UNIVERSITY OF PUNE
[4363]-109
T. E. (*Civil Engg*) Examination – 2013
Environmental Engineering-I (2008 Course)

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

Instructions:

1. *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II*

2. *Answers to the **two sections** should be written in **separate answer-books**.*

3. *Neat diagrams must be drawn wherever necessary.*

4. *Figures to the right indicate full marks.*

5. *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

6. *Assume suitable data, if necessary.*

SECTION –I

Q.1 A What is the Necessity of Water Supply Schemes? Describe the different phases involved in design of water supply scheme and enlist the data to be collected for design of any water supply project. 6

B Enlist various valves used in rising mains Also state their location and function. 6

C Discuss the advantages and disadvantages of various types of pipes used in water supply. 4

OR

Q.2 A What objection would be there if 6
i) turbidity ii) Chlorides iii) Nitrates iv) Hardness
v) Fluorides vi) Calcium are present in excess in drinking water?
State its permissible limit as per IS 10500:1991 in drinking water.

B Explain the any three methods of forecasting the future population of a town. Following is the census data of a town. Calculate prospective population in the year 2040 by incremental increase method. 10

Year	1930	1940	1950	1960	1970	1980	1990
Population In thousands	13	19	22	30	37	43	57

Q. 3 A What are intakes? What are the important considerations which govern the selection of site for an intake. 6

| | B | Explain the purpose of aeration in water treatment. Discuss its limitations. | 4 |
| | C | What do you understand by treatment of water? Why it is necessary? Explain the various processes adopted for treatment of water. | 6 |

OR

| Q. 4 | A | Explain what do you understand by plain sedimentation. Describe the design principles of a settling tank. | 6 |
| | B | A water treatment plant treats 200 m^3/hr of water. Workout the following with respect to flocculator.
i) Dimensions of flocculator unit
ii) Power input by paddles to water.
iii) Size and number of paddles
assume water temp. 25°C and absolute viscosity=0.89x10^{-3} N-S/mt^2.
Detention time = 30 minutes.
Given the velocity of water in inlet pipe = 1.2 mt/sec, drag coefficient C_D=1.8, G=40 sec^{-1}.
Velocity at tip of paddle=0.5 mt/sec. | 10 |

| Q. 5 | A | Explain with the help of a neat sketch, the components parts of a rapid sand gravity filter. Explain its working including the method of back washing. | 10 |
| | B | A filter unit of size 4 m x 8 m. after filtering 10,000 m^3day in 24 hours of period, the filter is back washed at the rate of 10 lit/m^2/sec for 10 minutes. Compute the average filtration rate, quantity and percentage of treated water used in washing and te rate of wash water flow in each trough in four troughs are provided | 8 |

OR

Q. 6	A	Enlist and explain various operational troubles associated with rapid sand gravity filter.	6
	B	Write short note on mixed media filter.	6
	C	A filtered water discharge of 1 MLD has a chlorine demand of 4.8 mg/l it is requires to maintain a chlorine residual of 0.2 mg/l. determine the quantity of bleaching powder necessary for six months. [Chlorine available-25%]	6

SECTION II

| Q. 7 | A | A water sample contains the following impurities. Compute the annual requirements of slaked lime and soda ash for treating 1 MLD water. The purity of slaked lime is 85% and that of soda ash is 90%.
$Ca(HCO_3)_2 = 220mg/l, MgCl_2 = 160mg/l$
$Mg(HCO_3)_2 = 140mg/l, MgSO_4 = 110mg/l$
$CaSO_4 = 120mg/l, NaCl = 25mg/l$
$Na_2SO_4 = 45mg/l.$ | 10 |

	B	Describe various methods of defluoridation.	4
	C	Enlist various methods of colour and odour removal and explain any one	4

OR

Q. 8	A	Design tube settler module of square cross section with following data. 1. average output required from tube settler. $250 m^3/hr$ 2. Loss of water in desludging 2% of output required 3. average design flow $255.1\ m^3/hr$ 4. Cross section of square tubes 50 mm x 50 mm 5. Length of tube 1 m 6. Angle of inclination of tubes 60°	10
	B	Enlist various methods on demineralization of water. Explain Reserve Osmosis in detail.	8

Q. 9	A	The designed demand is 4 MLD. Water is pumped into a elevated service reservoir from 5 am to 1 pm. The supply to the community is from 5 a.m to 10 a.m and 5 p.m to 10 p.m at a uniform rate. Deign the balancing capacity of the reservoir	10
	B	Explain the benefits of rain water harvesting and discuss the various methods of rain water harvesting.	6

OR

Q. 10	A	Describe the various layout or distribution network in a water supply system and state their advantages and disadvantages.	10
	B	Explain the methods of determining the capacity of a service reservoir for storage.	6

Q. 11	A	Explain following effect of noise on human. i) Audioligical ii)Physiological iii) Physical iv) Annoyance	6
	B	Calculate resultant noise level in a machine shop where eight machines are working simultaneously and each M/C is procuing 70 dB of noise	4
	C	Explain the effect of various atmospheric stability conditions on dispersion of air pollutants	6

OR

Q. 12	A	Explain various techniques to control noise pollution.	6
	B	Explain with neat sketch principle ESP and fabric filter for Air Pollution Control.	6
	C	Explain in brief control of Air Pollution at source	4

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

(1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6,Q7 or Q8, Q9 or Q10,Q11 or Q12.
(2) Answers to the **two sections** *should be written in* **separate answer-books***.*
(3) Neat diagram must be drawn wherever necessary.
(4) Black figures to the right indicate full marks.
(5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
(6) Assume suitable data, if necessary.

SECTION-I

Q1.

a) Explain the terms: (1) Sampling tubes (2) Area ratio (3) Disturbed samples   [6]

b) With a neat sketch, explain the method of wash boring for soil exploration. Also, state its importance?   [6]

c) Calculate the depth of soft strata underlain by hard strata. Use the following data: v_1=300 m/s and v_2=900m/s and the break in the plot was θ located at 35m. Determine the depth of overburden.   [6]

OR

Q2.

a) Explain electrical resistivity method. Where do you recommend this method   [6]

b) Write a short note on pressuremeter test.   [6]

c) Find the corrected blow count at 12m depth of unit weight of soil=18kN/m^3. Blow count observed in SPT test is 25. Water table is at a depth of 2m and unit weight soil above GWT is 16 kN/m^3.   [6]

Q3.

a) Explain the concept of floating foundation applied to a raft. Discuss its applications. [4]
b) State and explain Tezzaghis equation of bearing capacity [4]
c) The construction of a strip footing is undertaken during a summer period and W.T is observed at 2.5m from G.L. During monsoon, the W.T rises to the G.L. the soil parameters are, unit weight=19.2 kN/m^3 and ϕ=32°. The bearing capacity factors are, Nq=23.2 and Nr=30.2, C=0, width of footing is 3m and depth is 2m. Determine the gross safe bearing capacity in both the cases for a factor of safety of 2.50, use Teng's W.T correction factors. [8]

OR

Q4.

a) Explain the following: 1) Concept of RQD
                              2) Perimeter shear concept [6]
b) Enumerate the stepwise procedure of conducting plate load test. Draw a neat sketch of the test set up. [6]
c) A plate load test was conducted using a square plate of size 300mm×300mm, when failure take place at a load of 45 kN with settlement of 1.62cm. find the ultimate load that a footing of size 1.5m×1.5m can carry, if allowable settlement is 3cms [4]

Q5.

a) What is contact pressure? Draw contact pressure distribution of a rigid footing on sandy and clayey soil strata. [4]
b) Explain the following terms and state the formulae
   1) Coefficient of compressibility
   2) Degree of consolidation
   3) Coefficient of consolidation [6]
c) The time to reach 60% consolidation is 30 seconds for a sample of 1cm thick tested in a laboratory under condition of double drainage. How many years will the corresponding layer in nature require to reach the same degree of consolidation, if it is 10m thick and drained on one side only? [6]

OR

Q6.

a) What is elastic settlement? State and explain Janbhu's equation for estimation of elastic settlement [6]

b) Write a short note on 'assumptions made in Tezzaghi's theory of consolidation. [4]

c) Derive the expression for consolidation settlement as

$$Sc = \frac{Ho}{1+e_o} \cdot Cc \cdot log_{10} \left(\frac{\sigma_0^1 + \Delta\sigma^1}{\sigma_0^1} \right)$$ with usual meaning of each term [6]

SECTION-II

Q7.

a) Explain with sketches any five types of classification of piles with basis of classification? [6]

b) Draw a neat sketch of Pneumatic caisson and explain its working. [6]

c) A group of piles consists of 15 piles arranged in three rows and five columns. Compute efficiency of pile group by (a) loss-angles formula and (b) field rule. Assume diameter of piles= 300mm and spacing 0.75m centre to centre. [6]

OR

Q8.

a) Explain with a neat sketch sand Island method for well sinking. [4]

b) Explain how do you decide bearing capacity of single pile by a conventional pile load test? [7]

c) Discuss the concept of negative skin friction in piles with a sketch. How would you determine magnitude of the same in cohesive and cohesion less soils? [7]

Q9.

a) Explain any four Engineering problems associated with black cotton soils. [6]

b) Explain with a neat sketch, procedure and Interpretation for swelling pressure test. [6]

c) Explain the terms with sketches (1) free earth support (2) fixed earth support [4]

OR

Q10.

a) Explain the effects of swelling and shrinkage of expansive soils on wall and flooring of building constructed on it. Also enlist precautions to be taken with illustrative sketches. [6]

b) Draw a neat sketch of Double under-reamed pile foundation. Name the various component parts. [6]

c) Draw the sketches of structural arrangements involved in (1) Cantilever sheet pile (2) Anchored sheet pile [4]

Q11.

a) What are the functional requirements of various types of geosynthesis? [6]

b) Explain the terms: 1) Magnitude of an earthquake
                                  2) Intensity of an Earthquake [4]

c) What is liquefaction? Discuss effects of liquefaction? [6]

OR

Q12.

a) Differenciate between P-waves and S-waves [4]

b) Explain use of geosynthetics in (1) Retaining waves (2) Load bearing capacity improvement [6]

c) Write a short note on classification of geosynthetics with examples [6]

UNIVERSITY OF PUNE
[4363-102]
T.E.(Civil) Examination 2013
Infrastructure Engineering and construction Techniques
(2008 pattern)

Time-Three hours   **Maximum Marks-100**
[Total No. of Question=12]   **[Total no. of printed pages= 2]**

SECTION-I

Q.1 (a)Draw a typical cross section of a permanent way and show various parts. Also state the requirements of a good track.   (6)
(b)Give the classification of railway lines based on speed.(as per Indian Railway)   (6)
(c)Write a short note on minimum depth of ballast cushion.   (6)

OR

Q.2 (a)State the various zones of Indian railways .Explain in brief the organizational set up of Indian Railways.   (6)
(b)Explain in brief the importance of coning of wheels and filting of rails with the help of a neat sketch.   (6)
(c)Write a note on Types of Railway sleepers.   (6)

Q.3 (a)A 5^0 curve diverges from a 3^0 main curve in a layout of B.G.Yard. If the speed on branch line ta restricted to 35 kmph. Determine the restricted speed on main line.   (6)
(b)Define the following terms.   (5)
(i)Turnout (ii)Tongue Rail (iii)Stock Rail (iv)Crossing (v)Switch
(c)Write a short note on Track Maintenance.   (5)

OR

Q.4 (a)Write a short note on: (16)
(1)Measured shovel packing
(2)Types of switches in points & crossing
(3)Mono rail and Metro Railway
(4)Grade compensation

Q.5 (a)Compare the advantages and disadvantages of tunnel with open cut. (6)
(b)Explain in brief NATM method of Tunneling.   (4)
(c)State the general sequence of operation for driving tunnels through Hard Rock.   (6)

OR

Q.6 (a)Define breakwater wall. What is the necessity of it?   (4)

(b)What are the various points to be considered for selection of site for Harbour. (4)

(c)Define Dock. Differentiate between wet dock and dry dock. (4)

(d)Explain in brief Merits and Demerits of water transportation. (4)

SECTION-II

Q.7 (a)Explain the construction of high rise structures considering following points. (6)

      (i)Construction Techniques

      (ii)Safety

(b)Explain with suitable example,the role of construction industry in economic development of a any country. (6)

(c)Write a short note on quality control in construction of Pretabicated elements. (4)

OR

Q.8 (a)Explain in brief Labour problems in construction sector Also state the remedial measures to prevent migration of labour from construction industry to another industry. (6)

(b)Draw a neat labelled sketch of a Derrick crane. (4)

(c)State the difference between equipment oriented construction and labour oriented construction. (6)

Q.9 (a)Explain in brief the factors affecting the output of dragline. (6)

(b)Write a note on preventive maintenance & record keeping of instruments. (6)

(c)State the factors affecting the selection of machinery for any earth work. (4)

OR

Q.10 (a)What is work cycle?Explain in work cycle of a Dumper. (6)

(b)What do you mean by Depriciation of equipment. State various methods of depriciation and explain any one in brief. (6)

(c)State the Name of equipment and its use in following construction works.: 1.Dam   2.Tunnel. (4)

Q.11 (a)Explain in brief the Termic pipe method of underwater concreting. Also state the merits of this method over other methods. (6)

(b)Explain in brief the following. 1.slip form pavers 2.From work for Tunnels. (6)

(c)Draw a neat sketches of primary and secondary crushers. Also explain difference them. (6)

OR

Q.12 Write a short notes on: (18)

(a)Vacuum watering system

(b)Layout of RMC plant

(c)Methods of dredging

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

(1) Answer any 3 question Section-I and 3 question Section-II
*(2) Answers to the **two sections** should be written in*
    ***separate answer-books**.*
(3) Figures to the right indicate full marks.
(4) Draw neat diagram wherever necessary.
(5) Use of calculator is allowed.
(6) Assume suitable data, if necessary.

SECTION-I

Q1.

a) Define precipitation and State different forms and types of precipitation. Explain cyclonic and frontal type of precipitation.   [10]

b) Describe the working of a float type recording rainguage with neat sketch. Mention its advantages over non-recording type   [08]

OR

Q2.

a) State various methods to measure evaporation. Discuss the factors affecting infiltration. Explain flooding type inflitrometre.   [10]

b) What is stream gauging? Explain area velocity method with sketch and explain its application in water resources engineering.   [08]

Q3.

a) Explain with a neat sketch geographic divide and geologic divide of catchment area and distinguish clearly between perennial flow and intermittent flow streams. [08]

b) State various formulae to estimate flood and explain any two methods. [08]

OR

Q4.

a) Explain with neat sketch Synthetic Unit Hydrograph (Snyder method). [08]

b) Given below are the observed flows (cumecs) from a storm of 6-hours duration on astram with a drainage area of 316 sq.km. Assume a constant base flow of 17 cumecs. Derieve and plot a 6-hour duration unit hydrograph.

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66	72
Flow	17	113.2	254.5	198	150	113.2	87.7	67.9	53.8	42.5	31.1	22.64	17

[08]

Q5.

a) State types of reservoirs and explain how topography and geology will affect for selecting the site for a reservoir and state the investigation required for construction of a reservoir. [08]

b) What is design life period of storage reservoir? How do you account for sediment deposition in the reservoir while fixing its storage capacity? [08]

OR

Q6.

a) Define trap efficiency of reservoir. Describe how the time required to the reservoir to fill up with the sediments is calculated. [08]

b) Write a note on various storage zones of a reservoir with neat sketch [08]

SECTION-II

Q7.

a) Explain crop area and volumetric methods of assessing canal revenue. And state their merits and demerits. [08]

b) Following data pertains to a off taking canal and it's C.C.A

Sr.no	Crop	Crop period (Days)	Area (ha)	Duty (ha/cumec)
1	Sugarcane	280	300	620
2	Sugarcane Overlap	100	90	620
3	Jawar (r)	120	4500	1500
4	Bajari (k)	120	5000	2700
5	Vegetables	120	300	600

Find [10]
a) Q required at the head of the main canal.
   Take time factor=0.7 and capacity factor=0.8
b) Gross storage capacity of the reservoir

OR

Q8.

a) Explain the relation between duty, delta and base period. Derive the relation between them and states the methods to improve duty of water. [08]
b) Find the reservoir capacity for the following data. Consider canal losses=20% and reservoir losses=15% [10]

Crop	Base period (Days)	Duty (ha/cumec)	Area (ha)	Intensity of Irrigation (%)
Rice	120	1000	3000	90
Cotton	200	1500	2000	80
Wheat	120	2000	4500	60
Sugarcane	360	1000	5200	60
Vegetables	120	800	1000	75

Q9.

a) Explain Dupits and Thiems theory and state the assumptions made [8]
b) Enlist different types of tube wells and dug wells and explain strainer type with a neat sketch [8]

OR

Q10.

a) Explain pumping and recuperation test. What should be the diameter of an open well to give safe yield of 5 lit/sec? Assume the working head at 3.75 m

and the subsoil consists of fine sand. (For fine sand specific yield =0.5/hour)

[08]

b) In an artesian aquifer of 10m thick, a 10 cm diameter well is pumped at a constant rate of 100 lit/minute. The steady state drawdown observed in two wells located at 10 m and 50 m distances from the centre of the well are 3 m and 0.05 m respectively, compute the transmissivity and the hydraulic conductivity of the aquifer. [08]

Q11.

a) What is lift irrigation scheme. Explain the investigations necessary and approvals required for its implementation. State the design considerations for the components of lift irrigation scheme. [12]

b) Write a note on ancient system of water distribution. [04]

OR

Q12.

a) What are co-operative water distribution society's. State the rules and regulation laid down by the societies for equitable distribution of water to famers. [08]

b) What is water logging? What are the ill effects of water logging? Explain any one method to improve the sub-surface drainage. [08]

UNIVERSITY OF PUNE
[4363]-101
T.E CIVIL EXAMINATION (Semester - I)- 2013
STRUCTRUAL ANALYSIS-II
(2008 COURSE)

[Total No. of Questions :12]   [Total No. of Printed Pages :5]

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

Instructions :

    *(1) Answer **Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12** question from each section.*

    *(2) Answers to the **two sections** should be written in **separate answer-books**.*

    (3) Black figures to the right indicate full marks.

    (4) Neat diagrams must be drawn wherever necessary.

    (5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

    (6) Assume suitable data, if necessary.

SECTION-I

Q1) Analyze the Continuous beam loaded as shown in fig.(1) by using Slope Deflection Method and draw B.M.D   [16]

AB=I, BC=2I, CD=I

Fig. 1

OR

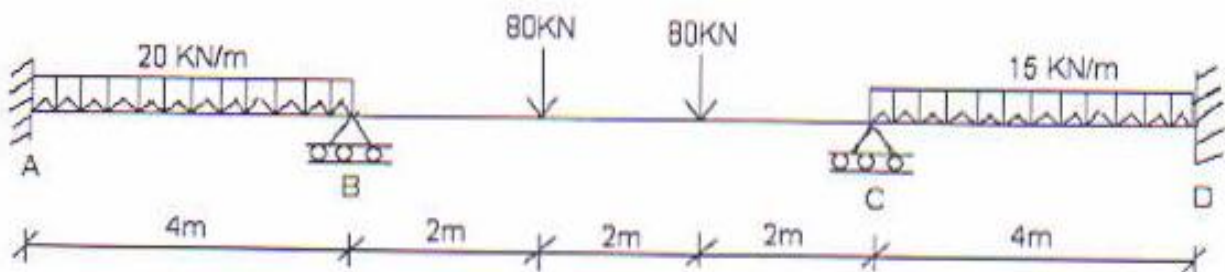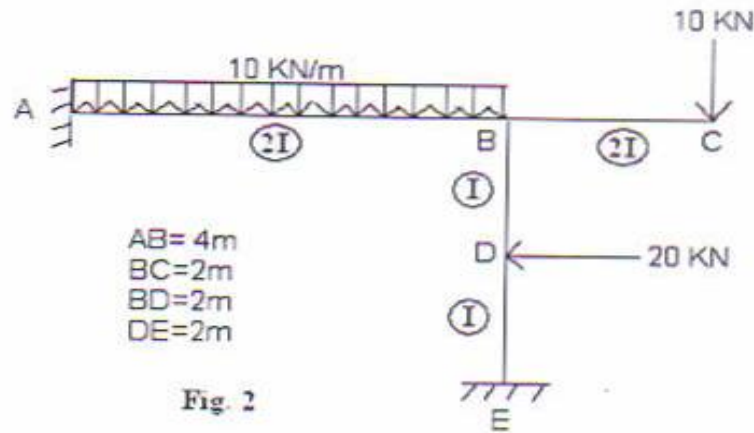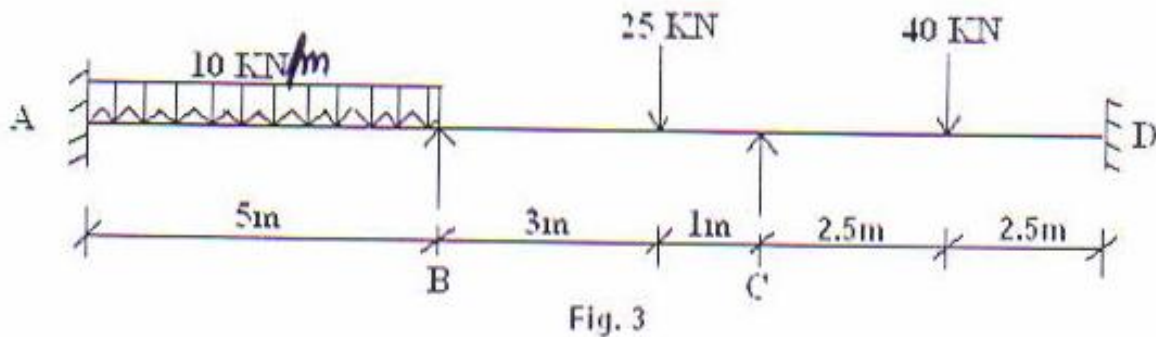Q2) Analyze the Structure Shown in fig (2) by using Slope Deflection Method and
sketch SFD and BMD   [16]

10 KN

10 KN/m

A

(2I)   B   (2I)   C

(I)

AB= 4m   D ←——— 20 KN
BC=2m
BD=2m
DE=2m   (I)

Fig. 2   ⊥⊥⊥⊥
                          E

Q3) Analyze the continuous beam loaded as shown in fig (3) by Moment
Distribution Method and draw SFD and BMD   [16]

25 KN   40 KN

10 KN/m

A   D

5m   3m   1m   2.5m   2.5m
      B   C

Fig. 3

OR

Q4) ABCD is a Portal frame subjected to horizontal load of 30 KN/m acting
uniformly on vertical column AB, the support A and D are hinged. Analyze the
frame and draw the BMD. All members have same flexural rigidity. Ref.Fig (4) [16]

Fig. 4
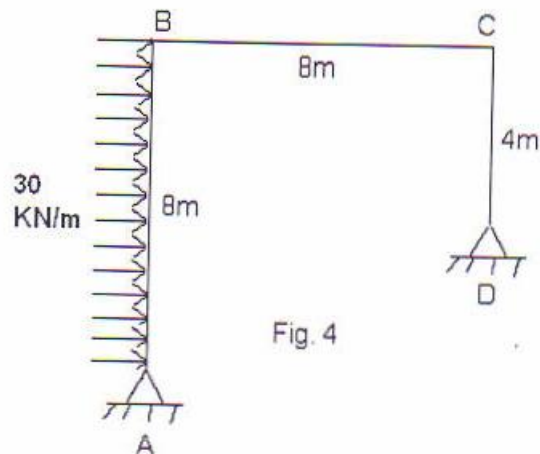
Q5 a) A Symmetrical three hinge parabolic arch of span L and rise h carries a point load W which may be placed anywhere on the span. Find the section where maximum moment occurs. [8]

b) A three hinge parabolic arch ABC of span 30 m has its support A and B at different level. A being at higher level than B. If support A is 4 m below the crown hinge C and 12 m horizontally from A. Find the depth of support B below hinge C. If the arch carries UDL of 30 KN/m from A to C determine thrust and vertical reaction at the support find also maximum B.M. for the arch. [10]

OR

Q6 a) A two hinge parabolic arch of 20 m and 4 m rise carries a UDL of 50 KN/m on the left half of the span. Find the reaction at support and the position and maximum B.M [8]

b) A two hinge parabolic arch of Span L and rise h carries concentrated load W at the crown show that horizontal thrust equal to 25 WL / 128 h at each support. [10]

SECTION-II

Q7 a) Explain concept of Flexibility matrix. [4]

b) Analyze the continuous beam Shown in fig (5) by flexibility method and draw SFD, BMD and Elastic curve [12]
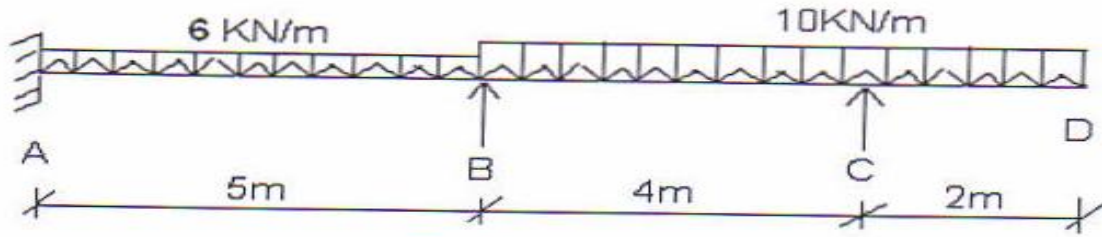

Fig. 5

OR

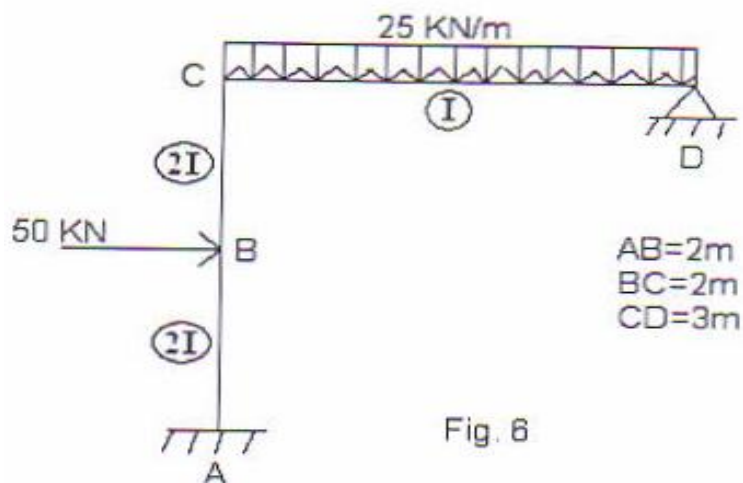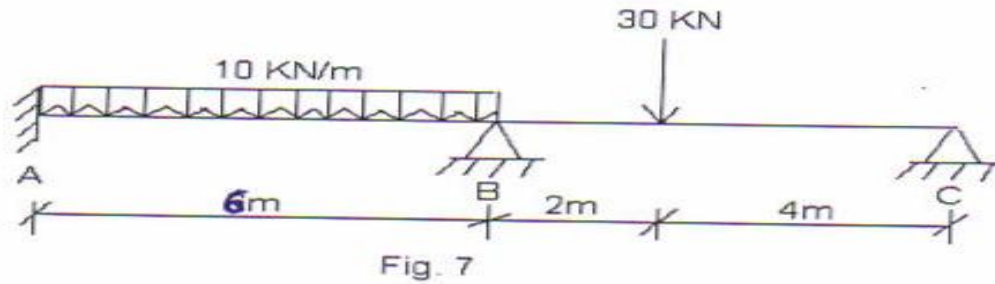Q8) Analyze the frame shown in fig (6) by flexibility method and draw SFD and BMD [16]
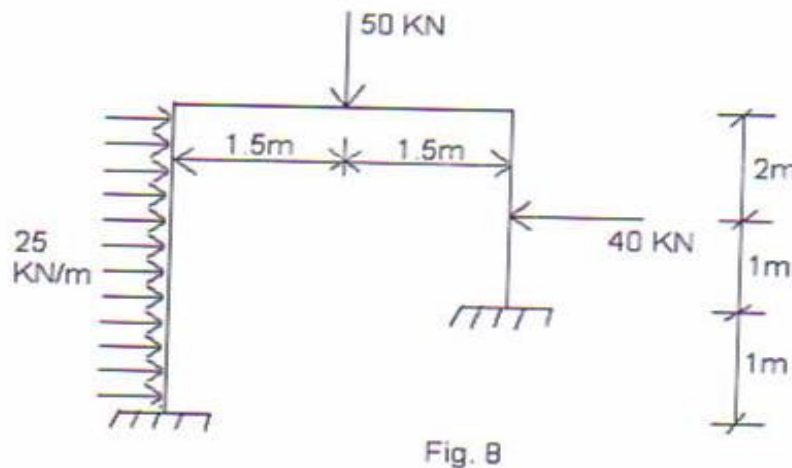

Fig. 6

Q9) Analyze the beam shown in fig (7) by stiffness matrix method, support B sinks by 25 mm Take E=3800 KN-m^2 [16]


Fig. 7

OR

Q10) Analyze the frame shown in fig (8) by stiffness matrix method, take EI=constant [16]

Fig. 8

Q11 a) A cantilever of span L supports load P at free end of cantilever, Determine the deflection at free end by using finite difference method. [6]

b) Analyze the frame by using Portal method and draw the BMD. All columns have same cross sectional area [12]

18 KN

36 KN

4m

6m

5m   6m   5m

Fig. 9
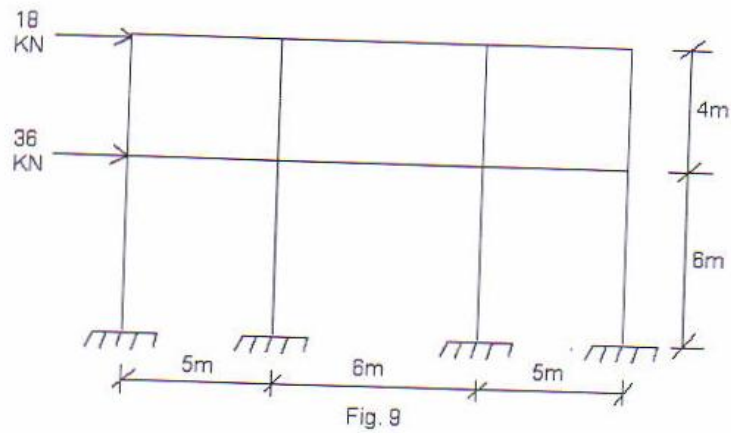
OR

Q12 a) A simply supported beam of span 8 m carries UDL 10 KN/m over entire span. Taking five nodes determine the deflection at nodal points using finite difference method. [6]

b) Analyze the frame by using Cantilever Method. Area of each exterior column is one-half area interior column [12]

30 KN

45 KN

(A)   (2A)   (A)   3.5m

3.5m

6m   8m

Fig. 10
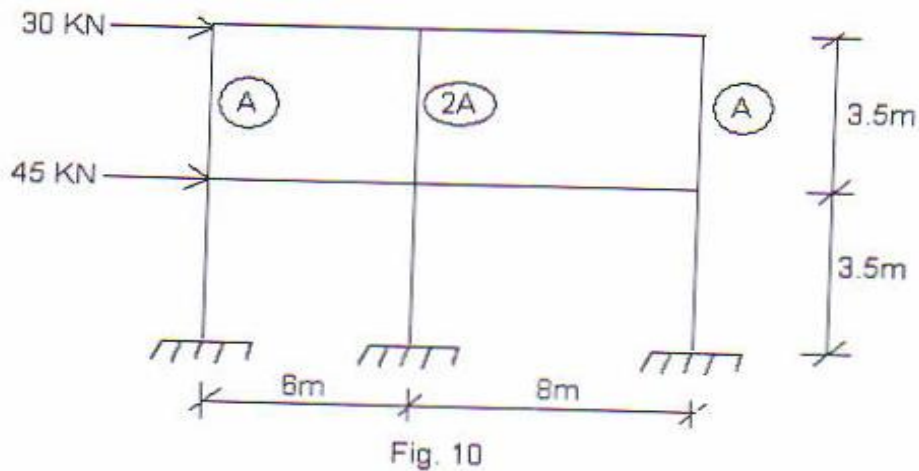
UNIVERSITY OF PUNE
[4363]-103
T. E. (Civil) May - 2013
STRUCTURAL DESIGN I
(2008 Pattern)

[Time : 4 Hours]   [Max. Marks : 100]
Total No. of Questions : 08   [Total No. of Printed Pages :3]
Instructions :

(1) Attempt Section I :Q1or Q2, Q3 or Q4, and
     Section II: Q5 or Q6, Q7 or Q8,
*(2) Answers to the **two sections** should be written in*
     ***separate answer-books**.*
(3) Black figures to the right indicate full marks.
(4) Neat diagrams must be drawn wherever necessary.
(5) Take f_e 410 grade of steel.
(6) Take ultimate stress in bolt, $f_{ub} = 400 \ N/mm^2$.
(7) Use of electronic pocket calculator IS: 800-2007 and steel
     table is allowed.
(8) Use of cell phone is prohibited in the examination hall.

SECTION I

Q1) a) Define gauge line, gauge distance, pitch, edge distance and end distance   [06]

   with sketch.

   b) State advantages and disadvantages of steel structures.   [06]

   c) Design the tie of a roof truss subjected to factor design tension,   [13]

   T = 230 kN using unequal angle section. Centre to centre length of intersection

   is 2.8 m . Also design the welded connection and draw the design details.

OR

Q2) a) Explain philosophy of limit state design for strength and serviceability.   [06]

   b) State advantages and disadvantages of welded connection.   [06]

   c) Determine design strength of tension member consist of 2-ISA   [13]

80 x 80 x 8 mm at 9.6 kg/m connected back to back on both side of a 10 mm thick gusset plate by fillet weld.

Q3) a) Design a column to support a factored load of 1100 Kn. The column has as effective length of 7.0 m with respect to z-axis and 5 m with respect to y-axis. [15]

b) Design a slab base for the column consisting of ISWB 300 @ 48.1 kg/m carrying an axial factored load of 1100 kN. Design welded connection between column and base plate. Concrete of grade M_{20} is available. [10]

OR

Q4) a) Design a double angle discontinuous strut to carry a factored load of 135 kN. The centre to centre length of strut is 3 m. The angles are placed back to back on opposite side of gusset plate. Also design the welded connection and draw the design details. [10]

b) Design a built-up column to carry an axial load of 1200 kN resulting from dead load and live load. One end of column is pinned and other is fixed. Centre to centre distance between supports is 5.5 m. Use two channels placed back to back with single lacing connected with bolts. [15]
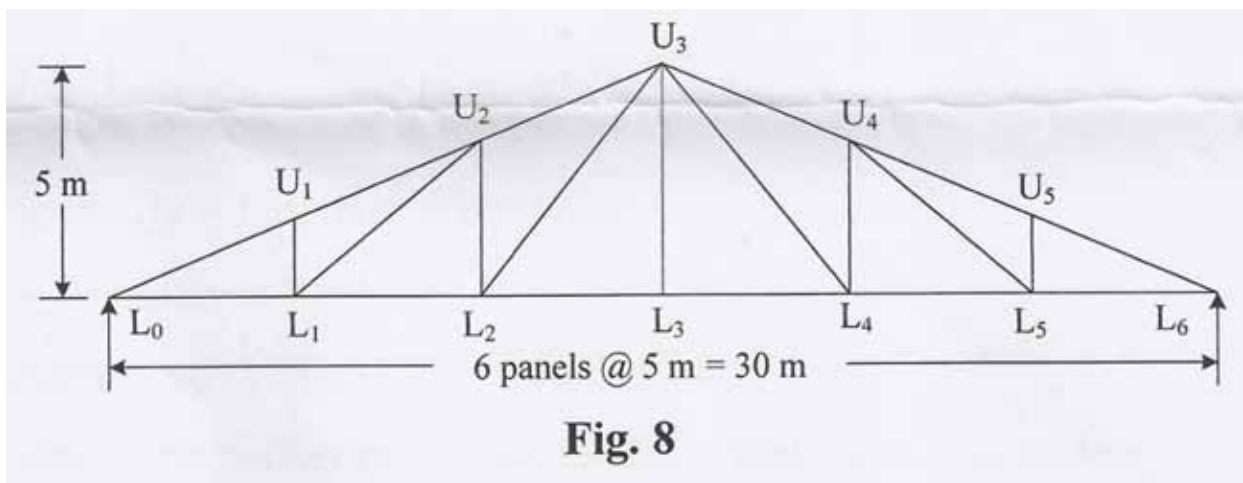
SECTION II

Q5) a) A simply supported beam of effective span 5 m carries a uniformly distributed load 60 kN/m throughout the span and a central factored point load of 75 kN. The compression flange of beam is laterally supported throughout the span. Design the section and check for shear and deflection. [12]

b) A column having effective length of 3.5 m is subjected to factored axial load of 450 kN and factored moment of 50 kNm. Design the column section. Check for section strength only. [13]

OR

Q6) a) ISMB 400 at 61.6 kg/m is used as a beam simply supported with effective span [13] of 3 m. The compression flange of beam is laterally supported throughout. Determine design strength of the section.

b) An ISLB 325 @ 43.1 kg/m transmit a factored end reaction of 75 kN and a [12] factor end moment of 100 kNm to the flange of a column ISHB 250 @ 54.7 kg/m. Design the bolted connection.

Q7) Design Suitable cross section for welded plate girder for an effective span [25] of 30 m and carrying uniformly distributed load w = 30 kN/m. It is also loaded with two concentrated load of 150 kN acting at 10 m either supports. The compression flange of the girder is laterally supported throughout the span. Also design load bearing stiffener, connection between flange and web plate and draw the design sketches.

OR

Q8) Design L_0U_1, L_0L_1, and $U_1 L_1$ of a truss as shown in Fig. 8 The design wind [25] pressure is 1200 N/m², the truss are covered with A C sheet and the centre to centre spacing of truss is 6 m.

Fig. 8

3

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

Instructions :

(1) *Answer Section I :Q1or Q2, Q3 or Q4, Q5 or Q6*
(2) *Answers Section II: Q7 or Q8, Q9 or Q10, Q11 or Q12*
(3) *Answers to the* **two sections** *should be written in* **separate answer-books**.
(4) *Neat diagrams must be drawn wherever necessary.*
(5) *Black figures to the right indicate full marks.*
(6) *Your answers will be valued as a whole.*
(7) *Use of electronic pocket calculator is allowed*
(8) *Assume suitable data, if necessary.*

SECTION I

Q1) a) An airfoil planform area 16 m^2 has an angle of attack 7^0. The airfoil is [08] travelling with a velocity of 240km/h in air. If the coefficients of lift and drag for this angle of attack 0.7 and 0.01, respectively, find (a) the lift force, b) the drag force, (c) the resultant force. The density of air is 1.22 kg/ m^2.

b) Explain Magnus effect in detail [06]

c) With the help of examples distinguish between the streamlined and bluff bodies. [04]

OR

Q2) a) Explain with a neat sketch water hammer phenomenon an elastic pipe due to the sudden closure. [06]

b) Derive an expression for effective bulk modulus of elasticity of fluid taking into account the elasticity pipe material. [06]

c) A tank 12 m long and 6 m wide and the bottom has uniform slope. The depth [06]
of water is 1.8 m at the shallow end 3 m at the deep end. The tank is to emptied
through an orifice of an effective area 300 cm^2 placed at the bottom of the deep
end. Find how long it will take to reduce the deep end from 3.0 to .03 m?

Q3) a) A jet of water having a velocity of 25 m/s impinges on a curved vane which [08]
is moving in the same direction as that of the jet with a velocity of 10 m/s.
the jet makes an angels of 20^0 with the direction of motion of vane at entry
and leaves the vane at an angle of 90^0 to the direction of motion of vane at
outlet. If the water enters and leaves the vane without shock, find the vane
angels at inlet and Outlet. Also find the work done per second per unit
weight of water striking the vane.

b) Explain with the help of neat sketches 3 types of impeller for centrifugal [08]
pump.

OR

Q4) a) Derive an expression for force exerted by a jet on a flat fixed plate held [08]
inclined to the jet.

b) A centrifugal pump delivers water against a head of 18 m. the external and [08]
internal diameter of the impeller are 450 mm and 250 mm respectively.
Find the minimum starting speed of pump.

Q5) a) What is cavitation? What are its effect? Where it is likely to occur? What [06]
are the measures to reduce its effects?

b) A pelton wheel having wheel diameter of 1.2 m rotates at 600rpm. Water is [10]
supplied at the rate of 0.6 m^3 /s under a head of 450 m. If the buckets deflect
the jet through an angle 160^0, find the power developed and hydraulic
efficiency of the turbine. Assume coefficient of velocity as 0.97 and neglect
the frictional losses in the bucket.

OR

Q6) a) Sketch a layout of typical hydroelectric power generation plant and explain [08]
in brief function of each element.

b) A turbine operating under a head of 35 m develops 10000 kW at a speed of [08]
150rpm. Determine the speed and power developed by the turbine when the

head on the turbine is reduced to 18m.

SECTION II

Q7) a) A trapezoidal channel is 5 m wide at bottom and has a side slope of 0.5 H : 1V. The bed slope of the channel is 0.0003. Find the discharge of the most Economical section. Assume Manning's coefficient 0.2. [08]

b) Explain energy and momentum equation as applied to open channel flow. [10]

OR

Q8) a) A rectangular channel is designed for a terrain with Chezy's constant as 56. The discharge is 1000 lit/s and the width of flume is 3 m. Find the bed slope required when the depth of flow is 60 cm. Find the conveyance K of the channel. [08]

b) Show that for most economical trapezoidal section a semi-circle can be drawn with water surface as the diameter and touching all the three sides of the section. [06]

c) What are the characteristics of uniform flow in open channel? [04]

Q9) a) Derive the relation between sequent depths y_1 and y_2 in a hydraulic jump [08]

b) A rectangular channel 3 m wide is laid to a slope of 0.0085 in which uniform flow occurs at a depth of 1.6m. Find the height of hump so that there is no afflux. If the upstream depth is to raised up to 2 m what should be height of the hump? Take n = 0.013 [08]

OR

Q10) a) What are different types of flumes used for measurement of discharge in An open channel? Explain in detail any one of them. [08]

b) A 3.6 m wide rectangular channel conveys 9 m^3 /s of water with a velocity of 6 m/s (i) Is there a condition for hydraulic jump to occur? If so calculate the height, length and strength of the jump (ii) What is the loss of energy per kg of water? [08]

Q11) a) A rectangular channel 15 m wide carries water with normal depth of 3.2 m. The end slope of the channel is 1 in 3600. If the water level is to be raised to 4.8 m above the channel bed by constructing a weir across the channel. [10]

Determine how far upstream of this section the depth of flow will be 10 % of normal depth. Use step by step method and take only 2 steps. Take Manning's as 0.016. Classify and sketch the profile.

b) Write short notes on M2 and S2 profile. [06]

OR

Q12) a) A wide rectangular channel carries a discharge of 2 m^3 /s/m. At a section [08] the depth of flow is 1.9 m. How far upstream or downstream of this section, the depth will be within 5% of the normal depth of flow? Bed slope of the channel is 1/8000 and Manning's n = 0.025. Use step method and us 2 step only.

b) Derive Gradually Varied Flow Equation in its usual form. [08]

UNIVERSITY OF PUNE
[4363]-105
T. E. Civil Examinations
(May2013)
(2008 Course)
ADVANCED SURVEYING

[Time : 3 Hours]   [Total No. of Printed Pages :4]

[Max.Marks: 100]

SECTION I

Q.1 a) Explain why the base line of triangle of any class of triangulation is usually shorter than its sides? How extension of the base is carried out to avoid ill conditioned triangle?   [6]

  b) Describe three important segments of GPS system with illustration.   [6]

  c) A,B, and C are the stations in a minor triangulation survey A Satellite station S is set up near C such that AC an BC fall within triangle ASB. It is given that AC=7.5km,BC=6.3km, CS=40.5km, Angle ASC=62° 10'40"and Angle ASB=75° 15'15**",** Calculate the angle ACB.   [6]

OR

Q.2 a) Define, i) Well conditioned triangle ii) Strength of a figure
    iii) Accuracy of triangulation iv)Towers v) phase of a signal
    vi) Station marks   [6]

  b) Describe different types of error in GPS system   [6]

  c) There are two stations P and Q at an elevation of 200 and
   995m, respectively. The distance of Q from P is 105 km. If
  the elevation of a peak M at a distance of 38 km from P is 301
  m. Determine whether Q is visible from P or not? If not
  what would the height of Scaffolding at Q so that Q becomes
  visible from P.?   [6]

Q.3 a) Define with example
    i) Direct and indirect observation
    ii) Independent and conditioned quantity
   iii) Observation equation and conditioned equation   6

  b) An angle A was observed three times as given below with
   their respective weights. What is the weight of the weighted
   arithmetic mean of the angle?

1

Angle A	Weight
62°15'7"	1
60°15'10"	2
60°15'15"	3

What is the weight of 3A if angle A=35°25'40" if its weights is 4   [4]

c) Determine the adjusted values of the following observed angles closing the horizon.   [6]

Angle A	Weight
108° 20'40"	4
94° 30'15"	1
58° 12'02"	2
98° 57'01"	3

OR

Q.4 a) Define Geodetic quadrilateral and describe methods of its adjustment.   [5]

  b) What do you mean by a spherical triangle and how do you find out the length of sides of a spherical triangle?   [5]

  c) Determine the most probable values of the angles A, B, and of a triangle ABC from the following observed angles and the respective probable errors of measurement.   [6]

Angle	probable error
A= 64° 12'40"	± 3"
B= 55° 14'23"	± 2"
C= 60° 33'21"	± 4"

Q.5 a) While doing an underground survey describe the transferring the surface alignment through a Shaft?   [6]

 b) The triangulation stations A & B are 2800 m part. Observations were for vertical angle of elevation from A to B and the mean angle observed was 1° 28'32". The height of the instruments was 1.38 m and signal was 2.46 m high. If the reduced level of station A

was 125 m and the coefficient of refraction was 0.07, calculate the reduced level of B. The radius of the earth 6372 km. [10]

OR

Q.6 a) Describe the setting out of grades for sewers and Pipe lines. [6]

b) It is required to determine the elevation of a station O. Observation were to three stations A,B, and C already fixed and of known elevations. The following data was recorded. [10]

Instrument station	Station observed	Height of Instrument(m)	Distance(m)	Height of signal(m)	Vertical angle
O	A	1.5	3600	5.6	(+) 1° 1'20"
	B		4700	4.1	(-) 0° 53'00"
	C		5000	4.9	(-) 0°34'10"

The reduced level A,B and C were 294,159.5, and 181 m, respectively.
Take m = 0.07 and R sin 1" =30.88 m

Section II

Q.7 a) What are the different types of aerial photographs? Discuss each briefly giving their use. [6]

b) Define and explain the following terms with neat sketch
i) Exposure station ii) swing iii) Azimuth iv) principal line v) Isocentre
vi)Tilt [6]

c) i) A tower was photographed from an elevation of 800 m above the datum. The redial distance of the top and bottom of the tower from the principal point are 112.2 mm and 81.6 mm, Respectively. If the bottom of the tower has an elevation of 250m, determine the height of the tower above its bottom. [3]

ii) The Distance of an image of a point 230 m above mean sea level from the principal point is 34.8 mm. Determine the relief displacement if the flying height is 1600 m. [3]

OR

Q .8 a) Explain the principal of stereoscopy in details with sketch and give conditions for aerial Photography for stereoscopy. [6]

b) Explain Relief displacement and write the conclusions that can be drawn from expression of relief displacement. [6]

c) The point A and B which appears in vertical photograph taken from a

camera having focal Length of 220 mm and from an altitude of 2800 m, have their elevation as 400 m and 600 m respectively. Their photo coordinates are as under. [6]

Point	Photo Coordinates	
	X(mm)	Y(mm)
a	+23.8	+ 16.4
b	-13.6	-29.7

Determine length of the ground line AB.

Q.9 a) Define remote sensing. State how it differs from Photogrametry? [6]
    b) Give the application of remote sensing with respect to natural hazards and that of archaeology [6]
    c) Differentiate between Active and passive system of Remote sensing. [4]

OR

Q.10 a) Describe briefly the following with regard to presentation of geographical features:
i) Point data ii) Line data iii) Aerial data [6]
b) What ate the functionalities of GIS? [6]
c) Write short note on i) Buffering in GIS ii) Map overlays [4]

Q.11 a) Explain the term sounding and explain different methods of locating the Sounding positions. [6]
   b) Explain the three point problem and method of solution of three point problem using Tracing paper and station pointer method. [6]
    c) During a sounding fieldwork, P and Q were stations on the shore. S was sounding station. The angles measured were angle SPQ= 42° 32' and angle SPQ= 64° 36'. Find the coordinates of S with respect to P if the distance PQ is 1580 m. [4]

OR

Q.12 a) Explain the term mean sea level (MSL) and its importance. Explain the method used to arrive at the mean sea level at place. [6]
    b) Explain the phenomenon of tides and different methods of measuring the tide level [6]
    c) The following observations refer to tidal gauge reading and soundings. Find the corrected soundings referred to the datum. At 10.00a.m, the gauge reading is 6.85m.After 10 minutes; the gauge reading is 6.95 m. The datum gauge reading is 1.0 m. The sounding taken at 10.05 a.m., were – 2.35 m and 7.65 m. [4]

****

UNIVERSITY OF PUNE
[4363]-107
T. E. (CIVIL)SEM II Examination - 2013
PROJECT MANAGEMENT & ENGINEERING ECONOMICS
(2008 Course)

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

SECTION -I

Q.1   A   Write a note on Project categories.   4
      B   What do you understand by delegation of authority?   4
      C   Explain merits and demerits of Gantt chart.   6
      D   Define Activity, event and critical event, critical path.   4

OR

Q.2   Listed below are the activities of a project along their durations.

Activity	1-2	2-3	2-4	2-5	3-10	4-6	4-7	5-10	6-8	7-8	8-9	9-10
Duration (days)	4	5	7	4	15	7	Dummy	10	6	7	12	10

   i)   Draw AOA network and calculate the total project
        duration. Highlight the critical path.   6
   ii) Calculate EST,EFT,LST,LFT, Total float, Free-
        float and Independent float. Write in tabular form   12
        with sample calculation.

Q. 3   A   Define cost slope and What do you understand by crashing of   4
           network?
       B   Following table shows the cost duration data for a small   12
           construction project. Carry out step by step crashing and how
           much you save crashing network. Indirect cost may be taken as
           Rs. 300 week.

Activity →		1-2	2-3	2-4	3-5	4-5	5-6
Normal →	Cost	4000	2000	5500	200	2200	4000
	Duration (weeks)	3	6	5	7	4	8
Crash →	Cost	4200	4800	6400	1200	2600	4200
	Duration (weeks)	1	2	2	3	2	4

OR

Q. 4   A   Following table shows the data of small construction project.   16
           i)   Draw the network diagram and update the network by
                using the following conditions at the end of 10 days.
           ii) What is the change in the project duration?

Activity	1-2	2-3	2-4	3-5	4-5	5-6	5-7	6-7
Duration (days)	4	6	5	2	1	4	6	6

At the end of 10 days review was taken which indicates-----
   a) Activity 1-2 & 2-4 was completed as originally planned.
   b) Activity 2-3 & 3-5 delayed drastically and
       requires 5 & 6 more days respectively for their
       completion.
   c) Activity 4-5 & 5-6 is in progress and both require 8 more
       days for their completion.
   d) Activity 6-7 yet to start and the original time estimate
       still appear to be accurate.
   e) Activity 5-7 requires 8 days in place of 6 days for its
       completion.

Q. 5   A   What are the functions of material manager?   4
       B   Explain the costs associated to inventory problem   4
       C   Define i) Safety stock   ii) Lead time   2
       D   Derive expression for EOQ.   6
                                    OR
Q. 6   A   What are the assumptions made in EOQ.   4
       B   Segregate the items as per their annual usage and plot ABC   12
           curve.

Sr. No.	Item	Annual usage (Rs.)
1	Cement	170000
2	Sand	41000
3	Wash basin	65000
4	Steel	155000
5	Aggregate (12mm)	130000
6	Aggregate (19mm)	110000
7	Nails	2200
8	Oil	2800
9	Water	1500
10	Grease	1200

SECTION II

Q. 7 A What are the points to be considered while preparing site layout?   6

        B Write a safety program to be undertaken while working on highway construction.   4

        C Draw a site layout for multistoried residential project.   6

OR

Q. 8 A What are the various causes of accidents on any building construction site?   6

        B How to judge nature and extent of accident?   4

        C Draw a site layout of a project you have visited.   6

Q. 9 A Explain with one example 'Law of diminishing marginal utility'   6

        B Write a note on   6
  i) Demand curve
  ii) Supply curve

        C Explain the following terms with suitable examples   6
  i) Law of substitution
  ii) Elasticity of demand

OR

Q. 10 A What are the income effect, price effect and substitution effect   6

        B Define Engineering. Economics. Explain its importance in Civil Engineering   6

        C Explain in brief elasticity of demand.   6

Q. 11 A Write a short note on any TWO.   8
  i) Annuity
  ii) Break even analysis
  iii) Working capital

        B What do you understand by NPV method? State the project is feasible or not by NPV method if project cost is Rs. 200000 has cash flow of Rs. 30000 for a period 5 years. Firm expects returns at 10% per annum.   8

OR

Q. 12 Write a short note on any FOUR.   16
  i) Cash flow diagram
  ii) Payback period
  iii) Benefit cost ratio
  iv) ARR method
  v) IRR method

UNIVERSITY OF PUNE
[4363]-108
T. E. (*Civil*) Examination - 2013
(Structural Design-II)(2008 Course)
[Time: *4* Hours]   [Max. Marks: 100]

Instructions:

    *1 Answers to the **two sections** should be written in **separate answer-books**.*

    2 Draw neat diagrams wherever necessary.

    *3 Numbers to the right indicate **full marks.***

    4 Assume suitable data, if necessary.

    5 Use of IS 456-2000 and non programmable calculator is allowed.

    *6 Answer **Q1** or **Q2, Q3** or **Q4** from **section-I** and **Q5** or **Q6** & **Q7** or **Q8** from **section-II**.*

    7 Mere reproduction from IS code as answer, will not be given full credit.

SECTION -I

Q.1   A   Draw stress strain curves for concrete in LSM and explain stress and strain values associated with the curves.   5

       B   A rectangular, singly reinforced beam, 300mm wide and 465mm effective depth is used as a simply supported beam over an effective span of 4m. The reinforcement consists of 4 bars of 16mm diameter at tension face. Find the safe concentrated load(at midspan) in addition to its self weight. Use WSM with M25 concrete and Fe 415 steel.   12

       C   Calculate the moment of resistance by LSM for flanged beam section detailed as below   8
            i.   Width of rib=230mm
            ii.   Effective flange width=1500mm
            iii.   Thickness of flange=150mm
            iv.   Effective depth=565mm
            v.   Tension steel=4 Nos.-#20 through plus+2Nos.-#16 curtail at midspan.
            vi.   Use M25 grade of concrete and Fe 500 grade of steel.

Q.2   A   A rectangular beam section, 230mm wide and 600mm deep is   8

reinforced with 4 bars of 20mm diameter in the tensile zone and 2 bars of 16mm in the compression zone. The clear cover is 25mm for both the reinforcement. Determine moment of resistance of the section using WSM. Use M25 grade of concrete and Fe 415 grade of steel.

|		
B	A reinforced concrete rectangular beam has width 230mm and total depth 600mm with clear cover of 25mm. The beam is reinforced with 3 bars with 16mm diameter at support section at tension side. Calculate the shear strength of the support section if 8mm diameter two legged stirrups are provided at spacing 150mm C/C. Use M20 grade of concrete and Fe 415 grade of steel. Use LSM.	8
C	Explain the terms bond stress and development length. Calculate development length for 16mm diameter bar in compression and tension by both methods (WSM and LSM). Use M30 concrete and Fe 500 steel.	9
Q. 3	Design the slab S5 and S13only for flexure by LSM. Refer the structural plan given in fig.1. Consider live load=3kN/m^2, Floor finish=1.5kN/m^2 Use M20 grade of concrete and Fe 415 grade of steel. Draw neat sketches showing details of reinforcement.	25
Q. 4	Design dog legged staircase from plinth level to the first floor level as shown in fig.1 for the following data: Floor to floor height=3150mm Rise=175mm; Tread=250mm Consider live load=4kN/m^2, Floor finish=1.0kN/m^2 At plinth level, plinth beam is provided below first step, whereas at midlanding level and first floor level beam is provided at the outer face of landing. Show detailed load calculations and reinforcement details in sectional elevation.	25

FIG.1

Midlanding Beam

Beam width for all beams = 230mm
Column width for all columns = 230mm
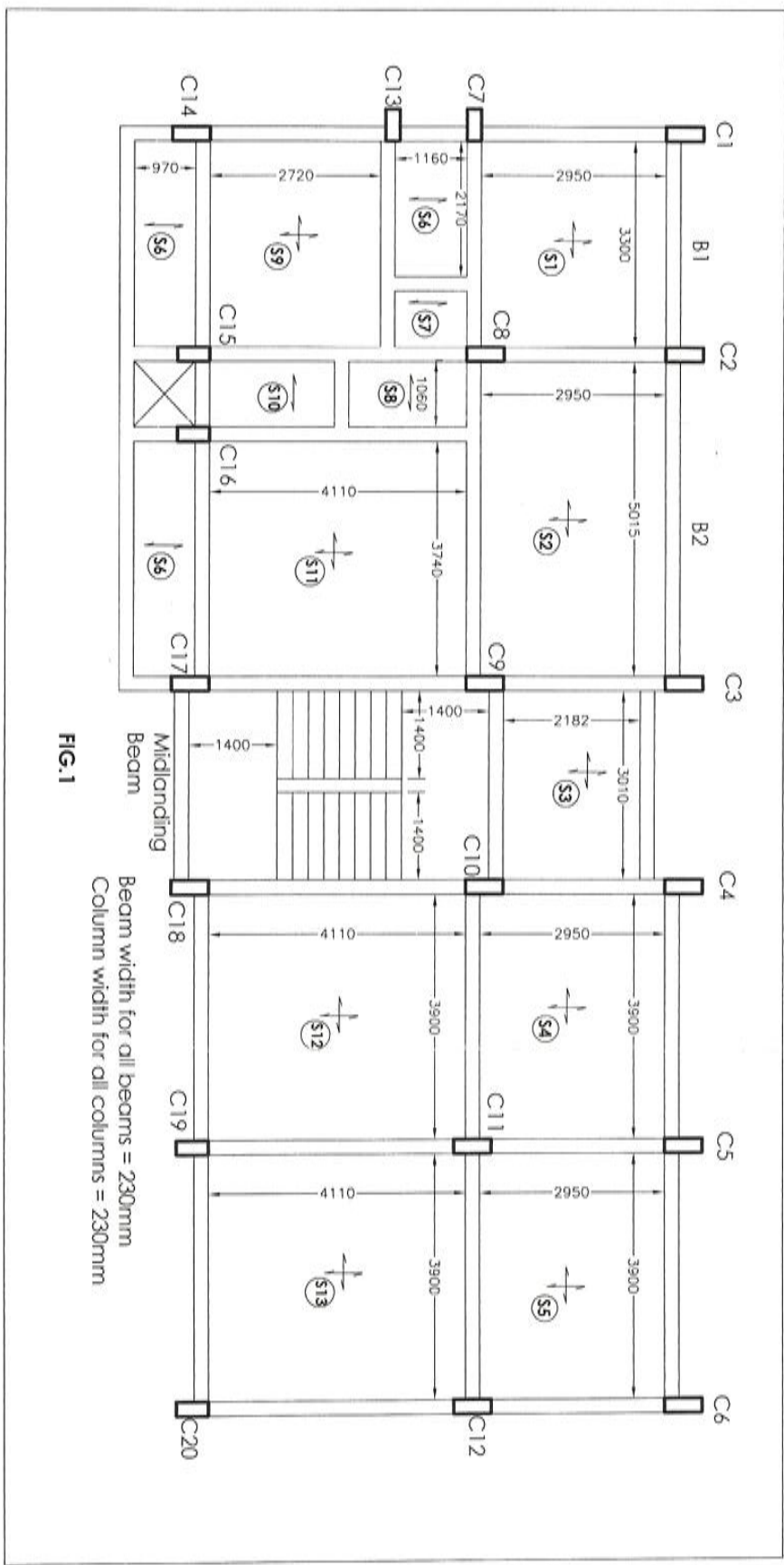
Q. 5   A continuous R.C.C. floor beam B1-B2(Refer Fig.1) is simply   25
supported at columns C1,C3 and continuous through column
C2. Consider live load on slab $3kN/m^2$ and floor finish 1.5
kN/m^2. Assume slab thickness 130mm for load calculation.
Show detailed load calculations and determine support
moment maximum span moments for both beams, using 20%
redistribution of moments. Draw bending moment diagram and
design the beam only for flexure. Draw longitudinal section
showing all details.
Material-Concrete of grade M25, Fe 500 reinforcement.

OR

Q. 6   A   A doubly reinforced concrete beam has the following data: 15
Clear   Span   of   beam=6m,   Width   of   supporting
columns=300mm, Beam section=230x450mm, Ultimate UDL
on beam=40kN/m, inclusive of self weight. Reinforcement at
top - 2Nos of 16mm diameter bars
Reinforcement at bottom-2Nos of 20mm diameter bars
through+2Nos of 16 mm diameter bars curtail.
Design the shear reinforcement using vertical stirrups. Draw
neat diagram showing zoning. Material - Concrete of grade
M20, Longitudinal reinforcement-Fe 415 HYSD, Shear
reinforcement-Fe 415.

       B   State the situation where doubly reinforced concrete beams   10
become necessary. State the procedure to find tension and
compression steel in doubly reinforced section. What is role of
compression steel?

Q. 7   Design column C11 as axially loaded short column for G+2   25
building with isolated trapezoidal footing for the following
data. Refer fig.1
Floor to floor height=3.15m
Height of plinth above ground level=1.0m
Depth of foundation below ground level=1.5m
Live load on all slabs=$5kN/m^2$
Floor finish load on all slabs=$1.0kN/m^2$
Water proofing load at terrace level=$1.5kN/m^2$
thickness of slab=130mm
Thickness of wall on all beams=230mm
Height of parapet wall=1m
Size of all beams=230x450mm
S.B.C. of soil=$200 kN/m^2$
Material-Concrete of grade M25,Fe500 HYSD reinforcement.

Detailed load and design calculations are expected. Draw neat sketches giving reinforcement details of column and footing.

OR

Q. 8   Design a bi-axial short column by limit state method with material M25 and Fe 415 to carry a working load of 750 kN. Working moment of 70 kN-m about major axis bisecting the depth of column and 50kN-m about minor axis bisecting the width of column. The unsupported length of column is 4.5m. The column is fixed at one end and hinged at the other. Also design the footing for this column considering axial load and moment about major axis only. Take SBC=250kN/m^2. Show detailed design calculations and reinforcement details in plan and sectional elevation. (Use given charts)   25

Chart 5 : Interaction Diagram for Combined Bending and Compression R Section-Equal Reinforcement on All Sides
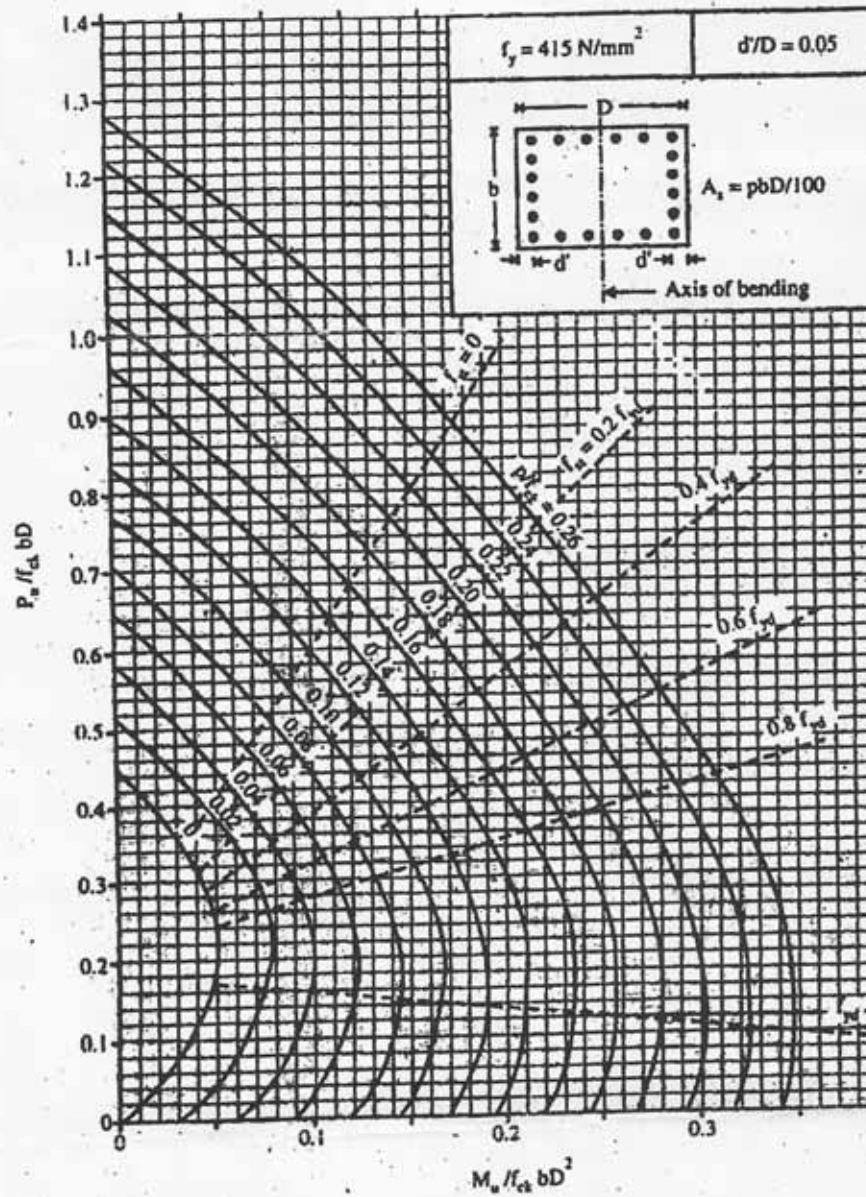
$f_y = 415 \text{ N/mm}^2$ $d'/D = 0.05$

$A_s = pbD/100$

Axis of bending

$P_u/f_{ck} bD$
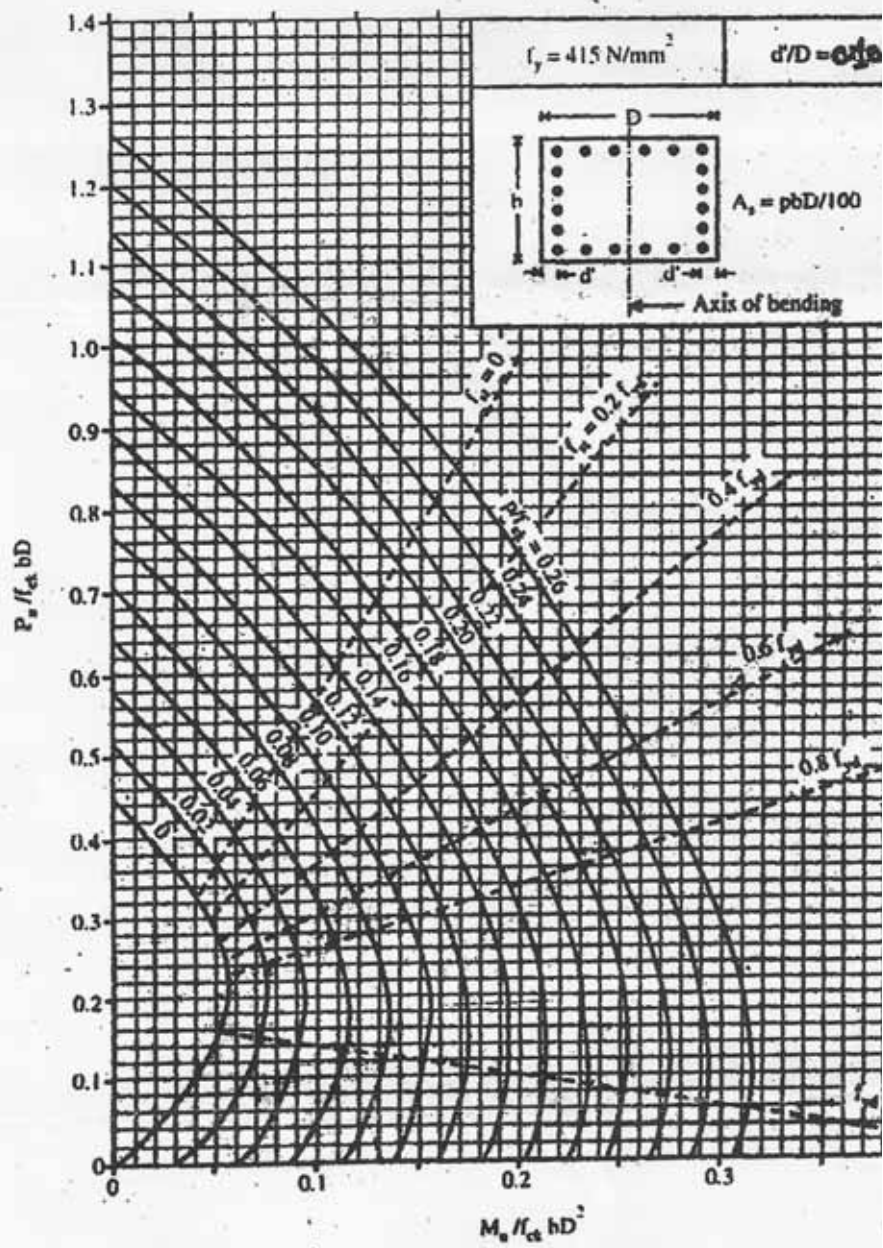
$M_u/f_{ck} bD^2$

Chart 5

Chart 6

Chart 7 : Interaction Diagram for Combined Bending and Compression R
Section-Equal Reinforcement on All Sides