure 9.2

OR

Q. No. 10: a) Using influence lines, obtain then reactions at support A and B for the beam shown in Figure 10.1. (8)

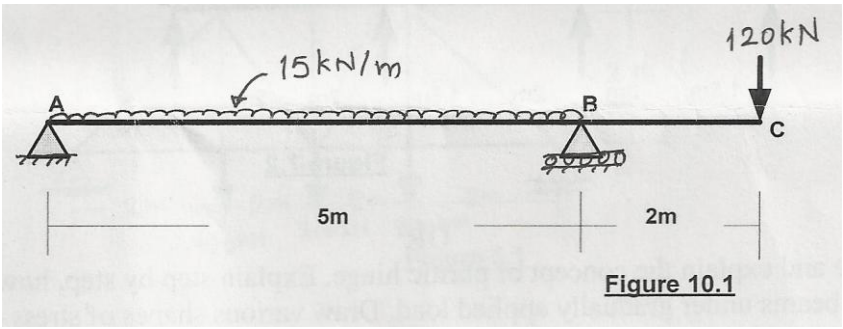

Figure 10.1

Figure 10.1

b) Plot ILD for reactions at A and B supports and S.F. and B.M. at point 'E' for the beam shown in Figure 10.2. (8)

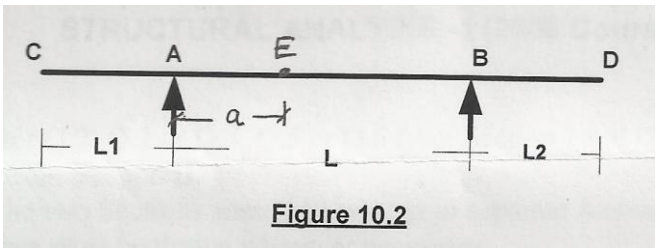

Figure 10.2

Figure 10.2

Q. No. 11: a) A uniformly distributed load of 75 kN/m of 6m long crosses a girder AB of span 20m. Calculate maximum shear force and maximum bending movement at a section 10m from end A. (8)

b) Find the maximum positive and negative end shear for the girder as shown in Figure 11.1

when the train of loads crosses the girder. Assume 120 kN load leading the train. (8)

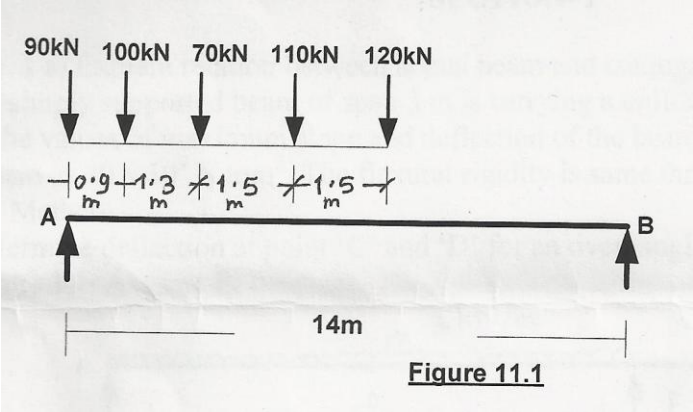

Figure 11.1

OR

Q. No.12 a) Two wheel loads 100kN and 120kN are spaced 3m apart and are moving on a girder AB of 13m span. Any wheel can lead the other. Find i) Max. positive and max. negative shear force at 5m from 'A'. ii) Maximum end shears. (8)

b) Find absolute maximum bending movement under leading load 150kN for the girder shown in Figure 12.2 (8)

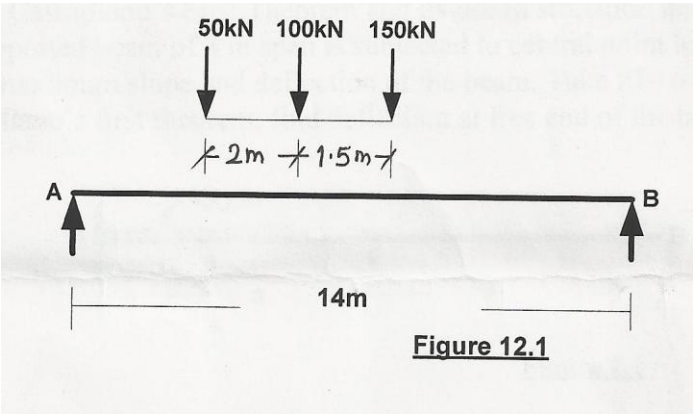

Figure 12.1

UNIVERSITY OF PUNE

[4362]-110A

S.E. (Civil) Examination

ENGINEERING ECONOMICS AND MANAGEMENT

(2003Pattern)

[Time : 3 Hours] **[Max. Marks : 100]**
Total No. of Questions : 12 **[Total No. of Printed Pages :3]**

Section I

Instructions

1. Answer any 3 question from each question
2. Answer to the two section should be written in Separate Book
3. Neat diagram must be drawn whenever necessary
4. Assume suitable Idea , if necessary

Q 1 a. Define Economics. What is it's signification in Construction sector? (6)

b. Explain the terms cost & value with suitable examples. (6)

c. Explain the term : Marginal Utility with the help of suitable example (6)

OR

Q 2 a. Give the definition of following (6)

1. Assets
2. Liabilities
3. Wealth
4. Wants
5. Price
6. Investment

b. Explain the Elasticity of Supply and Elasticity of Demand. State the formulae for the same. State how to market situation is indicated by these two factors. (6)

c. Discuss the indifference curve technique. (6)

Q 3 a. Define productivity. Differentiate between Productivity of materials & labor (8)

b. What are the characteristics of perfect competition ? Give one example to elaborate your point. (8)

. OR

Q 4 a. What are the step to be followed to over come resource scarcity? (8)

b. Explain the terms of GNP & GDP (8)

Q 5 a. Explain the role of Reserve bank of India (8)

b. Explain the terms Working capital & Fixed capital (8)

OR

Q 6 a. Give the advantage & disadvantages of small scale Industry (8)

b. Differentiate between Share & Debenture (8)

Section II

Q 7 a. What is Deming's PDCA cycle? Explain it's application in construction industry. (6)

b. What is the meaning of delegation of authority? Explain with Suitable Example. (6)

c. What are the advantage & disadvantages of Partisanship? (6)

OR

Q 8 a. What are the requirement of cooperative organization? Explain Method of working. (6)

b. State the qualities of a successful manager (6)

c. Write down the contribution by Fayol in the development of management. (6)

Q 9 a. Explain the use of Decision tree (8)

b. What is the importance of training? Give advantage & disadvantages of the same. (8)

OR

Q 10 a.Expain the scope of HR department (8)

b. What is the different leadership style? Explain with stable example (8)

Q 11 a. Explain theory x and theory y. (8)

b. explain the implementation of MIS for construction industry (8)

Q 12 Write short note on any four (16)

a. Industrial Disputes
b. Function of Trade Union
c. Scientific Management
d. Kaizen & Kanban
e. Human Relation & Construction
f. Benefit cost analysis

UNIVERSITY OF PUNE

[4362 - 101]

S.E.CIVIL EXAMINATION, 2013

ENGINEERING MATHEMATICS-III

(2008 COURSE)

Time-3 hours **Maximum Marks-100**

[Total No. of Question=12] **[Total no. of printed pages= 7]**

INSTRUCTION TO CANDIDATE

I. Answer Q1 OR Q2 ,Q3 OR Q4, Q5 OR Q6 from Section I,Q7 OR Q8,Q9 OR Q10,Q11 OR Q12 from Section II

II. Answers to the two sections should be written in separate books.

III. Neat diagrams must be drawn wherever necessary.

IV. Figures to the right indicate full marks.

V. Use of Non-Programmable, electronic pocket calculator is allowed.

SECTION -I

Q1.a) Solve any three. (12)

I) $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6y = e^x cosh2x$

(ii) $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = cos2x$

(iii) $\frac{d^2y}{dx^2} + 9y = 4cosec^2 3x$ (by variation of parameters)

(iv) $x\frac{d^2y}{dx^2} + \frac{dy}{dx} - \frac{y}{x} = ax^2$

b) Solve $\frac{dx}{2z-y} = \frac{dy}{x+z} = \frac{dz}{-2x-y}$ (05)

OR

Q2. a) Solve any three (12)

(I) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 4y = e^x \cos^2 x$

(II) $\frac{d^3y}{dx^3} - 7\frac{dy}{dx} - 6y = (1 + x^2)e^{2x}$

(III) $\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$ (by variation of parameters)

(IV) $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = 4\cos[\log(1 + x)]$

b) Solve (05)

$$\frac{dx}{dt} + y = 7x$$

$$3\frac{dx}{dt} - \frac{dy}{dt} = 5(3x - y)$$

Q.3 a) For a cantilever with uniform load W per unit length, prove that the differential equation satisfied with fixed end as origin is $EL\frac{d^2y}{dx^2} = \frac{W}{2}(L - x)^2$. Hence show that the maximum deflection at the free end x= L is $\frac{WL^4}{8EL}$ (08)

Q.3 b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ if (08)

I) u is finite for all t.

II) u =0 when x = 0 , π for all t

III) $u = \pi x - x^2$ when t =0 and $0 \leq x \leq \pi$

OR

Q .4 a) Find the solution of mechanical system with weight 6LB. Stiffness constant 12 Lb/ft; damping force 1.5 times instantaneous velocity, external force 24 cos 8t and initial conditions

$x = \frac{1}{3} ft,\ \frac{dx}{dt} = 0\ \ when\ \ t = 0$ (08)

(b) Solve the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ with conditions (08)

(I) u =0 when $y \to \infty$ for all x

(II) u =0 when x =o for all values of y

(III)u =0 when x =1 for all y

(IV)$u = x\ (1 - x)$when y =0 for $0 < x < 1$

Q.5 a) Solve the following system of equations by Gauss elimination method. (09)

$5x_1 + x_2 + x_3 + x_4 = 4$

$x_1 + 7x_2 + x_3 + x_4 = 12$

$x_1 + x_2 + 6x_3 + x_4 = -5$

$x_1 + x_2 + x_3 + 4x_4 = -6$

b) Given $\frac{dy}{dx} = x^2(1+y)$and

x	1	1.1	1.2	1.3
y	1	1.233	1.548	1.979

Evaluate y (1.4) by Adams-Bash forth method.

OR

Q.6 a)Solve the following system of equations by Gauss-Seidel method. (09)

$$10x_1 + 2x_2 - x_4 = 11$$

$$-x_1 + 20x_2 + 2x_3 = 49.5$$

$$-x_1 + 10x_3 - x_4 = 27.5$$

$$-x_2 + 2x_3 + 20x_4 = 92.4$$

b) Using Runge - Kutta Fourth order method of compute y for x =0.2, x = 0.4

Given $\frac{dy}{dx} = y - 2\frac{x}{y}$, $y(0) = 1, with \quad h = 0.2$ (08)

SECTION -II

Q7 a) The first four moments of distribution about the value 5 of the variable are 2,20,40,50 .Calculate mean, the four central moments, β_1 and β_2 (06)

b) Obtain regression line for following data

Estimate y when x =6, (ii) x when y =20 (07)

x	2	3	5	7	9	10	12	15
y	2	5	8	10	12	14	15	16

c) In a Poisson distribution if $p(r = 1) = 2\mathrm{p}(r = 2)$ find $p(r = 3)$ (04)

OR

Q.8 a) Obtain correlation coefficient between population density(per square miles) and death rate(per thousand persons) from data related to 5 cities (07)

Population density	200	500	400	700	300
Death rate	12	18	16	21	10

b) On an average a box containing 10 articles is likely to have 2 defective. If we consider a consignment of 100 boxes, how many of them are expected to have three or less defectives. (05)

c) In a male population of 1000, the mean height is 68.16 inches and standard deviation is 3.2 inches. How many men will expected to be more than 6 feet (72 inches).

[z = 1.2 Area=0.3849] (05)

Q .9 a) Find the angle between the tangents to the curve $\bar{r} = t^2\hat{\imath} + 2t\hat{\jmath} - t^3\hat{k}$ at points t = -1 and t=1 (05)

b) Find the directional derivative of the function $\phi = x^2 - y^2 + 2z^2$at the point P(1,2,3) in the direction of PQ where Q is (5,0,4) (06)

c) Prove that the vector field given by $\bar{v} = 2\text{xyz}\hat{\imath} + (x^2z + 2\text{y})\hat{\jmath} + x^2y\hat{k}$ is irrotational and hence find scalar function u (x,y,z) such that $\bar{v} = \nabla u$ (06)

OR

Q 10 a) Find the directional derivative of $\phi = xy^2 + yz^3$at (1, -1 ,1) along the direction normal to the surface $x^2 + y^2 + z^2 = 9at(1,2,2)$ (05)

b) Prove any two (08)

(I) $\nabla^2 (\nabla.\left(\bar{r}/_{r^2}\right)) = {}^2/_{r^4}$

(II) $\nabla^4(r^2 log\ r) = {}^6/_{r^2}$

(III) ∇ x $(\frac{\bar{a}\ X\ \bar{r}}{r^n}) = \frac{(2-n)}{r^n}\ \bar{a} + \frac{n}{r^{n+2}}\ (\bar{a}.\ \bar{r}\ )\ \bar{r}$

c) Given that $\bar{v} = (x^2 - y^2 + 2\text{xz})i + (xz - xy + yz)\hat{\jmath} + (z^2 + x^2)\hat{k}$ find curl $\bar{v}$. Show that curl $\bar{v}$ at the two points p(1, 2, -3) and Q(2, 3, 12) are orthogonal. (04)

Q 11 a)If $F = (2\text{xy} + 3\text{z}^2)i + (x^2 + 4yz)j + (2\text{y}^2 + 6\text{xz})\hat{k}$. Evaluate $\int_c\ \bar{F}$. d $\bar{r}$ where c is the curve x = t, $y = \text{t}^{2,} z = t^3$joining the point (0,0,0) and (1,1,1). (05)

b) Evaluate $\iint_s (x^3 i + y^3 j + z^3 k) . d\bar{s}$ where S is the surface of the sphere $x^2 + y^2 + x^2 = 16$ (06)

(c) Evaluate $\iint_s \nabla X F . \hat{n}\, d\, s$ where $\bar{F} = (x - y)i + (x^2 + yz)j - 3xy^2\hat{k}$ and s is the surface of the cone $z = 4 - \sqrt{x^2 + y^2}$above xy plane (05)

OR

Q 12 a) Evaluate $\phi\bar{F}. d\bar{r}$where $\bar{F} = \sin z\, i + cos\, xj + siny\hat{k}$ where c is the boundary of the rectangle $0 \leq x \leq \pi$ and $0 \leq y \leq 1$ and z=3 (06)

b) Use the divergence Theorem to Evaluate $\iint_s (y^2 z^2\, i + z^2 x^2 j + x^2 y^2 \hat{k}) . d\bar{s}$ where s is the upper part of the sphere $x^2 + y^2 + z^2 = 9$ above the xy plane (03)

c) If the velocity potential of a fluid motion is given by $\phi = log(xyz)$find the equation of stream lines (05)

UNIVERSITY OF PUNE
[4362]- 105
S.E. [Civil] [I Sem.] EXAMINATION, 2013
GEOTECHNICAL ENGINEERING
[2008 PATTERN]

[Total No. of Questions:12] **[Total No. of Printed pages :4]**

Time: three hours **Maximum Marks: 100**

Instructions*:*

[i] Answer three questions from Section I and three questions from Section II.
[ii]Answers to the two Sections should be written in separate answer-books.
[iii]Neat diagrams must be drawn wherever necessary.
[iv]Use of of logarithmic tables, slide rule, electronic calculator in allowed.
[v]Assume suitable data, if necessary.

1 [a] Starting from first principles, derive the relation between Sr, w, e, G [6]

[b] Explain weathering and distinguish between mechanical and chemical weathering giving examples. [6]

[c] Define and mention the formulae for the following terms : [6]

[i] Void ratio

[ii] Porosity

[iii] Degree of saturation

[iv] Percentage air voids

[v] Water content

[vi] Specific gravity.

OR

2. [a] State the field tests for determination of field density and explain any one. [6]

[b] A soil sample has a wet mass of 520g and upon drying; its weight is reduced to 400g. If specific

gravity is 2.7, determine the degree of saturation of the soil sample and its water content. [6]

[c] Define consistency of soils and show the 4 states of consistency graphically with appropriate consistency limits. [6]

3. [a] Calculate the coefficient of permeability of a soil sample, 6 cm in height and 50 cm2 in cross-sectional area, if a quantity of water equal to 450 ml passed down in 10 min, under an effective constant head of 40 cm. [4]

[b] State the field tests for determination of permeability and derive the relation in case of an unconfined aquifer. [6]

[c] State and explain practical applications of flow net [6]

OR

4. [a] Explain the phenomenon of piping and critical hydraulic gradient. [4]

[b] How much seepage per meter run along the dam axis will occur through the dam with nf= 3 and nd = 12 and reservoir level is 26 m above datum and tail water lever is 2 m above that datum ? Permeability of dam material is 10-7 m/sec. [6]

[c] What is Darcy's law ? Explain and discuss its limitation? [6]

5. [a] Define compaction and explain field compaction methods [6]

[b] Determine MDD and OMC for following data of light compaction test. Also draw the saturation line on the same diagram [Assume G = 2.7]. [6]

Observations	1	2	3	4	5	6
Water Content [w] %	10	13	16.5	20	24.5	29.0
Dry density [kg/m3]	1500	1575.2	1673.8	1650	1485.9	1395.3

[c] Write a short note on significance depth of pressure bulb. [4]

OR

6. [a] A concentrated load of 100 kN acts on the surface of homogeneous soil mass of large extent. Find the stress intensity at a depth of 4 metres directly under the load; Use Boussinesq's equation. [4]

[b] Explain briefly the field compaction control using Proctor needle.[6]

[c] Write short note on: Effect of compaction on soil properties [6]

Section II

7. [a] Write a note on Vane Shear Test. [6]

[b]What are the advantages and disadvantages of direct shear test [6]

[c]]xplain the terms sensitivity and thixotropy. [6]

OR

8- [a] What are the three standard triaxial shear tests with respect to drainage condition? [6]

[b]What are the factor affecting shear strength of soil [6]

[c]Explain unconfined compression test procedure with neat sketches. [6]

9 [a] State assumption in Rankine's earth pressre theory. [4]

[b] Differentiate between Rnkine's and Coulomb's theories of earth pressure.[6]

[c]Explain effect of wall moment with respect to earth pressure [6]

OR

10 [a] What is 'earth pressure at rest' and state equation for same [4]

[b] What is Taylor's stability numbers? What its utility in the analysis of stability of slopes [6]

[c] Define the terms Active Earth Pressure Passive Earth Pressure [6]

with sketches

11[a]What are different index properties of rocks? [6]

[b] Write a short note on

i] Geological classification of rocks [10]

ii] Shear strength of rocks

OR

12[a] What are different modes of failure of rocks? [6]

[b] Explain durability of rocks [4]

[c] Write a short note on i] Porosity of rocks ii] Permeability of rocks [6]

UNIVERSITY OF PUNE
[4362]-106
S.E. Examination–2013
FLUID MECHANICS-I
[Civil Engineering-2008 COURSE]

[Time: 3 Hours] **[Max. Marks: 100]**
Total No. of Questions: 12 **[Total No. of Printed Pages: 4]**

Instructions:

i) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I & Q7 or Q8, Q9 or Q10, Q11 or 12 from section II.
ii) Answers to the two sections should be written in separate answer books.
iii) Neat diagrams must be drawn wherever necessary.
iv) Figures to the right indicates full marks
v) Assume suitable additional data if necessary.

SECTION 1

Q.1 a) The velocity distribution over a plate is given by (6)

$$u = \frac{3}{2}y - \frac{1}{2}y^2$$

Where u=velocity in m/s &
Y= distance from the plate boundary in m.
If the viscosity of the fluid is 8 poise find the shear stress at the plate boundary and at y=0.15 m from the plate.

b) Explain Froudes Model law & importance of model studies. (6)

c) Determine the minimum size of glass tube that can be used to measure water level, if the capillary rise in the tube is not to exceed 0.25 mm. Take surface tension of water in contact with air As 0.0735 N/m. (6)

OR

Q.2 a) Using Buckingham's II-theorem, show that the velocity through a circular orifice is given by (10)

V= $\sqrt{2gH}$ ϕ [D/H, $\frac{\mu}{\varrho VH}$] where

H= head causing flow $\mu/\varrho VH$
D= diameter of the orifice
μ=coefficient of dynamic viscosity
ϱ=mass density &
g=acceleration due to gravity

b) Inside a 60mm diameter cylinder a piston of 59mm diameter rotates concentrically. Both the cylinder and piston are 80mm long. If the space between the cylinder and piston is filled with oil of viscosity of 0.3 Ns/m^2 and torque of 0.15 Nm is applied, find - (8)
i) the rpm of the piston &
ii) the power required.

Q.3 a) An isosceles triangular plate of base 3m & altitude 3m immersed vertically in an oil of specific gravity 0.85. The base of plate coincides with the free surface of oil. Determine (8)
(i) Total pressure on the plate
(ii) Centre of pressure

b) Define and explain the following terms. (8)
(i) Stable equilibrium of floating bodies
(ii) Unstable equilibrium of floating bodies
iii) Neutral equilibrium of floating bodies
iv) Metacentre & metacentric height

OR

Q.4 a) A solid cube of sides 0.5m each is made of material of Relative Density 0.5. The cube floats in a liquid of relative density 0.95 with two of its faces horizontal. Examine its stability. (8)

b) Derive an expression for total pressure and the depth of centre of pressure from free liquid surface, at an inclined plane surface submerged in the liquid. (8)

Q5 a) The velocity potential function for a two-dimensional flow is ϕ=x (3y-1), At a point P(4,5) determine (8)
i) the velocity & ii) the value of stream function

b) Define the following terms- (8)
i) Pathline, streamlines
ii) convective, local acceleration
iii) Steady, unsteady flow
iv) Circulation, vorticity

OR

Q6 a) Derive the continuity equation for one-dimensional flow, stating the assumption made in deriving the equation. (8)

b) Show that the streamlines & equipotential lines intersect each other orthogonally. What are the uses & limitations of flow net? (8)

SECTION II

Q7 a) Derive an expression for flow rate through orifice meter (8)

b) What is pitot tube? How it is used to measure velocity of flow at any point in a pipe or channel? (6)

c) Differentiate between venturimeter & orificemeter (4)

OR

Q8 a) A vertical venturimeter carries a liquid of relative density 0.8 and has inlet and throat diameters 125mm and 50mm respectively. The pressure connection at the throat is 100mm above that at inlet. If the actual rate of flow is 40 litre per sec. and cd=0.97), calculate the pressure difference between inlet and throat in N/m^2 (10)

b) State and prove Bernoulis equation, listing the assumptions made in deriving it. What are the limitations of the Bernoulis equation. (8)

Q9 a) Derive an expression for the velocity distribution for laminar flow through a circular pipe. Also sketch the distribution of velocity and shear stress across a section of the pipe. (8)

b) Why is it necessary to control the growth of boundary layer on most of the bodies? What method are used for such a control? (8)

OR

Q10 a) Oil of absolute viscosity 1.5 poise and density 850kg/m^3 flows through a 30cm pipe. If the head loss in 3000m length of pipe is 20m, assuming a laminar flow, determine- (8)

i) the velocity ii) Reynold's number iii) friction factor

b) What is boundary layer? Explain the development of boundary layer over a smooth flat plate (8)

Q11 a) Write short notes on- (8)

i) Hydrodynamically smooth & rough boundaries

ii) Prandtl's mixing length theory

b) Find the distance from the pipe wall at which the local velocity is equal to the average velocity for turbulent flow in pipes (8)

OR

Q12 a) Derive an expression for the loss of head due to sudden enlargement in pipe flow (8)

b) A compound piping system consists of 1800m of 50cm diameter, 1200 m of 40cm diameter and 600m of 30cm diameter pipes of the same material connected in series. What is the equivalent length of a 40cm diameter pipe of the same material? State clearly the assumptions made. (8)

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S.E. Civil EXAMINATIONS [MAY 2013]
[2008 PATTERN]
SURVEYING
[201006]

[Total No. of Questions:12] **[Total No. of Printed pages :7]**

Time: three hours **Maximum Marks: 100**

Instructions :

(1) Answer ***any three*** *questions from each section.*
(2) Net diagrams must be drawn wherever necessary.
(3) Figures to right indicate full marks.

(4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
(5) Assume suitable data, if necessary.

Section-I

Q. la] Define Meridian and state the types of meridians. Explain [6]

with a neat sketch True meridian and magnetic meridian.

b] Differentiate between Whole circle and Quadrantal bearing and [4]

convert i]N 89 ^{o} 30' W ii] S 90^{0} 0' E to whole circle bearing

c] State methods of Plane Table survey and explain Intersection and [8]

Traversing method of Plane Table survey. What are the disadvantages of Plane Table?

OR

Q.2a] Given below are the bearings observed in a traverse survey [10]

conducted with a prismatic compass at a place where local attraction was suspected

Line	**Fore Bearing**	**Back Bearing**
AB	124^0 30’	$304^0$30’
BC	68^0 30’	246^0 00’
CD	310^0 30’	125^0 15’
DA	200^0 15’	17^0 45’

At what stations do you suspect local attraction? Find the correct Bearings of the lines and the included angles.

[Solve by applying corrections to the bearings]

b] State the accessories used in plane table surveying. What are the [8]

methods of orientation? Explain orientation by back sighting with neat sketch.

Q. 3a] Describe the two peg test method of permanent adjustment of a [8]

dumpy level

b] Draw sketches for various land features such as, gentle slope, steep [8]

slope, plateau. Valley line. Ridge line, cliff, overhanging cliff and saddle

OR

Q. 4a] Reciprocal levelling done between two point A and B situated [8]

on the opposite sides of the of the a valley 730 m wide the following data was collected:

Instrument at	Height of Instrument	Staff at	Staff reading
A	1.463	B	1.688
B	1.463	A	0.991

Determine the difference in level between A and B and the amount of collimation error if any.

b] Explain step by step procedure to carry out Tacheometric contouring [8]

over an hilly area with three tachometric stations covering an area of 3.84 Ha

Q.5a] How will you use 20" vernier transit theodolite for lining in, [8]

prolonging a line and measurement of bearing

b] In running a traverse the lengths and bearings of the lines observed are [8]

tabulated. Point F is situated at the centre of the line joining A and E. Find out

the length and bearing of the line CF.

Line	Length [m]	Bearing
AB	150	$N\ 75^0\ 42'\ E$
BC	100	$N\ 32^0\ 48'\ E$
CD	300	$S\ 28^0\ 54'\ E$
DE	800	$S\ 5^0\ 36'\ E$

Q. 6a] How will you use 20'' vernier transit theodolite for measuring a [8]

angle by method of repetition what errors shall be eliminated by this method

b] A Traverse is run to set out a line MQ=1900 m at right angles to a given line MN.The lengths and bearings observed are as fallows

Line	Length	Bearings
MN	-	$360^0\ 00'$
MO	850	$120^0\ 00'$
OP	1000	$86^0\ 30'$
PQ	?	?

Calculate the length and bearing of the ling PQ

Section-II

Q7a] State Fundamental Axes of transit theodolite and also state the [10]

desired relation between them. How will you test whether horizontal axis is perpendicular to vertical axis of theodolite and also suggest adjustment

b] Alevelling staff is held vertical at a distance of 100 m and 300 m from [8]

the axis of a tacheometre and the staff intercepts for the horizontal sights are 0.99 m and 3.00 m respectively, Find the constants of the instrument.

OR

Q.8a] Explain the testing of plate bubble and altitude bubble in short [8]

and explain the adjustment for altitude bubble.

b] Determing the gradient from a point P to another point Q from the [10]

fallowing observations made with a tacheometer fitted with an analytic lense. The constant of the instrument was 100 and the staff was held vertical.

Instrument Station	Staff Station	Bearing	Vertical Angle	Staff Readings [m]		
R	P	130^0	$+ 10^0$ 32’	1.255	1.810	2.940
	Q	220^0	$+05^0$ 06’	1.300	2.120	2.940

Q.9a] List the various methods to set out curves and explain briefly [8]

Rankine's two theodolite method

b] Two straights AI and BI meet at chainage of 3450 m. A right handed [8]

simple circular curve of 250 m radius joins them. The deflection angle between two straights is 50^0.Tabulate the necessary data to layout the curve by Rankine's method of deflection angles. Take chord interval as 20m.

OR

Q .10a] Explain the function of transition curve and Define deflection [8]

angle, point of curve, point of tangency, unit chord, subchord and angle of

intersection.

b] It is required to set out a curve of radius 100 m with pegs at [8]

approximately 10 m centres the deflection angle is60^0. Draw up the necessary data for pegging out the curve by offsets from long chord.

Q.11a] Explain the procedure for establishing horizontal and vertical [8]

control for setting of a tunnel.

b] What are advantages of Total station survey over theodolite survey? [8]

Explain the working principle of total station.

OR

Q.12a] How will you set out a bungalow using foundation plan and [10]

What precaution you will take for marking the centres of columns.

b] Explain distance and angle measurement with Total station. [6]

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SE Civil Engineering (2008 Course) Examination, 2013
CONCRETE TECHNOLOGY

Time: 3 hrs **Max Marks:100**
Total pages:5
Instructions :
i) Answer Q1 or 2, 3 or 4, 5 or 6 from section I & Q 7 or 8, 9 or 10, 11 or 12 from section II
ii) Answers to the two sections should be written in separate books.
iii) Neat diagrams must be drawn wherever necessary.
iv) Black figures to the right indicate full marks.
v) Your answers will be valued as a whole.
vi) Use of electronic pocket calculator is allowed.
vii) Assume suitable data, if necessary.

SECTION-I

Q1 a) Explain Manufacturing Process of Portland Cement. Differentiate dry process and wet process. 8

b) What is fineness modulus of aggregate? How will you find fineness modulus of aggregate in laboratory? 6

c) Explain the quality of water required to prepare concrete using the following points: 4

i) Ideal water
ii) Practicable water
iii) pH value
iv) Avoided water

OR

Q2 a) What are the minor compounds in Portland cement? What is their role? 6

b) Write a short note on classification of aggregate on the basis of 6
i) origin
ii) shape
iii) Unit weight

c) What are the different functions of admixtures? 6

Q3 a) Define workability and explain the tests for workability. 6

b) Explain the relationship between compressive strength and tensile strength of concrete. 6

c) Write a short notes on: 4
i) Segregation
ii) Bleeding

OR

Q4 a) State and explain various operations involved during concreting from mixing to finishing of concrete surface. 6

b) What are the factors affecting strength of concrete? 6

c) Write a short notes on: 4
i) Shrinkage
ii) Swelling of concrete

Q5 a) Using Indian Standard recommended guidelines, design a concrete mix for a structure to be subjected to the mild exposure conditions for the following requirements: 16
a) Design situations:
i) Characteristic strength at 28 days-20Mpa
ii) Maximum nominal size of aggregates-20mm
iii) Types of aggregate-Angular (crushed)
iv) Degree of quality control - Good
v) Source of aggregates – Natural
vi) Degree of workability – Compaction Factor:0.8

vii) Grading Zone:
a) Coarse aggregates – II
b) Fine aggregates – II

b) Characteristics of material:
i) Type of cement – OPC 53 grade
ii) Specific gravity – 3.15
iii) Bulk density – 1440 kg/m^3
Aggregates:

	Fine aggregates	Coarse aggregates
i) Specific gravity	2.6	2.65
ii) Bulk density (kg/m^3)	1700	1800
iii) Free surface moisture (%)	1.5	Nil
iv) Water absorption (%)	0.5	1.00

c) Mix design considerations (use fig.1 & Table 1)
i) t= 1.65
ii) For mild exposure of 20mm nominal maximum size and for Rc work:
iii) Minimum cement content – 300 kg/ m^3
iv) Maximum free water cement ratio – 0.55
Table 1: Approximate Sand and water contents per cubic meter of concrete:

Nominal size of aggregate (mm)	Water content per cubic water of concrete (kg)	Sand as Percentage of total aggregates (by volume)
10	208	40
20	186	35
40	165	30

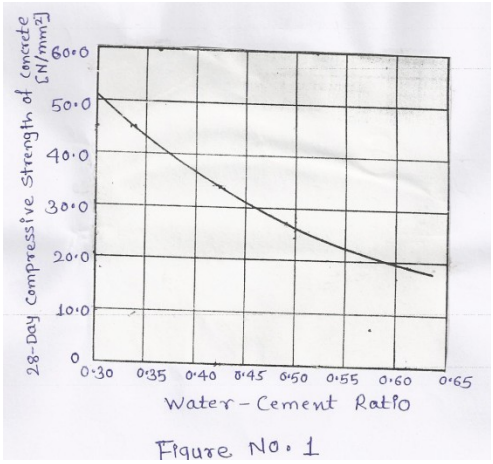

Figure No. 1

OR

Q6 a) Explain DOE method of mix design in brief. 6

b) What do you mean by 4
i) Mean Strength
ii) Variance
iii) Standard deviation
iv) Coefficient of variation

c) What are the factors which influences the choice of mix proportions? 6

SECTION –II

Q7 a) What precautions should be taken while placing concrete in deep formwork? 4

b) Write short notes on: 12
i) Ultrasonic pulse velocity test
ii) Impact echo test
iii) Marsh cone test

OR

Q8 a) What are the test cores? What are the advantages and disadvantages of Test cores? 4

b) Explain briefly Principles of design of formwork. 6

c) Explain different types of formwork. 6

Q9 a) Describes the types of vibrators used for compaction of concrete 4

b) Write short notes on: 12
i) Underwater concreting
ii) Ready mixed concrete
iii) Roller compacted concrete

OR

Q10 a) Write short notes on: 16
i) Light weight concrete
ii) Ferrocement
iii) Self compacting concrete
iv) Fibre reinforced concrete

Q11 a) What is evaluation of cracks? Why it is necessary? 6

b) Write short notes on 12
i) Shotcrete
ii) Attack by sea water
iii) Sulphate attack on concrete

OR

Q12 a) State and explain factors affecting permeability of concrete 6
b) Write short notes on 8
i) Acid attack
ii) Repair by stitching

c) What are the factors contributing cracks in concrete? 4