

**UNIVERSITY OF PUNE**  
**[4364]-404**  
**B. E. (Civil)-Examination May 2013**  
**STRUCTURAL DESIGN OF BRIDGES**  
**(2008 Pattern)**

**Total No. of Questions : 12**  
**[Time : 3 Hours]**

**[Total No. of Printed Pages :3]**  
**[Max. Marks : 100]**

- (1) *From section I-answer Q.1 or Q.2, Q.3 or Q.4, and from Section-II- answer Q.5 or Q.6, and Q.7 or Q.8*
- (2) *Answers to the **two sections** should be written in **separate answer-books**.*
- (3) *Figures to the right indicate full marks.*
- (4) *IS 800, IS 875, IS 1343 and steel tables are allowed*
- (5) *Assume suitable data, if necessary.*

Section-I

Q1.

- a) Explain IRC loading standards for Highway bridges [9]
- b) Explain how Impact factor is calculated for Highway bridges [8]
- c) Classify the bridges on the basis of materials of construction and forms of Superstructure. [8]

OR

Q2.

- a) Explain with neat sketches various types of Bridges bearings [8]
- b) Explain Curbon's theory of determining load carried by longitudinal Girder [10]
- c) Explain with neat sketches different types of Highway bridges. [7]

Q3. Design an Interior panel and Cantilever of R.C.C T-Beam deck slab bridge for two lane highway with following data [25]

- 1) Span of the Bridge-25 m

- 2) Foot path on either side-1.5 m wide
- 3) Width of carriage way-7.5 m
- 4) Spacing of longitudinal Girders-3.3 m (3 No's)
- 5) Spacing of cross Girders- 3.0 m
- 6) Thickness of wearing coat-75 mm
- 7) Loading-IRC Class AA Tracked vehicle
- 8) Material-M30 and Fe 500
- 9) Use  $m_1=0.055$  and  $m_2=0.021$
- 10) Sketch the details of reinforcement

OR

Q4. Using the design data of Question No (3) Design the intermediate Post tensioned Pre stressed girder using M 45 grade of concrete and high tension strands of 7 ply 15.2 mm dia. Having Ultimate strength  $1800 \text{ N/mm}^2$ , use Fe 415 as supplementary reinforcement take loss ratio=0.85 [25]

### Section-II

Q5. Design a deck type plate girder highway bridge for a span of 30 m. The bridge consists of two lanes with a reinforced concrete slab of 200 mm thick inclusive of the wearing coat. Two foot paths of 1.5 m are to be provided on either side of the carriage way. Design the plate girder for IRC class A loading shown in fig.4 and also sketch the details. [25]

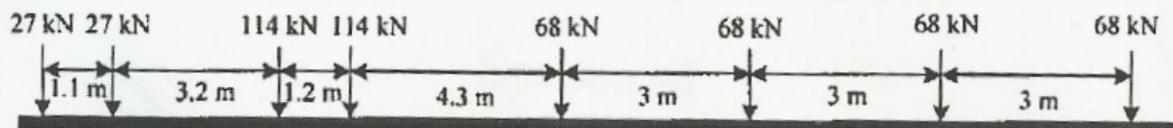


Fig. 4.

OR

Q6. The effective span of through types truss girder highway two lane bridge is 30 m. The reinforced concrete slab is 300 mm thick inclusive of the wearing coat. Two foot paths of 1.5 m width are to be provided on either side of the carriage way. The highway bridge is to carry IRC class A loading. Suggest a suitable truss girder for the bridge. Design the central top chord and diagonal members of the central panel and sketch all the details. [25]

Q7.

- a) Write a short note on bridge bearings. [7]
- b) The effective span of truss girder through Type Bridge for a single board gauge track is 38 m. The reaction due to dead load, live load and impact load is 1850 kN. The vertical reaction due to wind is 270 kN. The tractive force is 1030.05 KN and the breaking force is 735.75 kN. Design a suitable bearing and sketch the details [18]

OR

Q8. A Pratt truss girder through bridge is provided for single broad gauge track. The effective span of bridge is 50 m. the cross girders are spaced 5m apart. The stringers are spaced 2 m between centre lines. 0.60 KN/m stock rails and 0.40 KN/m check rails are provided. Timber Sleepers are spaced at 0.45 m centre to center and are size 2.8 m x 250 mm x 250 mm. Weight of timber may be assumed as 7.5 KN/m<sup>3</sup>. The main girders are provided at spacing of 7 m between their centre lines. Design the central top chord member and bottom chord member. The bridge is to carry standard main line loading. [25]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 5]

UNIVERSITY OF PUNE

[4364]-405

B. E. Examination – 2013

System Approach in Civil Engineering (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions**

:

- 1 Answer any three questions from each section.
- 2 Answers to the **two sections** should be written in **separate answer-books**.
- 3 Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 4 Assume suitable data, if necessary.

**SECTION –I**

- Q.1 A A firm manufactures two types of blocks A & B for any day it must produce 200 nos. of A and 150 nos. of B. the maximum total requirement of blocks A & B is 1250 and minimum total is 500. Both blocks are to be processed on machines  $m_1$  and  $m_2$ . Total no. of machines  $m_1$  and  $m_2$  available are 5 each. Processing times in hours for each shaft on machines  $m_1$  and  $m_2$  are as follows.
- |                  |     |     |
|------------------|-----|-----|
| $m_1$            | 1.5 | 2   |
| $m_2$            | 1.2 | 1.4 |
| Profit/unit (Rs) | 15  | 25  |
- If the firm has 26 working days a month, each of 8 hours, formulate the mathematical model for the problem.
- B Also, solve it by graphical method. 8
- C Show the following cases by graphical means and explain 6
- i) Unique solution                      ii) Infinite solution  
iii) Unbalanced solution              iv) No solution

**OR**

- Q.2 A Solve the following problem using Big m method 8
- Minimize  $x_0 = x_1 - 3x_2 + 2x_3$   
Subject to  $3x_1 - 3x_2 + 2x_3 \geq 7$   
 $-2x_1 - 4x_2 \leq 12$   
 $-4x_1 + 3x_2 + 8x_3 \leq 10$   
 $x_1, x_2, x_3 \geq 0$

- B Explain the difference between between simplex solution procedure fo a maximization & minimization problem with  
 i) Constraint equations with  $\leq$  type  
 ii) Constraint equations of  $\geq$  or  $=$  type 4
- C What is the role of or in decision making? Give names of different or techniques. 6

- Q. 3 Solve the following transportation problem using 16
- a) North West corner method  
 b) Row minima method  
 c) Column minima method  
 d) Least cost method.

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	D <sub>6</sub>	
01	8	10	12	16	14	10	100
02	6	8	10	12	12	18	100
03	10	6	10	11	15	13	100
04	15	12	9	14	12	16	100
05	20	9	8	13	15	12	100
	75	50	150	25	75	125	

Give transportation cost by each method by specifying the allocations.

X  
X

OR

- Q. 4 A Consider the problem of assigning 5 operators to 5 machines. The assignment costs are as given below 6

	m <sub>1</sub>	m <sub>2</sub>	m <sub>3</sub>	m <sub>4</sub>	m <sub>5</sub>
A	6	8	-	7	9
B	5	4	8	9	6
C	10	11	8	-	9
D	9	4	6	5	8
E	7	8	9	10	3

Operator A cannot be assigned to machines M<sub>3</sub> & C cannot be assigned to m<sub>4</sub>. Find the optimum assignment schedule.

- B Solve the following assignment problem to give minimum cost 6

	A	B	C	D
1	8	9	7	15
2	18	12	17	10
3	8	10	5	16
4	12	11	8	14
5	13	7	15	9

- C Write a short note on "Assignment model" 4

- Q. 5 A What is dynamic programming? How it is different from linear programming? Also state the Bellman's Principle of optimality. 8

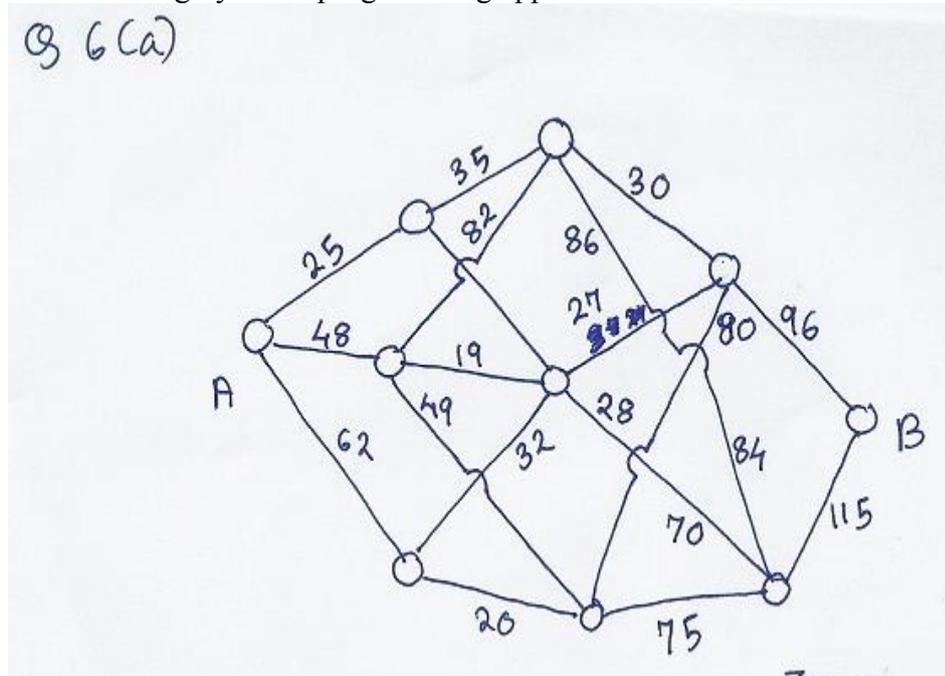
- B A manufacturer has entered into a contract for the supply of following number of blocks at the end of months. 8

Month	Jan	Mar	May	July	Sept	Nov
No. of units	500	750	800	500	1000	600

The blocks manufactured during a month are supplied at the end of the month or stored with a storage cost of Rs 5 per block (for two months). The manufacturing cost is Rs 5000/- for each batch of blocks. Determine the production schedule that will minimize the total cost

OR

- Q. 6 A Find the shortest path passing through each zone for the following road network using dynamic programming approach. 10



- B Give the procedure adopted in the analysis of dynamic Programming problems 6

### SECTION II

- Q. 7 A Maximize  $f(X)=2X_1X_2-2X_1^2-2X_2^2+6X_2$  with initial value (1,1) using gradient method. 8

- B Use Lagrange Multiplier Technique to maximize  $Z=X_1^2+3X_2^2+2X_1X_2+2X_1+6X_2$   
 Subject to  $2X_2-X_1=4$ ,  
 And  $X_1, X_2 \geq 0$  8

OR

- Q. 8 A Minimize  $f(X)=2(X_1-1)^2 + (X_2-X_1)^2$  with initial value (-1,2) using gradient method. 8

- B Use Fibonacci method to maximize  $Z=16X-0.2X^2$  in the range of (0,100) with 0.1% accuracy. Carry out five stages. 8

- Q. 9 A Solve the following sequencing problem involving 3-machines, n-jobs and no passing, to obtain the sequence of jobs to be processed so as to 12

minimize the total time elapsed. Determine the total elapsed time and idle hours of the machines, if any. Tabulate the results indicating the schedule of processing of all the jobs.

Jobs	Time in hours		
	Mach. A	Mach. B	Mach. C
1	6	5	9
2	7	7	11
3	3	8	8
4	4	5	9
5	5	6	12
6	10	4	9
7	16	7	10
8	12	3	14

B What is sequence? What are assumptions in sequencing problem? 4

**OR**

Q. 10 A A sample of 100 arrivals of automobiles at toll booth is found to be according to the following distribution; 12

Time between arrivals in Min.	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Frequency	2	6	10	24	20	15	10	7	4	2

The time taken for service follows the distribution;

Service time in Min.	0.5	1.0	1.5	2.0	2.5
Frequency	13	22	37	20	8

Estimate the average % waiting time and idle time of a customer by simulation for next 10 arrivals. Use the following random numbers.

Arrivals:	16	77	23	02	77	28	06	24	25	93
Service:	56	65	05	61	86	90	92	10	79	80

B State advantages and limitations of simulation technique. 4

Q. 11 A Explain how theory of replacement is used in replacement of items whose maintenance cost varies with time. 6

B The purchase price of a machine is Rs.60,000. The installation charges amount to Rs.12400 and its scrap value is only Rs.3400. the maintenance cost in various years is given below; 12

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	2500	3500	4500	7500	9500	14500	16500

After how many years should the machine is replaced? Assume that the machine replacement can be done only at the year ends.

**OR**

Q. 12 A Explain Two-Person Zero-Sum Game. Distinguish between pure strategy & mixed strategy. 6

B Reduce the following game by dominance and find the game value

12

Player B

Strategies	I	II	III	IV
I	3	2	4	0
II	3	4	2	4
III	4	2	4	0
IV	0	4	0	8

Player A

**UNIVERSITY OF PUNE**  
**[4364]-408**  
**B. E. (Civil) Examination - 2013**  
**Advance Geotechnical Engg**  
**(2008 Pattern)**

**Total No. of Questions : 12**  
**[Time : 3 Hours]**

**[Total No. of Printed Pages :3]**  
**[Max. Marks : 100]**

**Instructions :**

- (1) Answer 3 questions from Section I and Answer 3 questions 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) Your answers wil be valued as whole.
- (5) Use of logarithmic tables, electronic pocket calculator is allowed & IS codes are not allowed.
- (6) Assume suitable data, if necessary.

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Section-I

Q1.

- a) Discuss different soil classification system. [8]
- b) Explain different 'clay minerals'. [8]

OR

Q2.

- a) Compare the following two sites, for foundation construction,

	Site 'a'	Site 'b'
1) PL	20%	22%
2) LL	40%	60%
3) IF	20	10
4) %w	30%	40%

- And state which soil is more suitable [8]
- b) Discuss, 'Diffuse Double layer' & role of 'montmorillonite'. [8]

Q3.

- a) A vertical retaining wall 4.5 m high, supported a backfill with horizontal ground surface, with,  $\gamma=19\text{kN/m}^3$ ,  $\phi=32^\circ$ ,  $\delta=20^\circ$ . A footing running parallel to the wall & carrying a load intensity of 19 kN/m, is to be constructed. Find the safe distance of the footing from the face of the wall, so that there is no increase in lateral pressure on the wall. [10]
- b) Explain- (1) AEP (2) PEP (3) EP at rest [7]

OR

Q.4

- a) Design a gravity retaining wall, 5m high with vertical back to retain a dry sand with  $\gamma=19\text{kN/m}^3$ , &  $\phi=30^\circ$ . Find also the FOS against sliding assuming,  $\delta=30^\circ$ , the wall is made up of concrete with  $\gamma=24\text{kN/m}^3$  & top width of 1.2m, use Rankine's theory. [9]
- b) Explain the steps for 'Anchored Sheet pile design'. [8]

Q5.

- a) Discuss the following [12]
- 1) Different types of geosynthetics & their functions.
  - 2) Properties & functional requirements of geogrid.
- b) Explain- 'geosynthetics in geoenvironment: [5]

OR

Q6.

- a) Explain the following: [12]
- I. 'Prinquet & Lee' theory.
  - II. Reinforced earth wall
- b) Explain 'soil nailing' with situations applicable [5]

SECTION II

Q7. Explain the following [16]

- a) Free & forced vibrations
- b) Barken's method
- c) Pauw's analysis
- d) Elartic half space method.

OR

Q8.

- a) Resonance occurred at a frequency of 25 cycles/sec in a vertical block vibration test on block of 1mx1mx1m. Determine  $C_u$  if the weight of oscillator is 700 N & the force produced by it at 15 cycles/sec is 1200N [8]
- b) Discuss the design criteria for impact type machines as per IS-2974 (Pt-II)-1966 [8]

Q9. Explain the following:

- a) Bored compaction piles. [4]
- b) Stone columns. [4]
- c) Pecher grouting. [4]
- d) Sand drains. [5]

OR

Q10.

- a) Explain the steps for design of sand drains, for following cases, (1) Isotropic soil (2) Anistropic soil. [8]
- b) Explain the stages of inserting reinforcement in vibro-expanded pile. [9]

Q11.

- a) Discuss different 'Rheological Models'. [9]
- b) Explain the utility of 'Rheological Models'. [8]

OR

Q.12

- a) Discus the 'basic & composite', 'Rheological Models'. [7]
- b) Explain the following , with the help of 'Rheological Models', [10]
  - 1) Secondary Consolidation.
  - 2) Creep.

[Total No. of Questions: 12]

[Total No. of Printed Pages: 4]

UNIVERSITY OF PUNE  
[4364]- /422

**B. E. (Civil) Examination - 2013**

*Advanced Transportation Engineering. ( 2008 Course)*

[Time: 4Hours]

[Max. Marks: 100]

**Instruction**

- 1 Answer 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 Figures to the 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.
- 6 Neat diagrams must be drawn wherever necessary.

**SECTION - I**

- Q.1 A Explain in brief the following projects 6
- i) Delhi Metro
  - ii) PMGSY
- B What is regression analysis? Why is it useful in traffic and transportation planning? Explain with an example 6
- C Explain the travel demand forecasting process with a flow diagram 6
- OR**
- Q.2 A Explain in brief the following projects 6
- i) NHDP
  - ii) Bangalore Metro
- B Explain how O-D surveys are carried out and how the data is documented and used in transportation planning 6
- C Discuss the various factors affecting the trip generation 6
- Q.3 A Classify the various urban transportation innovations and explain any 2 of them in detail. (10)
- B Discuss problems of BRT adopted in Pune city 6
- OR**
- Q.4 A Explain concept of ITS and elaborate the various technologies used in it with examples. (2+8)
- B Discuss solutions to the problems of BRT adopted in Pune City 6

- Q. 5 A The client associated with Infrastructure development has decided to evaluate two highway proposals with the following cash flows. 16

Option I			Option II		
Year	Cash Inflow (Rs.)	Cash Outflow (Rs.)	Year	Cash Inflow (Rs.)	Cash Outflow (Rs.)
1	-	10,00,000	1	-	35,00,000
2	-	35,00,000	2	10,00,000	2,00,000
3	-	20,00,000	3	12,00,000	3,00,000
4	15,00,000	2,00,000	4	15,00,000	50,000
5	20,00,000	3,00,000	5	11,00,000	50,000
6	25,00,000	2,00,000	6	9,00,000	1,50,000
7	30,00,000	3,00,000	7	3,00,000	2,50,000

The decision criteria is based on NPV at 12%. Work out the values and suggest.

- Whether both proposals are worth investing, and
- The better alternative, stating reason.

**OR**

- Q. 6 A Explain merits and demerits of 16
- ARR and IRR.
  - BOT and BOOS.
  - NPV and B/C
  - BT and BOO.

**SECTION I**

- Q. 7 A Explain the following methods of traffic counting with examples (6+6+6)
- Manual classified Counts method
  - Moving vehicle method
  - Licensed plate survey method

**OR**

- Q. 8 A What are household surveys? How are they conducted? What are the advantages? Explain the standard household survey format and how data is collected using it with an example (2+2+4+10)

- Q. 9 A Design a flexible pavement for the following data, as per IRC-37 (10+2)

- i) 4 lane single carriageway
- ii) Expected year of completion-2014
- iii) CVPD in one direction in year 2010-2000
- iv) Design life – 12 years
- v) Traffic growth rate – 6%
- vi) Terrain – hilly
- vii) C.B.R. for subgrade – 5%

Also draw a typical cross-section showing all the basic layers

- B Discuss advantages of flexible pavements over rigid pavements 4

**OR**

- Q. 10 A Design a flexible pavement by using IRC-37 and the data given in problem 9 a, except for the change that the road is a 2 lane dual carriageway instead of the 4 lane single carriageway. Also draw the typical cross-section (10+2)

- B Explain how pavement riding quality is measured, with an example 4

- Q. 11 A Explain various types of overlays and compare/contrast amongst them 8

- B Explain the design procedure for any types of overlay based on the provisions made in IRC-81. Before designing an overlay what needs to be assessed and why? Explain (6+2)

**OR**

- Q. 12 Design a rigid pavement as per IRC-58 and draw the plan and cross-section showing correctly all relevant details with the correct nomenclature, based on the following data. 16

- i) 2 way CVPD=2500
- ii) Flexural strength of concrete = 48 kg/cm<sup>2</sup>
- iii) Effective modulus of subgrade reaction= kg/cm<sup>3</sup>
- iv) Elastic modulus of concrete = 3.3x10<sup>5</sup> kg/cm<sup>2</sup>
- v) Poissons ratio = 0.18
- vi) Coefficient of thermal expansion of concrete = 10x10<sup>-6</sup> per°C.
- vii) Tyre pressure = 8.2 kg/cm<sup>2</sup>
- viii) Traffic growth rate = 7%
- ix) Design life = 15 years
- x) Spacing of contraction joints = 4.5m
- xi) Slab width 4.0 m.
- xii) Load safety factor = 1.05
- xiii) Maximum temperature difference between the top and bottom of the slab = 23°C
- xiv) Centre to centre distance between tyres = 32cm.

xv) Axle load spectrum is as follows

Single Axle Loads		Tandem Axle Loads	
Load in Tons	%	Load in Tons	%
20	0.5	36	0.3
18	1.4	32	4.0
16	3.8	28	3.0
14	12.0	24	2.0
12	20.0	20	4.0
10	22.0	16	1.0
less	25.0	Less than 16	1.0

xvi) Trial Thickness = 30cms

xvii) Use following table if required

L/l or B/l	C	L/l or B/l	c
1	0.000	7	1.035
2	0.042	8	1.075
3	0.178	9	1.085
4	0.445	10	1.080
5	0.725	11	1.060
6	0.925	12	1.000

Check whether the pavement is safe for

- i) Critical condition with dowel bars and
- ii) Critical condition without dowel bars.

If the pavement fails, design a suitable pavement thickness so as to withstand all the critical conditions

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

**UNIVERSITY OF PUNE**

**[4364]-426**

**B. E. (Civil) Examination – 2013**

*Hydropower Engineering (Open elective) (2008 Course)*

**[Time: 3 Hours]**

**[Max. Marks: 100]**

***Instructions:***

- 1 *Answer three questions from Section I and three questions 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 | Explain various guidelines of planning for hydropower development in detail.  | 8 |
|     | B | Describe briefly the sources of hydrologic data in India. Explain hydrological analysis for the water power projects. | 8 |

**OR**

- |     |   |   |   |
|-----|---|---|---|
| Q.2 | A | What is need of energy? Explain renewable and non renewable energy sources with their advantages and disadvantages. | 8 |
|-----|---|---|---|



sketch.

B What is instrumentation in power house? How instrumentation and control is achieved in case of powerhouse? 8

**OR**

Q. 8 A Explain any four electrical equipments for the power house. 8

B Explain underground powerhouse and types of arrangement of underground powerhouse with neat sketches. 8

Q. 9 A What is draft tube? What are the functions of draft tube? Explain different types with figures and draft tube theory. 8

B Determine the number of turbines and diameter of runner for a power plant having 40 cumecs inflow, 20 m head. The efficiency of turbine is 85% with the speed of 225 rpm. Assume the specific speed as 250 and speed ratio as 0.8. 10

**OR**

Q. 10 A Write short notes on 8

1. Governing of turbines
2. Water hammer in turbines

B The internal and external diameter of an outward flow reaction turbine are 2.5m & 3m respectively. The turbine is running at 275 rpm and the rate of flow of water through the turbine is  $7\text{m}^3/\text{sec}$ . the width of runner at inlet and outlet is equal to 300mm. head on turbine is 150m. neglecting the thickness of vanes and taking the discharge radial at outlet, determine 10

1. Velocity of flow at inlet and outlet
2. Vane angle at inlet and outlet

Q. 11 A What are the provisions related to licensing in case of hydroelectric power generation as per electricity act 2003? 8

B What are the factors governing the pricing of electricity? 8

**OR**

Q. 12 A Explain the concept of carbon credit? Give its significance. 8

B Write note on economic considerations of hydroelectric power plant 8

UNIVERSITY OF PUNE

[4364]-403

B. E. (Civil) Examination - 2013  
Structural Design-III  
(2008 Pattern)

Total No. of Questions : 8

[Total No. of Printed Pages :4]

[Time : 3 Hours]

[Max. Marks : 100]

**Instructions :**

- (1) Answer Q1 or Q2, Q3 OR Q4, From section I
- (2) Answer Q5 OR Q6, Q7 OR Q8, From section II.
- (3) Answers to the **two sections** should be written in **separate answer-books**.
- (4) Figures to the right indicate full marks.
- (5) IS 1343, IS 456, IS 3370 are allowed
- (6) If necessary assume suitable data and mention it clearly.

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Q1.

- (a) Explain with neat sketches various systems of Pre stressing [5]
- (b) Explain in detail various types of losses in post tensioned member [5]
- (c) An Unsymmetrical I-Section of size top flange 500 x 200 mm, Bottom flange 350 x 250 mm and web 150 x 600 mm is used to support an imposed load of 15 KN/m over a span of 16 m. the effective pre stressing force of 1250 KN is located at 90 mm From soffit of the section at mid span. Cable profile is parabolic and concentric at Support calculates the extreme fiber stresses in concrete at mid span at initial and final stages. Take loss ratio as 0.82. [15]

OR

Q2.

- (a) State what are the remedial measures to be taken to reduce losses in prestress. [8]

(b) A post tensioned prestressed concrete beam is simply supported over a span of 20m having cross sectional dimensions of top flange as 500 x 200mm, web 150 x 800 mm and bottom flange 400 x 250 mm. the beam is prestressed with 5 no's of 12/5 Freyssinet parabolic cables with their C.G at 120 mm from extreme bottom fibre cables are stressed one at a time from one end only with pre stressing force of 1000KN. Calculate total loss of prestress and jacking force at the age of 100 days, if coefficient of friction is 0.3, coefficient of curvature and wave effect = 0.0026/m length of cable, slip of anchorage at jacking end = 2 mm, creep coefficient = 2.4,  $E_s=200$  Gpa, Creep and relaxation of steel= 1 % of initial prestress, Concrete grade=M 40 [17]

Q3. Design a post tension prestressed concrete beam using I section for flexure to carry a live load of 15 KN/m over a simply supported span of 18 m with M 40 grade of concrete and Freyssinet cables of 12/5 ( $f_y=1750$  Mpa) or 12/7 ( $f_y=1500$ Mpa), design the end block also. Draw sketches showing details of cable profile, end block reinforcement, check fiber stress in concrete and deflection. [25]

OR

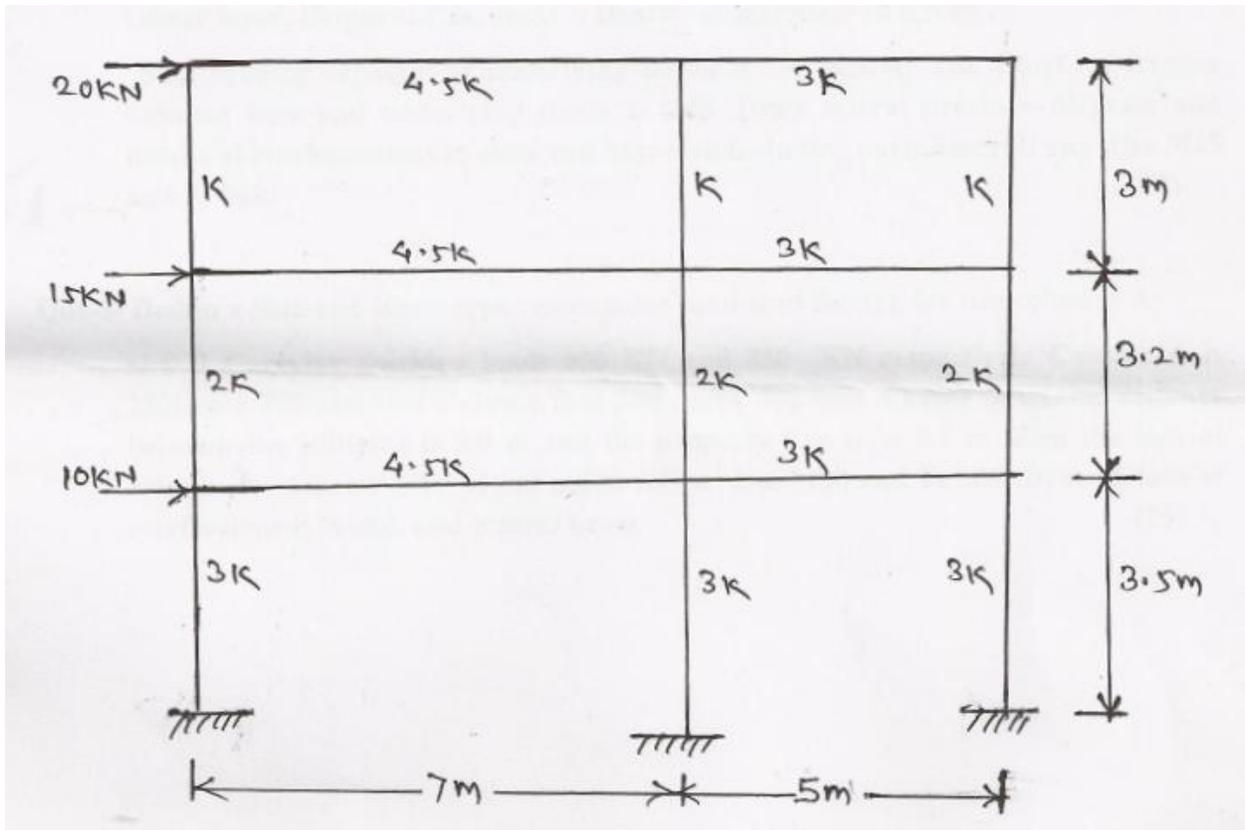
Q4.

(a) Explain need of High strength steel and high strength Concrete in Prestress Concrete construction [7]

(b) A post tension prestress concrete two way slab of 7m x 9 m with discontinuous edges to support imposed load of  $\text{KN/m}^2$  use S3 cable having area of each  $100 \text{ mm}^2$ , and  $f_y=1800$  Mpa. Check the safety of slab against collapse and deflection at service load. Use M40 concrete [18]

SECTION=II

Q5. Fig (1) Shows an intermediate frame of multistorie building the frames are spaced at 4.5 m center analyze a rigid jointed frame taking live load  $3 \text{ KN/m}^2$  and dead load as  $4 \text{ KN/m}^2$  for panels AB and BC respectively. Self weight of beam may be taken as for 7m span= $5 \text{ KN/m}$  and for 5m Span= $4 \text{ KN/m}$ . the relative stiffness of the member are as shown in the fig. use portal method for horizontal loads and proper substitute frame for vertical loads. Design the beam ABC for combined effect of horizontal and vertical loads. Use 20% redistribution of moments for vertical load moments. Use M25 and Fe 500. [25]

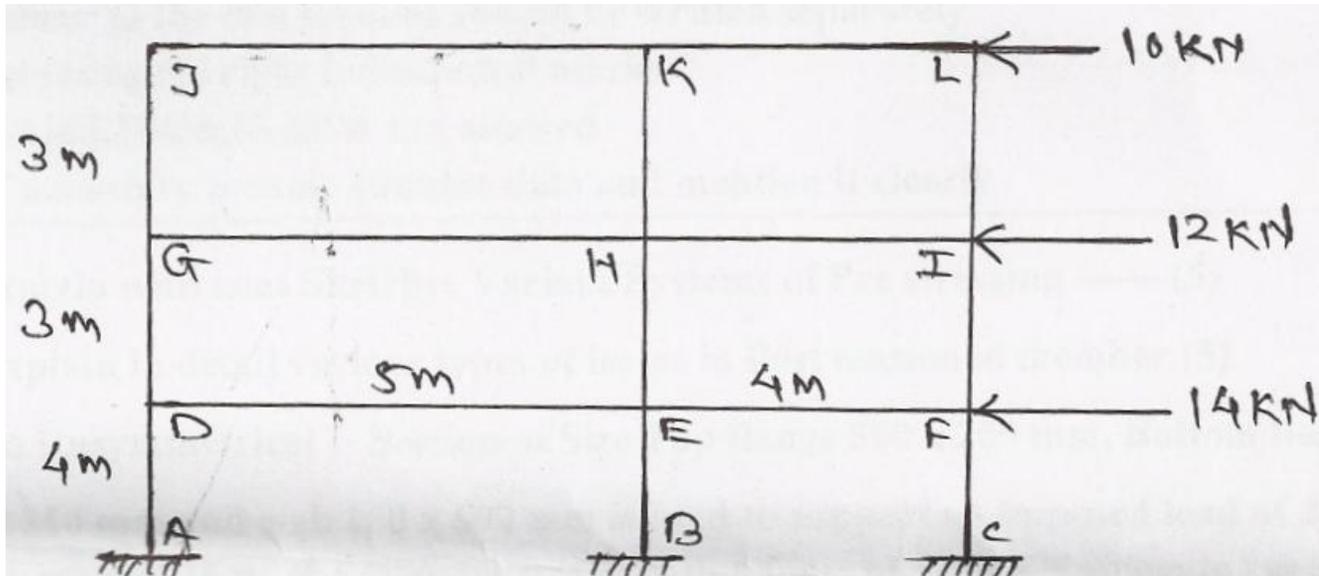


OR

Q6.

(a) Write detail note on substitute frame method. [8]

(b) Analyze the rigid jointed frame as shown in fig (3) by cantilever method for Lateral loads. Flexural rigidity for all members is same. Analyze beam GHI using Proper Substitute Frame, if it is subjected to vertical ultimate live & Dead load including its self weight of intensities 15 KN/m and 12 KN/m on Span GH and 20 KN/m and 15 KN/m on HI respectively. The horizontal forces are as shown in fig. Calculate maximum span moment for HI and support moment at H. design section for combined effect of vertical and horizontal loads. Adopt 15% redistribution of moments for vertical load moments. Use M20 and Fe 500 [17]



Q7. Design a T-shaped retaining wall for two layered leveled backfill for the following Data

Upper layer, Height=2.5m,  $\phi=30^\circ$ , density of material=16kN/m<sup>3</sup>.

Lower layer, Height=2.5m,  $\phi=32^\circ$ , density of material=18kN/m<sup>3</sup>.

Safe bearing capacity of underlying strata is 195 kN/m<sup>2</sup> the coeff. of friction between base and underlying strata is 0.45. Draw lateral pressure diagram and details of reinforcement in stem and base slab including curtailment if any.

Use M25 and Fe 500

[25]

OR

Q8. Design a slab and Beam type rectangular combined footing for two columns A and B carrying working load 650 kN and 80 kN respectively column A is 230 mm x 375 mm and column B is 230 mm x 40 mm. center to center distance between the columns is 3.0 m and the property line is at 0.9 m from the faces of column A. assume SBC of soil is 180 kN/m<sup>2</sup> Use M20 and Fe 500. Draw details of reinforcement in slab and central beam

[25]

**PUNE UNIVERSITY**  
**[4364]-413**  
**B. E. (Civil Engineering)**  
**Examination - 2013**  
**Advance Concrete Technology**  
**(2008 Course)(Elective II)**

[Total No. of Questions : 12]

[Total No. of Printed Pages :3]

[Time : 3 Hours]

[Max. Marks : 100]

**Instructions :**

- (1) Answer Q.1 or Q. 2,Q.3 or Q.4,Q.5 or Q.6 and Q.7 or Q.8,Q.9 or Q.10,Q.11 or Q.12
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Figures to the right indicate full marks.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Electronic pocket calculator is permitted.
- (6) Assume suitable data, if necessary.

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SECTION-I

- Q. 1. A) What are the different grades of ordinary Portland cement? Name few (5) brands available in the market.
- B) Explain coning and quartering method of obtaining laboratory sample (5) of aggregates.
- C) Enlist any five factors affecting workability of concrete. Explain how (8) shape and size of aggregates affect the workability.

OR

- Q. 2. A) What is grading of aggregate? How fineness modulus of aggregate is (8) determined? Explain the importance of grading in concrete mix design.

B) Define Admixture. What are the two basic types of admixtures? (5)

write the names of few chemical and mineral admixtures.

C) Enlist the various characteristic of coarse aggregates. Explain particle size and shape (5)

Q. 3. A) Write a detailed note on “Design of No Fines concrete mixes” (8)

B) Write in detail what do you mean by light weight concrete. What are its advantages? (8)

OR

Q. 4. Write notes on, (16)

1) Vacuum concrete. 2) Mass concrete 3) Underwater concreting

4) Gap graded concrete.

Q. 5. A) Write notes on, (10)

1) Acoustic emission method 2) Pulse echo method.

B) Differentiate between cracking, sapling and staining. (6)

OR

Q. 6. Write notes on, (16)

1) Core Test 2) Ground penetration method 3) pull off test

## SECTION-II

Q. 7. A) Explain fibre reinforced in respect of : (4+4+4+4+2=18)

i) Definition ii) Types of fibres iii) Merits of fibres iv) Demerits of fibres v) Mixing of fibres

OR

Q. 8. A) List the properties that are improved by addition of polymers to concrete? (6)

B) What are the key property improvements one can realize by the use of polymers in concrete? (6)

C) Write a note on application of polymer concrete. (6)

Q. 9. Write on notes :

1) Steel fibres (5)

2) Behaviour of SFRC in compression (5)

3) Current developments if FRC (6)

OR

Q. 10. A) Write notes on : (8)

i) Carbon fibres. ii) Polypropylene and nylon fibres

B) Explain stress strain property and compressive strength properties of FRC (8)

Q. 11. A) Define ferrocement? What are its applications? (8)

B) Enlist the casting techniques of ferrocement and explain any one (8)

OR

Q. 12. A) Explain skeletal armature method of ferrocement along with merits and demerits. (8)

B) Write a note on fibre reinforced polymeric meshes (FRP) along with merits and demerits. (8)

[Total No. of Questions: 12]

[Total No. of Printed Pages: 2]

UNIVERSITY OF PUNE

[4364]-416

B. E. (Civil) Examination - 2013

Advance Structural Design (2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 *Attempt Q.1 or Q.2, Q.3 or Q.4 from section I and Q.5 or Q.6, Q.7 or Q.8 from section II.*
- 2 *Answers to the two sections should be written in separate answer-books.*
- 3 *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 *Use of cell phone is prohibited in the examination hall*
- 7 *Assume suitable data, if necessary.*

**SECTION - I**

- Q.1    A    What are the disadvantages of cold form light gauge section?    10  
      B    Two channels of 180mm × 80mm section with bent lips are connected    15  
          with webs to act as beam. The thickness of section is 2.5 mm and the  
          depth of lip is 25 mm the beam has an effective span of 4.0 m. determine  
          the maximum uniformly distributed load including self-weight, which  
          may be supported by beam. The beam is laterally supported throughout  
          its length. Take  $f_y = 235 \text{ N/mm}^2$ .

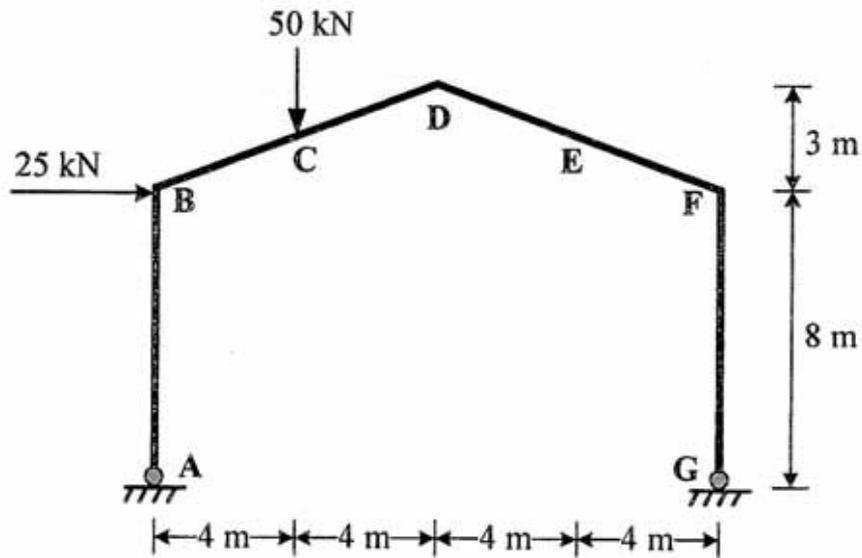
**OR**

- Q.2    A    State and explain design concept of castellated beams.    10  
      B    Explain design concept of moment resistance bases.    08  
      C    State the explain advantages of pre engineering building.    07

- Q. 3    Design an open web (castellated beam) for a span of 16 m. the dead    25  
          load coming on roof is 4 kN/m and live load is 4kN/m. Cut the selected  
          I-section at  $60^\circ$  and adjust section such that overall depth of section  
          should not exceed 700 mm. Assume  $f_y = 250 \text{ N/mm}^2$ .

**OR**

- Q. 4    Analyzed the gable portal frame shown in Figure and obtain the Plastic    25  
          moment. Plot the bending moment diagram.



Figure

**SECTION II**

Q. 5 Explain Rankine Grashoff theory for analysis of grid slab and design a grid slab using approximate method of analysis for following data: 25

Size of hall: 13.5 m × 9.0 m

Spacing of beams: 1.5 m along directions

Live load: 3.5 kN/m<sup>2</sup>

Materials: M<sub>25</sub> grade concrete and Fe<sub>415</sub> grade steel.

Draw the details of the reinforcement in beams and slab.

**OR**

Q. 6 Design only container of circular water tank for 6 × 10<sup>5</sup> liters capacity. 25

Draw the detail layout and reinforcement details at wall, top slab, bottom slab and beams supporting bottom slab.

Bottom of the tank is at 12 m above the ground level, EQ zone III, hard strata is available at 2 m below ground level, safe bearing capacity = 200 kN/m<sup>2</sup>, basic wind pressure = 1000 N/m<sup>2</sup> and material M<sub>25</sub>, Fe<sub>500</sub>.

Q. 7 Design staging and foundation for water tank of Q.6 assuming the size and load of the container. Draw the design sketches. 25

**OR**

Q. 8 A Design an exterior panel of size 5m × 5m of a flat slab with suitable drop to support a live load of 5 kN/m<sup>2</sup>. The floor system is supported by columns of size 450 mm. × 450 mm. Floor to floor distance is 4 m. Use M<sub>25</sub> grade of concrete and Fe<sub>415</sub> grade of steel. Draw the reinforcement details. 25

[Total No. of Questions: 12]

[Total No. of Printed Pages: 6]

UNIVERSITY OF PUNE

[4364]-423

B. E. (Civil) Examination - 2013

*Statistical Analysis and Computational Methods in Civil Engineering  
(2008 Course)*

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 Attempt 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 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**

- Q.1 A Describe how statistics can be used in civil engineering. 6  
B Find the mean, standard deviation and coefficient of kurtosis for the following data. 10

Class interval	59.5-62.5	62.5-65.5	65.5-68.5	68.5-71.5	71.5-74.5
No. of observations	5	18	42	27	8

**OR**

- Q.2 A What do you mean by sample and population? Enumerate various methods of sampling. 6  
B Determine the mean, standard deviation, Pearson's first and second 10

coefficient of skewness for the following data.

Class interval	1-1.5	1.5-2	2-2.2	2.2-2.5	2.5-3	3-3.5	3.5-4
No. of observations	4	2	5	3	1	3	3

Q. 3

The following table gives the annual maximum discharge of a river for 40 16 years (in hundred cumecs). Check whether the data following a normal distribution using chi-square goodness of fit test at 10% significance level.

Discharge	<4	4-5	5-6.2	6.2-7.4	7.4-8.5	8.5-9.6	9.6-10	>10
Observed frequency	3	2	12	12	4	5	1	1

Use the standard normal distribution table given below.

Z	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Area	0.0000	0.0398	0.0793	0.1179	0.1554	0.1915	0.2257	0.2580

Z	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Area	0.2881	0.3159	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332

Z	1.6	1.7	1.8	1.9	2.0	2.1	2.2
Area	0.4452	0.4554	0.4641	0.4713	0.4773	0.4821	0.4861

Z	2.3	2.4	2.5
Area	0.4893	0.4918	0.4938

Use the following chi-square distribution table.

$\vartheta \rightarrow$	3	4	5	6	7
$x^2 \propto \downarrow$					
$x^2 \propto = 0.10$	6.25	7.78	9.24	10.64	12.02
$x^2 \propto = 0.05$	7.81	9.49	11.07	12.59	14.07

**OR**

Q. 4

A The time for a super glue to set can be treated as a random variable having a normal distribution with mean 30 seconds. Find its standard deviation if the probability is 0.20 that it will take on a value greater than 39.2 seconds. Use the standard normal distribution table given in Q.3

- B A company operates four machines in three shifts each day. From production records, the following data on number breakdowns is collected. Test hypothesis that breakdowns are independent of the shift at the 5% significance level. 12

		machines			
		A	B	C	D
shifts	1	41	20	12	16
	2	31	11	9	14
	3	15	17	16	10

Use the chi-square distribution table given in Q.3.

- Q. 5 A The amount A of a substance remaining in a reacting system after an interval of time t in a certain chemical experiment is given in the following table. Find the value of A when t=11. 08

t	2	5	8	14
A	94.8	87.9	81.3	68.7

- B The temperature ' $\theta$ ' of a vessel and cooling time 't' in minutes since the beginning of observations are connected by the law of the form  $\theta = a.e^{bt}$ . Find the best value of a and b. 10

t	0	1	2	3	5
$\theta$	52.8	48.8	46	43.5	39.7

**OR**

- Q. 6 A Develop a regression equation of the form  $Q = a.G^b$  between the discharge Q in the river and the corresponding stage (G) using the data given below. 10

Q(m <sup>3</sup> /s)	1688	1419	1249	1028	640
G (m)	4.72	4.11	3.83	3.44	2.68

- B Define the coefficient of correlation between two random variables x and y, and explain its significance. If two random variables are uncorrelated, i. e. if the correlation coefficient is zero, are they necessarily independent? why or why not? 5
- C Explain Lagrange's interpolation formula 3

**SECTION II**

- Q. 7    A    Solve the following equation by Gauss elimination method.    6
- $$\begin{aligned}x - y + z &= 1 \\ -3x + 2y - 3z &= -6 \\ 2x - 5y + 4z &= 5\end{aligned}$$

- B    Solve the following system of equations using Gauss-seidel method.[4 iterations]    10

$$\begin{aligned}8x - y + z &= 18 \\ 2x + 5y - 2z &= 3 \\ X + y - 3z &= -6\end{aligned}$$

**OR**

- Q. 8    A    Solve the following equation by Gauss-Jordan method    6

$$\begin{aligned}x + y + z &= 6 \\ 3x + 3y + 4z &= 20 \\ 2x + y + 3z &= 13\end{aligned}$$

- B    Solve the following equation Gauss-seidel method.    10  
[4iterations]

$$\begin{aligned}8x + y + z &= 8 \\ 2x + 4y + z &= 4 \\ x + 3y + 3z &= 5\end{aligned}$$

- Q. 9    A    Use false position method to solve the following equation in the interval (3, 4) up to 3 iterations.  $f(x) = 2x - \log_{10}x - 7 = 0$     8

- B    Find the root of the following equation using Netwon-Raphson method.  $f(x) = 4x - e^x$     8

**OR**

- Q. 10    Write short note on (Any two)    16
- i.    Secant Method
  - ii.    Bisection Method
  - iii.    False Position Method
  - iv.    Newton-Raphson Method

- Q. 11    A    The distance covered by an object in 'm' from  $t = 12sec$  to  $t = 34sec$ . is given as    10

$$x = \int 200 \left[ \ln \left( \frac{1300}{1300-21t} \right) - t \right] dt . \text{ use simpson's } 1/3 \text{rd rule}$$

to find x

- B Using simpson's  $3/8^{th}$  rule, solve 8

$$I = \int_1^2 (x^3 + 1). dx$$

**OR**

- Q. 12 A Use Gauss Quadrature three point formula to evaluate 10

$$I = \int_0^1 \frac{1}{x} \cdot \sin \frac{1}{x} \cdot dx$$

- B Find area under the curve, passing through the following points using Trapezoidal rule (1,1), (2,4), (3,9), (4,16) 8

UNIVERSITY OF PUNE

[4364]-401

B. E. (Civil Engineering Semester I) Examination - 2013

ENVIRONMENTAL ENGINEERING-II

(2008 Pattern)

[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 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) 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, electronics pocket calculator is allowed.
- (6) Assume suitable data, if necessary.

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SECTION-I

Q1 a) Discuss the different systems of sewerage commonly used in India with their relative merits and demerits. 6

b) Write a short note on pumping of sewage. 4

c) Give the physical, chemical and biological characteristics of domestic sewage from urban area. 6

OR

Q2 a) Design a sewer for a population of 100,000 with a water supply of 140 lit/capita/day; 75% of that resulting in sewage. The sewer is laid at a slope of 1 in 625 and is designed to carry 3 times D. W. F. when running full. Find the diameter and the velocity of flow in the sewer. Assume  $N = 0.012$  in the maning formula.

8

- b) Explain the following terms: 8
- i) Self cleansing velocity.
  - ii) Variations in sewage flow.
  - iii) Hydraulically equivalent sections
  - iv) Effect of change of life on Sewage quality.

- Q3 a) Draw a figure showing different zones of stream pollution and discuss in detail about zone of active decomposition. 6
- b) Discuss the river classification in per MEF. 4
- c) Write Streeter-Phelps equation and explain the meaning each term involved in it. 6

OR

- Q4 a) Enlist velocity control devices in grit chamber. Explain any one of them in detailed with sketch. 8
- b) Design the screen chamber of an ETP to treat a peak flow of 40 MLD of sewage.

Assume inclination of bars  $45^\circ$  with horizontal, Size of bars: 10 mm x 60 mm; 10mm dimension facing the flow, clear spacing between bars as 50 mm and the velocity through the screen as 0.8 m/sec at peak flow. 8

- Q5 Explain the following modifications of the activated sludge process with necessary flow diagrams and clearly differentiate them from the conventional activate sludge process:- 18
- i) Tapered Aeration.
  - ii) Step Aeration.
  - iii) Extended Aeration.
  - iv) Modified Aeration.

OR

- Q6 a) Design a single stage high rate trickling filter for treatment of mixed waste water comprising domestic sewage and industrial waste water. 9

**Data:**

- i) Domestic sewage flow = 9MLD.
- ii) Industrial w/w flow = 1MLD.
- iii) Organic loading rate =  $0.8 \text{ Kg/ m}^3/\text{d}$  & Hydraulic loading rate  $15 \text{ m}^3/\text{m}^2/\text{d}$
- v) Recirculation ratio = 2

**Work out:**

- I) Volume of filter media.
- II) Dimensions of trickling filter.
- III) Efficiency & BOD<sub>5</sub> of treated effluent.

b) An activated sludge process is to yield an effluent BOD<sub>5</sub> of 20mg/l and suspended solids of 25 mg/l. The influent BOD<sub>5</sub> following primary classifications is 160mg/l. Work out the following. 9

- i) Volume of the tank,
- ii) Recirculation ratio,
- iii) Per day oxygen requirement.

Assumptions are

- i) Mean cell residence time,  $\theta_c = 10$  days,
- ii) Micro organism decay coeff,  $k_d = 0.05$ ,
- iii) The growth yield coeff,  $Y = 0.65$ ,
- iv) Waste flow is 10m<sup>3</sup>/minute.

**SECTION-II**

Q7 a) Write in details design parameters of aerated lagoons and mention the advantages and disadvantages of the same. 7

b) Design an oxidation pond to treat a domestic sewage flow of 3MLD at a place, the latitude of which is 24° N. The 5 day 20°C BOD of sewage is 250 mg/L, Photosynthetic oxygen yield is 225 kg/ha/day and  $k=0.23$  per day.

Assume necessary data if required. 9

OR

Q8 a) Write design steps required for oxidation pond. 6

b) Explain algal-bacterial symbiosis in oxidation pond. 4

c) Write about constructional details and design criteria of oxidation ditch. 6

Q9 a) Design a septic tank to treat sewage from a working women hostel of 25000 residents. Water supply rate 120 lpcd

Draw a neat sketch giving plan elevation of a septic tank designed above. Also design and draw a soak well for the above septic tank considering percolation capacity of the filter media say 1250 L/m<sup>3</sup>/day. Assume all other required data.

16

OR

Q10 a) Draw a neat sketch of conventional sludge digester and explain the following:- 16

- 1) Different stages of the digestion process.
- 2) Micro-organisms responsible for the process.
- 3) Design parameters of anaerobic digester.
- 4) Capacity of the digester.

Q 11 Write short note on [any three] 18

- a) Equalization and proportioning
- b) Neutralization.
- c) Sludge drying beds.
- d) Sludge thickener.
- e) Grab sample and composite sample

OR

Q12 Explain the source of wastewater generation its characteristics and treatment options for its wastewater with the help of suitable flow diagrams for any two of the following industries. 16

- i) Distillery Industry
- ii) Dairy Industry
- iii) Pulp and paper Industry
- iv) Textiles Industry

**UNIVERSITY OF PUNE**

**[4364-402]**

**B.E.(Civil) Examination 2013**

**Dams & Hydraulic Structs**

**(2008 pattern)**

**Time-Three hours**

**Maximum Marks-100**

**[Total No. of Question=12]**

**[Total no. of printed pages= 5]**

**Instructions:**

- (1) Answer any 3 question from each section.
- (2) Answer to the TWO sections should be written in separate answer books
- (3) Neat diagrams must be drawn whenever necessary.
- (4) Figures to the right indicate full marks.
- (5) Use of electronic pocket calculator is allowed.
- (6) Assume suitable data whenever necessary.

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**SECTION-I**

- Q.1 (a) Explain the role of dam in water resource development of a country.  
Classify dams based on different criteria giving example of each type and  
what are their advantages and disadvantages? (10)
- (b) Explain the suitability of construction of a particular type of dam  
under the following criterion. (6)
1. Topography
  2. Spillway size and location
  3. Availability of construction material.

**OR**

Q.2 (a) Enlist the various IS guidelines with reference to: (8)

(i) Dam safety

(ii) Dam design

(b) What are salient features of an arch dam and different types of arch dam?

Give three examples of arch dam? What is meant by best central angle of arch

dam and what is its value? (8)

Q.3 (a) A concrete gravity dam has the following features above RL of 100.00m

Top of dam = 200m RL

Water stands upto 195m RL

Width at top = 7 m

Upstream batter of 1H to 10V at 150m RL

Downstream batter of 0.7H to 1V at 190m RL

Drainage gallery at 10 m from u/s vertical face

Uplift coefficient at gallery = 0.6

Tail water depth = 5m

Specific weight of dam material  $24 \text{ kN/m}^3$

Determine the normal stress at each end of base of dam when reservoir is empty and full. (12)

(b) With a neat sketch of gravity dam, explain any three forces and their

effect on dam. (6)

OR

Q.4 (a) Give a brief outline of procedure for design of non-overflow section of a low gravity dam indicating clearly the forces considered for design. (10)

(b) Find the minimum base width of an elementary triangular profile of a gravity dam 25m high considering its self weight, water pressure and uplift pressure only. Assume specific gravity of material of dam 2.25 and

uplift factor 0.5. (8)

Q.5 (a) Discuss various causes of failure of an earth dam. (8)

(b) Explain Swedish slip circle method of slope stability analysis. (8)

OR

Q.6 (a) Determine the factor of safety of downstream slope of an earth dam of homogeneous section drawn to a scale of 1:500 with the following data. (8)

(i) Length of slip circle arc = 15 cm

(ii) Total area of N-rectangles =  $16.5 \text{ cm}^2$

(iii) Total area of T-rectangles =  $7 \text{ cm}^2$

(iv) Total area of U-rectangles =  $5 \text{ cm}^2$

(v) Angle of internal friction =  $26^\circ$

(vi) Cohesion =  $0.2 \text{ kg/cm}^2$

(vii) Specific weight of soil =  $1.8 \text{ kg/cm}^2$

(b) Explain the various design principles of an earth dam. (8)

## SECTION-II

Q.7 (a) With the help of sketches briefly one energy dissipater provided for each of the following cases.

(i) Jump Height Curve (JHC) lies above Tail Water Curve (TWC) at all discharges.

(ii) JHC lies below the TWC at all discharges. (6)

(b) Explain radial gate for spillway & its working with the help of sectional view. (6)

(c) Draw proportionate and neat labeled sketch of typical diversion

headwork showing its six important components. Write functions of any four components. (6)

OR

Q.8 (a) Draw proportionate and neat labeled sketches of the following energy dissipaters. (6)

(i) Roller bucket (ii) Ski-jump bucket

(b) Explain briefly Bligh's theory of seepage with sketch. State its four limitations. (6)

(c) Write brief notes on . (6)

(i) Safety and maintenance of spillway gates.

(ii) Differences between weirs and barrages.

Q.9 (a) What is meant by Cross-Drainage Work? Explain level crossing with the help of a sketch. (6)

(b) State merits and demerits of canal lining. (5)

(c) Discuss briefly various types of canal outlets. (5)

OR

Q.10 (a) Design a trapezoidal irrigation channel to carry a discharge of  $40 \text{ m}^3/\text{s}$  using Kennedy's theory. Assume ratio of base width (B) to depth (D) as 2.5, critical velocity ratio = 1, Kutter's rugosity coefficient 'n' = 0.023 and side slopes 1H:2V. (10)

(b) State various types of canal falls and explain any one type with the help of a sketch. (6)

Q.11 (a) Explain run-of-river of hydro-power with the help of a neat sketch. (4)

(b) Explain following components of a hydro-power plant with neat sketches.

(i) Forebay (ii) Surge tank (4)

(c) Draw a neat sketch & explain 'cut-off' as river training work. (4)

(d) Explain with neat sketches, uses of Groynes and their types. (4)

OR

Q.12 Explain the following with relevant sketches. (16)

(a) Alternate dikes: Necessity and advantages

(b) Guide bunds: Purpose and types.

(c) Groynes: Classification and uses

(d) Pumped -storage type of hydro-electric power plant.

UNIVERSITY OF PUNE

[4364]-406

B. E.(Civil Engineering Semester-I)Examination - 2013

AIR POLLUTION & CONTROL(ELECTIVE-I)

(2008 Pattern)

[Total No. of Questions:12]

[Total No. of Printed Pages :2]

[Time : 3 Hours]

[Max. Marks : 100]

**Instructions :**

- (1) Answer **any three** from each section.
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Your answers will be valued as a whole.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.
- (6) Assume suitable data, if necessary.

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**SECTION-I**

- Q1 a) Explain in brief the zones of atmosphere & Scales of meteorology. [10]  
b) State the concept of plume rise & write any two formulae for calculating plume –rise? [8]

**OR**

- Q2 Write in brief about: [18]  
a) Gaussian Model & its application  
b) Temperature Lapse rate
- Q3 a) Draw schematically a sampling train for stack sampling indicating the Equipment required. [9]  
b) Explain in detail with neat sketches about Isokinetic sampling. [7]

**OR**

- Q4 a) Explain briefly the ambient air sampling & stack sampling. [7]  
b) Discuss in detail about the methods used for the sampling of gases & particulates. [9]
- Q5 a) Explain briefly about the causes & sources of Indoor air pollution. [9]  
b) Disuss in details about control of Indoor air pollution. [7]

**OR**

- Q6 Write in brief about: [16]  
a) Methods of control of odour pollution      b) Air cleaning systems

**SECTION-II**

- Q7 Explain in brief about: [18]  
a) Control of air pollution by process modification  
b) Control of air pollution by change of raw materials  
c) Control of air pollution by fuel change

**OR**

- Q8 a) Explain how air pollution due to automobiles are controlled [9]  
b) Explain with sketches the mechanism of air pollution control by Electrostatic precipitator & cyclone equipment. [9]

- Q9 a) Explain the economics of air pollution control on the basis of cost/benefit ratio & Optimization. [8]  
b) Discussed the application of land use planning as a method of air pollution control. [8]

**OR**

- Q10 Explain in brief about: [16]  
a) Environmental Protection Act 1986.  
b) National Ambient Air Quality Standards

- Q11 a) What is the role of regulatory agencies & control boards in obtaining the Environmental Clearance for Project? [8]  
b) Explain the role of general public in environmental clearance for project? [8]

**OR**

- Q12 a) State the Environmental Impact of Thermal Power plants in India. [8]  
b) Discuss in details Environmental rules 1999 (sitting of Industries). [8]

**UNIVERSITY OF PUNE**  
**[4364]-407**  
**B. E. (Civil Elective) Examination- 2013**  
**ARCHITECTURE AND TOWN PLANNING**  
**(2008 Pattern)**

**[Time : 3 Hours]**

**[Max. Marks : 100]**

**Total No. of Questions : 12**

**[Total No. of Printed Pages :2]**

**Instructions :**

- (1) Assume suitable data, if necessary.
  - (2) Section I : Q1 or Q2, Q3 or Q4, Q5 or Q6  
Section II: Q7 or Q8, Q9 or Q10, Q11 or Q12
- 
- 

**SECTION I**

- Q1) A) How factor in architecture influence the design? [09]  
B) Explain the effectivity of water body conservation? [09]

**OR**

- Q2) A) Explain the importance of FILTERS in urban design. [09]  
B) Write a short note on garden styles: modern and historical. [09]
- Q3) A) Explain the importance of Built environment in urban areas. [08]  
B) Explain the effectivity of urban renewal stating the aspects. [08]

**OR**

- Q4) A) Explain the concept: enriching the spaces as per functional needs [08]  
B) Explain the effectivity of urban renewal for livability. [08]
- Q5) A) Explain the advantages and usage of sustainable materials. [08]  
B) Write a short note on Green build rating systems. [08]

**OR**

- Q6) A) Explain the advantages and usage of sustainable technologies. [08]  
B) Write a short note on any “Green build case study.” [08]

**SECTION II**

- Q7) A) Explain in detail : stages in town development. [09]  
B) Write short note on : town planning schemes, garden city. [09]

**OR**

- Q8) A) Explain the concept new towns ; giving suitable example. [09]  
B) Explain : ribbon, concentric development theories. [09]
- Q9) A) Explain the concept City development plan, its Scope & purpose. [08]  
B) Explain the planning agencies for various levels of planning. [08]

**OR**

- Q10) A) Explain the classification of traffic and elaborate importance of traffic management. [08]  
B) Write a short note on functioning of CIDCO. [08]
- Q11) A) Explain the UDPFI guidelines (for land use, infrastructure) [08]  
B) Write a short note on : application of GIS in relation with planning. [08]

**OR**

- Q12) A) Write a short note on : SEZ [08]  
B) Write a short note on : Application of GPS & Remote Sensing in planning. [08]

4364-409

B.E. (Civil)

Elective II

Matrix Methods of Structural Analysis

(2008 Pattern) (Sem. - I)

Time : 3 Hours]

[Max. Marks :100]

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Your answers will be valued as a whole.
- 5) Use of electronic pocketcalculator is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

Q1) Write a note on (Any two)

(16)

- a) Importance of Matrix Algebra in Matrix Methods of Structural analysis
- b) Gauss Jordan & Gauss Seidel iteration method
- c) Computer Algorithm & Programming aspects
- d) Gauss Elimination Method

OR

Q2) a) Write a note on “ill conditioned matrix”.

(6)

b) Solve the following equations by Gauss Elimination Method

(10)

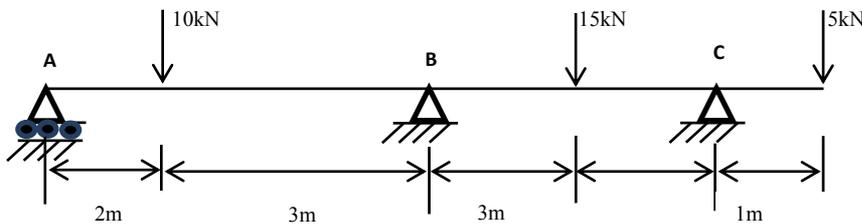
$$10X_1 - 4X_2 + 8X_3 = 10$$

$$-4X_1 + 2X_2 + 2X_3 = 2$$

$$8X_1 + 2X_2 = 12$$

Q3) Analyze the beam shown below by flexibility method (EI is constant)

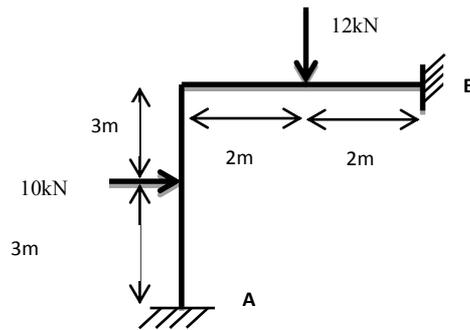
(18)



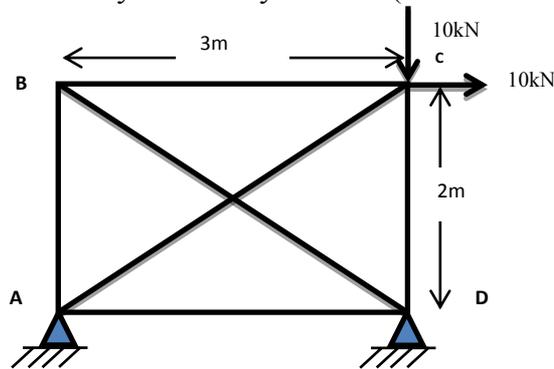
(PTO)

OR

Q.4 Analyze the portal frame using Flexibility Method (EI Constant) (18)



Q.5 Analyze the truss by Flexibility Method (EI Constant) (18)



OR

Q.6 Analyze the beam shown in Ex. 3 by Stiffness Method (EI is Constant) (18)

## SECTION II

Q.7 Write a note on (16)

- Force Method of structural analysis
- Displacement Method of structural analysis
- Determinacy and Indeterminacy
- Effective node numbering

OR

Q.8 a) Differentiate between structure approach and member approach used in stiffness matrix method. Explain how support conditions are accounted in both approaches. (8)

b) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure (8)

Q. 9 a) Show that stiffness matrix of a member of a structure in a structure co-ordinate system is obtained by transformation (9)

b) Explain properties and special characteristics of stiffness matrix of a structure (9)

OR

Q.10 a) State Maxwell's reciprocal theorem and indicate its effect in matrix analysis of structure (9)

b) State importance of band width in stiffness analysis by computer and measures to keep it minimum (9)

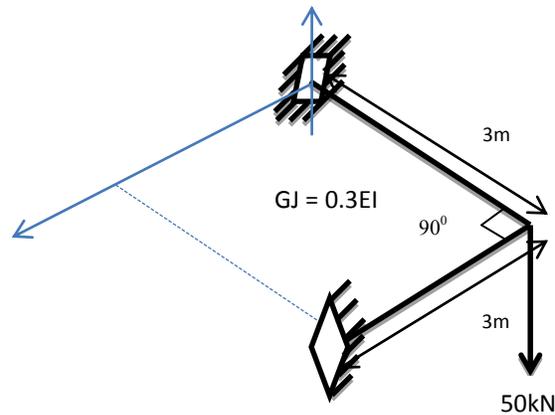
Q.11 A single bay two storied frame is to be analyzed by computer programme of Stiffness matrix method (18)

a) Prepare the flow chart for the programme and state input required for the same

b) How will you input support conditions of the structure

OR

Q.12 Analyze and draw BMD for grid structure as shown below by stiffness method (18)



**UNIVERSITY OF PUNE**  
**[4364]-410**  
**B. E. (Civil) Examination May 2013**  
**HYDROINFORMATICS (ELECTIVE II)**  
**(Course 2008)**

[Total No. of Questions:12]  
[Time : 3 Hours]

[Total No. Printed Pages:3 ]  
[Max. Marks : 100]

**Instructions :**

- i) Answer q. No. 1 or q. no2, Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6 from Section I*
- ii) Answer Q No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10. Q. No. 11 or Q No. 12 from section II.*
- iii) Answers to the two sections should be written in separate answer-books.*
- iv) Neat diagrams must be drawn wherever necessary.*
- v) Black figures to the right indicate full marks.*
- vi) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- vii) Assume suitable data, if necessary.*
- viii) Your answer will be valued as a whole*

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**SECTION –I**

- Q.1
- a) Define Hydro informatics. What is the necessity of Hydro informatics? [6]
  - b) What are components of hydro informatics systems? Explain in detail [6]
  - c) Discuss any currently available hydro informatics systems on internet [6]

**OR**

- Q.2
- a) What hydro informatics systems you would suggest for providing information about availability of water in open wells in a tahasil. [6]
  - b) A hydroinformatics system is to be designed to monitor the quality of water in the reservoirs of a tahasil. Explain in brief the components you would suggest [8]
  - c) Explain role of numerical modeling in hydroinformatics [4]
- Q.3
- a) What is multi-criteria decision support system in Hydraulic Engineering? [8]

What are the parameters to be considered for designing software for flood watch.

- b) Discuss design of multi – criteria decision support system for tsunami water levels giving details of information collection, analysis, predication, estimation, decision- dissemination of the information [8]

**OR**

- Q.4 a) What is a decision support system in water management? What are its components? What is the role of public sector in decision support system? [8]

- b) Discuss design of multi – criteria decision support system for rainfall forecasting giving details of information collection, analysis, predication, estimation, decision, dissemination of the information. [8]

- Q.5 a) Why simulations are necessary in Hydraulic Engineering? What are the types of simulations? Can simulations replace physical modeling? Explain with reasons. [6]

- b) Discuss design of simulation model for industrial water distribution system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [10]

**OR**

- Q.6 a) Discuss any commercial simulation model for 2-D flow modeling [6]

- b) Discuss design of simulation model for gate operation at a dam location giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [10]

**SECTION - II**

- Q.7 a) Discuss the working of artificial neuron. [4]

- b) What is Fed Forward information processing? Explain for a 3 layered neural network [6]

- c) Discuss cascade correlation and conjugate gradient algorithms [8]

**OR**

- Q.8 a) What are different training algorithms used for training an ANN? What is batch training and incremental training. [6]
- b) What are different stopping criteria while training the network [4]
- c) What is over fitting? Discuss how to use cross validation to avoid over fitting [8]
- Q.9 a) What is evolutionary computing? Explain 3 criteria for evolutionary process to occur. What are different types of evolutionary computing? [8]
- b) Discuss any case study for use of GA in hydraulic engineering. [8]

**OR**

- Q.10 a) What is a working principle behind the genetic algorithm. In your opinion which hydraulic engineering problems can be tackled using GA? Why? [8]
- b) What are the steps in implementation of Genetic Algorithm? [8]
- Q.11 a) What do you mean by network architecture? How it is decided? [8]
- b) What is training of a network? What is supervised and unsupervised training? How does training an ANN differs than calibration of a statistical Model? [8]

**OR**

- Q.12 a) Discuss a study about application of artificial Neural Networks in Water Resources Engineering giving details about problem definition, objective, [8]
- b) Write the steps in designing an ANN model [8]

**University of Pune**  
**B.E. (Civil)**  
**4364-411**  
**Examination - 2013**  
**TQM and MIS in Construction**  
**(2008 Pattern)**

**Total No. of Questions : 12**

**[Total No. of Printed Pages :2]**

**[Time : 3 Hours]**

**[Max. Marks : 100]**

***Instructions :***

- (1) Answer 03 question from each section.*
- (2) Answers to the two sections should be written in separate answer-books.*
- (3) Figures to the right indicate full marks.*
- (4) Use of Electronic packet calculator is allowed.*
- (5) Neat diagrams must be drawn whenever necessary.*
- (6) Assume suitable data, if necessary.*

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**Section I**

Q1. What is TQM? What are its benefits? What are the deterrents to its implementation? Explain in detail. [18]

OR

Q2. Explain the various reasons for poor quality of construction in India. As quality manager suggest remedial measures. [18]

OR

Q3. Discuss the contribution made by Juran, Crosby and Deming in the domain of quality. Also explain the role of quality circles in any construction organization. [16]

OR

Q4. Distinguish between, with examples:  
1. QA and QC, TQC and TQM. [8]

2. Conformities and NC's. [4]  
3. Internal and external customers. [4]

Q5. Classify the construction defects and give examples of each type Also explain how the defects are to be measured for determining the cost of poor quality. Explain concept of hidden costs. [16]

OR

Q6 Discuss in the context of inventory management, the supply chain management in detail. What are advantage and limitations of the SCM? Explain. [16]

Section II

Q7. What are MIS? What are its advantages? What are the pre-requisites necessary to develop an MIS? Explain in detail. [18]

OR

Q8. Draw flow diagram for an MIS of any construction organization who is contracting in the global construction market in the domain of Road infrastructure. Explain the various components of this MIS. [18]

Q9. Detail out the 5 modules in the project rework Reduction Tool Software. Enlist the contents of each module. Discuss advantages of this software. [16]

OR

Q10. What is strategic planning? What is its need? Explain how a comprehensive MIS would help a client's organization in the real estate sector to expand its business in a very competitive global scenario? [16]

Q11. What is ERP? What are its various modules? What are its advantages and limitations? Explain in detail. [16]

OR

Q12. Explain how the MOS and PI keeps a detailed MIS of various categories of construction projects in India. In what manner the reporting is done? What are the advantages? Explain. [16]

**UNIVERSITY OF PUNE**  
**[4364]-412**  
**B. E. (Civil) Examination – 2013**  
**Elective II- EARTHQUAKE**  
**ENGINEERING**  
**(2008 Pattern)**

[Time : 3 Hours]

[Max. Marks : 100]

Total No. of Questions : 12

[Total No. of Printed Pages :4]

**Instructions :**

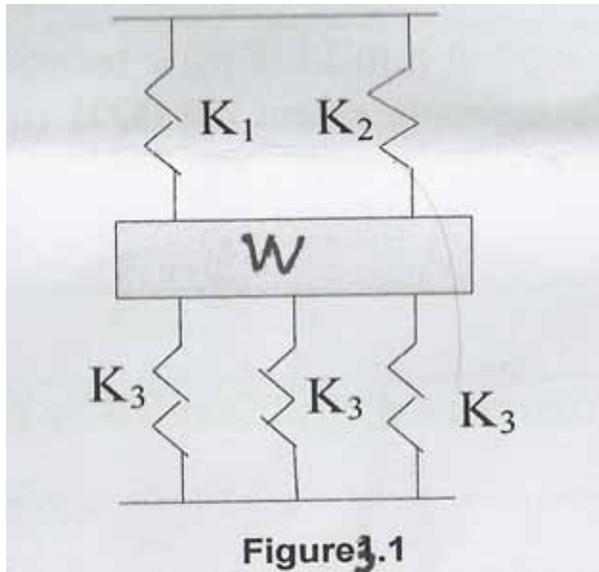
- (1) Attempt Section I : Q1 or Q2, Q3 or Q4, Q5 or Q6 and Section II: Q7 or Q8, Q9 or Q10, Q11 or Q12
  - (2) Answers to the **two sections** should be written in **separate answer-books**.
  - (3) Black figures to the right indicate full marks.
  - (4) IS 456, IS 1893 , IS 13920 are allowed in the examination.
  - (5) Neat diagrams must be drawn wherever necessary.
  - (6) If necessary, assume suitable data and indicate clearly.
  - (7) Use of electronic pocket calculator is allowed.
- 

**SECTION I**

- Q1) a) What are the causes of earthquakes? Explain with neat sketches the Elastic Rebound Theory? [10]
- b) What is meant by the focus and epicenter of an earthquake? [6]

**OR**

- Q2) a) Classify and describe with suitable sketches different types of waves generated by an earthquake and their effects on structure? [6]
- b) What is an earthquake? Classify earthquakes based on different parameters? [10]
- Q3) a) What is logarithmic decrement? Prove that logarithmic decrement  $\delta = 2\pi \xi$  for very small values of ' $\xi$ '. [10]
- b) Determine the weight of the system shown in Fig. 3.1 whose cyclic linear frequency is 4.21 Hz. Assume  $K_1 = K_2 = 2000$  N/m,  $K_3 = 1000$  N/m. [6]

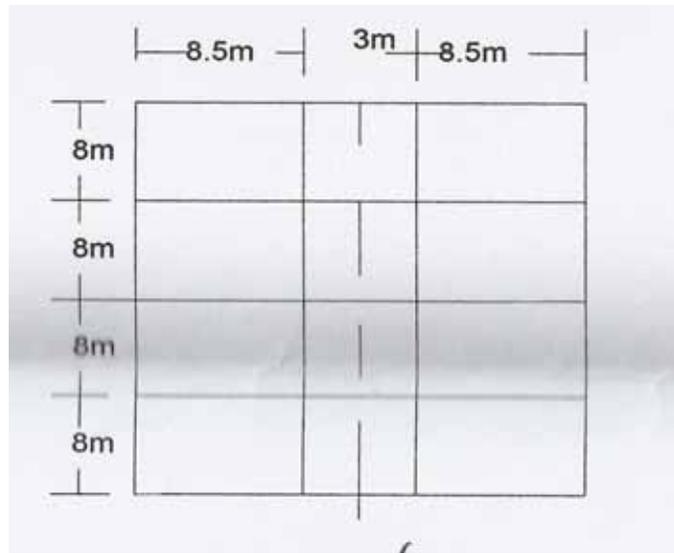


**OR**

- Q4) a) Determine natural frequency and natural period of system consisting of a mass of 100 kg attached to free end of a horizontal cantilever beam through a linear spring of constant 10 kg/cm. the cantilever beam has thickness of 0.80 cm and width 1.2 cm. take  $E = 2.1 \times 10^6 \text{ kg/cm}^2$  and length of 70 cm. [10]
- b) Compare between Static and dynamic Loading? Explain in brief the types of vibrations? [6]
- Q5) a) What are shear walls? Explain with neat sketches. [10]
- b) Explain the various structural arrangement by which the lateral loads on a structure can be resisted. [8]

**OR**

- Q6) a) A plan of five storey SMRF building for T.V. Centre is as shown in figure 6.1. [18]
- The Dead Load including self weight of slab etc. is  $5 \text{ kN/m}^2$ . And Live Load  $4 \text{ kN/m}^2$  on each floor and  $1.5 \text{ kN/m}^2$  on the roof. The building is situated in Zone IV. Assuming soil type II and storey height 3.5 m, determine lateral forces and shears at different storey levels.



### SECTION II

Q7) Describe the procedure to carry out dynamic analysis to obtain the designed seismic force and its distribution along the height of multistory building. [18]

**OR**

Q8) a) What are lap splices? Explain with neat sketches for a beam and a column. [9]

b) Describe the phenomenon of Liquefaction? Explain the measures taken to reduce the effect of liquefaction. [9]

Q9) A 250mm x 450 mm column is reinforced with 8-12 mm  $\phi$  bars. It is supported on an isolated footing subjected to a dead of 1000 kN and a moment of 35 kn-m. The SBC of soil is 220 kN/m<sup>2</sup>. Using M20 Grade of concrete and Fe415 Steel, design the footing. [16]

**OR**

Q10) a) How would you carry the assessment of RC building to ascertain the Requirements and level of retrofitting? [16]

Q11) Write notes on: [16]

i) Ductile Detailing of Slabs

ii) Learning from past earthquakes in India.

iii) Failure Mechanism of In filled Frames

iv) Seismic Dampers

**OR**

Q12) a) What is retrofitting and rehabilitation of structures? [8]

b) Explain the various techniques of retrofitting. [8]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 7]

**UNIVERSITY OF PUNE**

**[4364]-414**

**B. E. (Civil) Examination - 2013**

**QUANTITY SURVEYING CONTRACTS & TENDERS**

**(41009) (2008 Course)**

**[Time: 4 Hours]**

**[Max. Marks: 100]**

**Instructions:**

- 1 Answers to the two sections should be written in separate answer-books.*
  - 2 Black figures to the right indicate full marks.*
  - 3 Your answer will be valued as a whole*
  - 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.*
  - 7 Answer any three questions from Section I and any three questions from Section II*
- 
- 

**SECTION -I**

- Q.1      A) What is and estimate? State the purposes of preparing a detailed estimate? [4]
- B) State the unit of measurement and rule for deductions to be made for openings in cases of following items [6]
- i)      Plastering to the wall surface (Internal and

- external)
- ii) Brick masonry in superstructure for main walls and partition walls
- C) Prepare an approximate estimate for a school building. Use [6]  
following data.
- i) No. of students in the school = 400
- ii) Floor area for class rooms =  $1\text{m}^2$  / student
- iii) Area for administration building = 20% of classroom area class including staffroom, office Head
- iv) Area for sanitary block for girls, = 20% of class room area boys, ladies and gents staff.
- v) Area occupied by walls, Passage etc = 25% total floor area.
- vi) Plinth area rate of construction = Rs 1000 / $\text{m}^2$
- vii) Contingencies and work charg establishment = 5% of construction
- viii) Water supply, drainage and electrification =16% of total cost.

OR

- Q.2 A) State different types of estimate and hence differentiate [6]  
between revised estimate and suplimentary estimate
- B) What is a construction item? Write brief description as [4]  
required in the measurement and billing of any item.
- C) State different methods of preparing approximate estimate. [6]  
Explain any one method and elaborate various factors to be considered during preparation of approximate estimate.
- Q. 3 A) Figure 1 shows plant of a residential building. Determine [6]  
quantities of following items
- i) Excavation for foundation for tooting [3]
- ii) R.C.C. in tooting [3]
- iii) R.C.C. in columns [3]
- iv) R.C.C. in Slab [3]

V) R.C.C. in beam [3]

Vi) Steel reinforcement, its percentage of steel for various element is [3]

Column : 2% , Beam and lintel : 1.2 %

Slab : 1% , footing : 0.8%

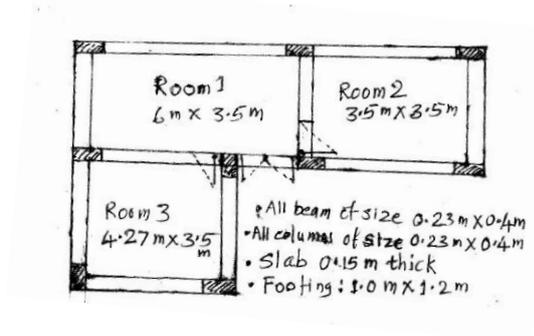


Figure 1(a)

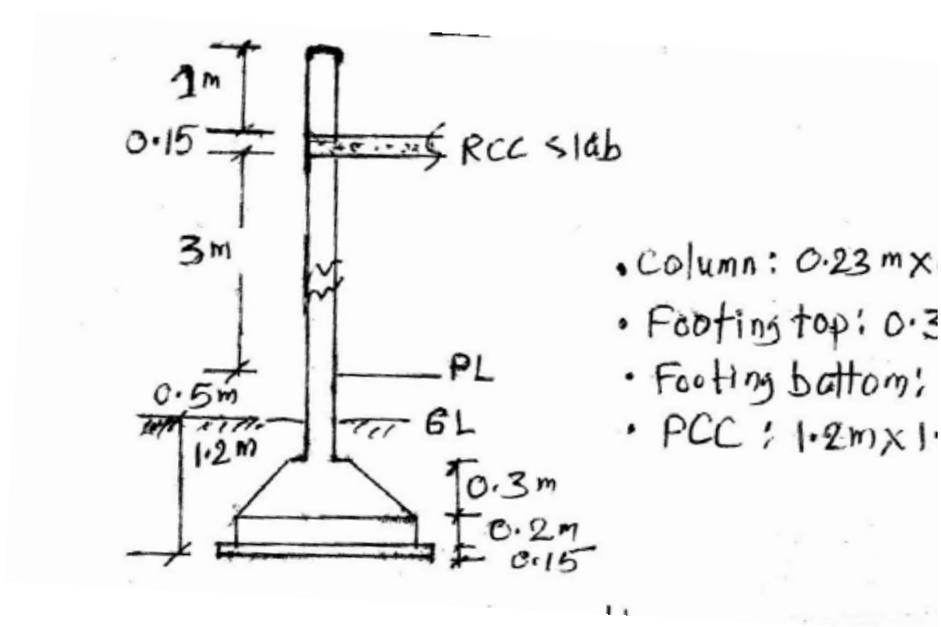


Figure 1(b)

OR

Q. 4 A) Figure 2 shows section of a circular R.C.C. storage reservoir. Determine the quantities of following items.

i) Excavation for foundation in hard murrum [2]

ii) P.C.C. M15 in plinth and foundation. [3]

- iii) U.C.R. Masonry in C.M. (1:6) in plinth and foundation. [3]
- iv) R.C.C. M20 in base slab and roof slab. [3]
- v) R.C.C. M20 in container wall of the tank [3]
- vi) Steel reinforcement in Kg if the percentage of steel in all R.C.C member is 1.5% [4]
- Q. 5 A) Determine the rate per unit for the item of U.C.R. masonry in C.M.C(1:6) in superstructure. use following rates for materials and labour, also assume any other data if necessary stating it clearly [6]
- Rubble : Rs 500/m<sup>3</sup>, Sand : Rs 1500/ m<sup>3</sup>,  
Cement : Rs 270 / bat, Mazdoor : Rs 300/day, mason : Rs 600/ day and head mason: Rs 800/ day.
- B) A residential building is constructed in brick masonry in C.M.(1:6). The details of the masonry are as below. [6]
- Main wall (one brick thick) : L = 62m, h = 3m b= 0.2m for one brick thick wall.
- i) Determine the basic materials like bricks, sand and cement to required complete the work.
- ii) If 5 masons and 12 mazdoors are employed for the work, determine the time in days required to complete the work
- C) Draft a detailed specification for providing and laying P.C.C. (1:2:4) in plinth and foundation bed with reference to following points. [4]
- i) Materials quality proportions etc  
ii) Method of execution and workmanship  
iii) Method of measurement and payment.

OR

- Q. 6 A) Determine the rate per Cu. m for providing and laying Brick Masonry in C.M. (1:6) Assume following rates for materials and labour and assume other details if required. [6]
- Materials : Bricks : Rs. 4000 / 1000 Nos., Cement : Rs 280/

bag Sand : Rs. 1200/m<sup>3</sup>.

Labour

Head mason : Rs 800 /day, Mason: Rs 600/ day and  
Mazdoor: Rs 300 / day.

- B) U.C.R masonry in C.M. (1:6) for a retaining wall is 412 m<sup>3</sup>. Determine the basic materials required for the construction of retaining wall. Also if 6 masons and 12 mazdoors are employed for this work, find the time in days required to complete the work. [6]
- C) Draft a detailed specification for providing internal plaster in C.M (1:3) with reference to following points [4]
- i) Materials , quality ect
  - ii) Method of execution, work manship and
  - iii) Method of measurement and payment

## SECTION II

- Q. 7 A) A construction equipment is purchased for Rs 160,000/- Knowing that the salvage value is Rs 20,000/- at the end of 5 years calculate book value of the equipment at the end of each year using constant percentages method of depreciation. [8]
- B) Explain in brief the following terms. [6]
- i) Sinking Fund
  - ii) Depreciation and
  - iii) Leasehold property
- C) Discuss any four purposes of valuation of a property [4]

OR

- Q. 8 A) A plot of land has the shape as shown in figure 3. Determine the value of the plot using belting method. The depth of the front belt is 24 m and its rate is Rs 400 per square meter. Assume number of belts, sizes of belts and their rates as per usual standard practice. [10]
- B) What do you understand by the term 'outgoing'? discuss the [4]

significance of outgoings in valuation

- C) What is meant by value of a property? Briefly explain any three types of values of a property. [4]

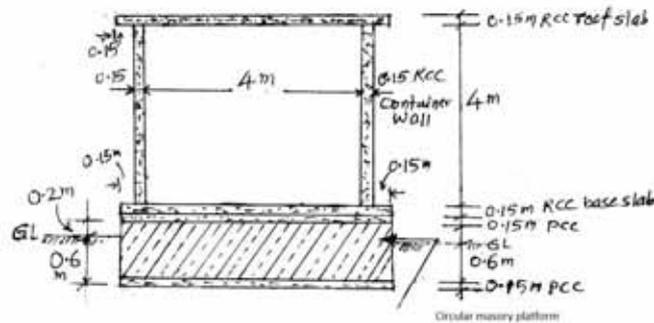


Figure 2(a)

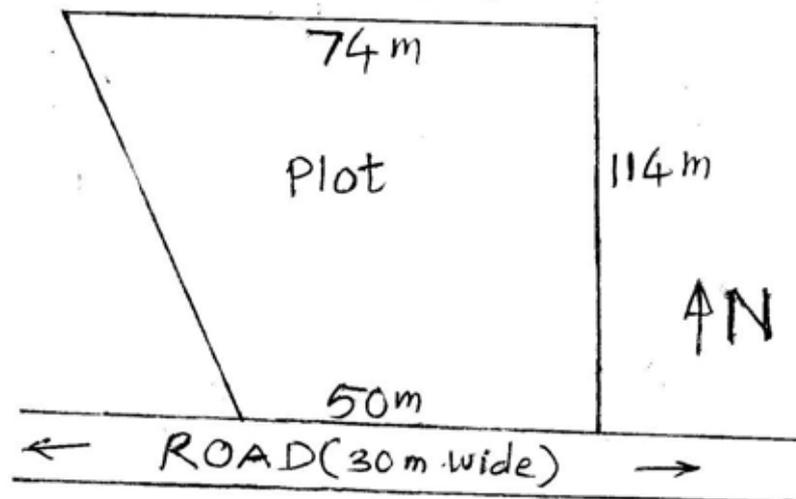


Figure 2(b)

- Q. 9 A) enlist various methods of execution of minor works in PWD. Explain any one method giving its merits and demerits. [6]
- B) A 6+1 residential bungalow of estimated cost Rs 60 lakhs is to be constructed in a plot lying on Mumbai-Pune expressway near to Monawala. draft a tender notice for inviting tenders under '2-bid' system for execution of the work. [6]
- C) Briefly discuss different forms of BOT tenders. [4]

OR

- Q. 10 A) What is administrative approval? Explain its significance in PWD method of execution of works [6]
- B) Write note on [6]
- i) pre-bid conference
  - ii) method of inviting tenders
- C) Explain the term 'Scruting of Tenders' [4]
- Q.11 A) Define 'arbitration' and hence explain various matters which can be referred to an arbitrator [4]
- B) state different types of contract and explain any one in detail [6]
- C) Discuss the responsibilities of an owner and a contractor with reference to the contract signed between them while execution of the work. [6]

OR

- Q. 12 A) State with reasons whether following sentences indicate the instances of legal valid contract or not [6]
- i) A contractor agrees orally to construct an additional floor on an existing ground floor of a bungalow. During discussion the owner and contractor agree to proceed with the work urgently.
  - ii) A contract signed by an owner undergoing treatment for severe headache.
  - iii) Contract signed for sharing of smuggled goods,
- B) State four advantages of arbitration Discuss the matters which can not be referred to an arbitrator' as per Arbitration Act 1940 [6]
- C) Write a note on conditions of valid contract [4]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 4]

**UNIVERSITY OF PUNE**  
**[4364]-415**  
**B. E. (Civil) Examination – 2013**  
**TRANSPORTATION ENGINEERING II**  
**(2008 Course)**

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 *Answer 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 *Black figures to the right indicate full marks.*
- 4 *Your answer will be valued as a whole*
- 5 *Neat diagrams must be drawn wherever necessary.*
- 6 *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7 *Assume suitable data, if necessary.*

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**SECTION – I**

- |           |   |  |     |
|-----------|---|--|-----|
| Q.1       | A | State the comparison between First road development plan and Second Road development plan.   | [6] |
|           | B | Explain in brief the Role of Transportation in social, economical and political development of any country   | [6] |
|           | C | Write a short note on Traffic signs.   | [4] |
| <b>OR</b> |   |  |     |
| Q.2       | A | Why Jaykar committee was formed? Also state the various recommendations of jaykar committee.   | [6] |
|           | B | Explain in brief the system of classification of roads, as per Nagpur road plan.   | [6] |
|           | C | Write a short note on spot speed studies.  | [4] |
| Q.3       | A | Define the following Terms:<br>1) Carriageway width 2) Formation width<br>3) Design speed 4) Gradient 5) Camber<br>6) Centrifugal Radio Or Impact factor | [6] |

- B Calculate the Absolute Minimum sight Distance for a level road, at the design speed of 80 kmph. [6]  
Assume suitable data as per IRC recommendations.
- C State the various objects of providing extra widening on Horizontal curves. [4]
- OR**
- Q. 4 A Discuss in brief the various factors controlling Highway Alignment with suitable sketches. [6]
- B What is Horizontal Transition curve? Why it is necessary? [4]
- C Define the following Terms: [6]  
1) Camber 2) Superelevation 3) Grade compensation  
4) Alignment 5) Right of way 6) Head light sight Distance
- Q. 5 A A Two lane two way road is at present carrying a traffic of 1000 CVD. It is to be strengthened for growing traffic needs. The VDF has been found to be 3.0 The rate of growth of traffic is 10% per annum. The period of construction is 5 years. The pavement is to be designed for 15 years after completion. Calculate the cumulative standard axles to be used in design. [6]
- B State comparison between Rigid pavement and Flexible pavement [6]
- C Why joints are necessary in concrete pavements. State the various types of joints. Explain any one in brief. [6]
- OR**
- Q. 6 A Explain in brief the following Terms: [6]  
1) GSB 2) Prime coat 3) Tack coat  
4) WMM 5) Cutback bitumen 6) Tar
- B Explain in brief the procedure of carrying out an Impact Test on Road Aggregate in labrotory. [6]
- C Explain in brief the CBR test and its importance in design of Flexible pavement. [6]
- SECTION II**
- Q. 7 A Describe the movement of aircraft in three principal axes with the help of a neat sketch. [6]
- B Define Runway. State various basic patterns of configurations of the runway with neat sketches. [4]
- C What is meant by basic runway length? Discuss the corrections that are to be applied for determining basic runway length. [6]

**OR**

- Q. 8    A    State the advantages and Limitations of air transportation. [6]
- B    Define the following terms: [6]  
              1) Cross wind component 2) Calm period  
              3) Ground speed 4) Air speed
- C    Draw a neat labeled sketch of an aeroplane to show various component parts. [4]

- Q. 9    A    Explain in brief the following: [8]  
              1 Afflux 2) Scour Depth
- B    The following are the costs of one pier and one superstructure of a multiple span bridge for various span lengths. The cost of superstructure span excludes the cost of railing and flooring system. Calculate the economic span: [8]

Span (m)	04	08	12	15
Cost of superstructure in (Rs)	1700	7000	16000	24000
Cost of one pier (Rs)	22200	23200	23000	23600

**OR**

- Q. 10    A    The catchment area of a stream is of sandy soil with thick vegetation cover and the area of the catchment is 8000 hectares. The length of the catchment is 20km and the fall in level from the critical point to the bridge site is 160 meters. Calculate the peak runoff for designing the bridge if the severest storm recorded yields 16 cm of rain in 4 hours. [Assume a coefficient of account for losses due to absorption =0.1 and coefficient to account for distribution of rainfall in space =0.76] [8]
- B    A bridge is proposed to be constructed across an alluvial stream carrying a discharge of 300 m<sup>3</sup>/sec Assuming the value of silt factor =1.1, determine the maximum scour depth when the bridge consists of [8]  
              1) Two spans of 35 m each  
              2) Three spans of 30 m each
- Q. 11    A    State precisely the purpose of providing bearings in bridges. Name the various types of bearings [6]
- B    Explain with a neat sketch the following: [6]  
              1) Traverser bridge 2) Cable stayed bridge

C How will you account for the following in the design of a highway bridge: [6]  
1) Wind Load 2) Impact effect 3) Forces due to water current

**OR**

Q. 12 A Define Abutment Give detail classification of abutment which additional force is required to consider for design, compare to bridge pier and why? [6]

B Explain with neat sketch the following: [6]  
1) Box culvert 2) Pipe Culvert

C Explain in brief any one method of erection of bridge superstructure. [6]

[Total No. of Questions:12]

[Total No. of Printed Pages: 3]

**UNIVERSITY OF PUNE**

[4364]-417

**B. E. (Civil) Examination - 2013**

*(Advanced Foundation Engg.)(Elective-III)(401007)( 2008 Course)*

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 Answer **any three** from each section.
- 2 Assume suitable data, if necessary.
- 3 Answers to the **two sections** should be written in **separate answer-books**.
- 4 Draw neat diagrams wherever necessary.
- 5 Use of logarithmic tables, electronic pocket calculator & IRC & IS codes are not allowed.
- 6 Your answers will be valued as a whole.

**SECTION -I**

- Q.1 A Explain the following; 8
- i. Significant Depth
  - ii. IS code provisions for subsail exploration.
- B Discuss IRC provisions for number of borings & 9  
different guidelines, for depth of exploration.
- OR**
- Q.2 A Discuss in brief different case studies for failure of 9  
foundation.
- B Explain i) Seismic Refraction Method 8  
ii) Electrical Resistivity Method
- Q. 3 A Explain the following with comparison, for Raft 8  
Foundation,
- i) Conventional method.
  - ii) Soil line method
- B A square footing of 1.5m size, rests at a depth of 1.2m in 9  
4.2m deep, saturated clay. The clay is NC with  $q_u=50\text{kpa}$ ,  $LL=40\%$ ,  $\gamma_{\text{sat}}=20\text{kN/m}^3$ ,  $w=30\%$  &  $G=2.7$ . Determine the safe load, which the footing can carry with a  $FOS=3$ , against shear. Also determine the settlement. Use  $N_e=5.7$ ,  $N_q=1$  &  $N_r=0$

**OR**

- Q. 4 A Discuss the steps for ‘Hansen’s Method’ for shallow foundation design, subjected to inclined loads. 9  
 B Discuss the utility of various softwares, for Geotechnical design, w.r. t. ‘Geo-slope’. 8
- Q. 5 A How the  $Q_a$  is determined, for the pile, under test, in a cyclic pile load test? Explain by drawing a sample graph. 6  
 B A square concrete pile, 32cm in size & 5.5m long, subjected to a horizontal load of 5kN & moment of 4k-m at GL. Taking  $E=3.1 \times 10^6 \text{ N/cm}^2$  &  $\eta_h=22 \text{ N/cm}^3$ . Determine the following 10  
 i. Total Deflection  
 ii. Total Slope  
 iii. Total Moment  
 iv. Total Shear  
 v. Total Soil Reaction  
 Assume, pile load free & use following coefficients,
- |       |        |       |       |       |
|-------|--------|-------|-------|-------|
| $A_y$ | $A_r$  | $A_m$ | $A_v$ | $A_p$ |
| 2.435 | -1.623 | 0.000 | 1.000 | 0.000 |
| $B_y$ | $B_r$  | $B_m$ | $B_v$ | $B_p$ |
| 1.623 | -1.750 | 1.000 | 0.000 | 0.000 |

**OR**

- Q. 6 A Explain the steps for ‘Reese & Matlock’ method. 8  
 B What is ‘LLP’? How  $E_s$ ,  $T$  &  $\eta_z$  is determined for a LLP. 8

**SECTION II**

- Q. 7 A A clay layer 5m thick, is consolidated with the help of sand chain of dia. 30cm & spaced at 2.7m c/c. Determine the influence of well on av. degree of consolidation in clay without sand chain & would be 20%. For following two cases, 9  
 i.  $K_r=K_z$   
 ii.  $K_r=5k_z$   
 Assume square pattern for sand chains. For  $V_z=20\%$ ,  $T_v=0.031$ ,  $V_r=0.34$ ,  $T_r=0.081$ , for  $T_r=0.407$ ,  $V_r=0.87$ .  
 B Explain the methods for determination of LCC, of Under reamed pile, for following cases, 8  
 i. Clayey soil  
 ii. Sandy soil

**OR**

- Q. 8 A A circular pile of 40cm dia. & 18m long is driven into a clay with  $q_u=70\text{kpa}$   $\phi_u = 0$ .  $V_{sat} = 22 \text{ kN/m}^3$ . GWT 9

- is at ground surface. If the pile has an enlarge base  $\phi=1.25$  M & Submerged net= 40kN, determine the ultimate uplift capacity of the pile.
- Q. 9 B Explain the design steps for construction of sand chains. 8  
 A Explain the design provisions for, 8  
 i. well curb  
 ii. cutting edge  
 iii. steining thickness  
 iv. bottom plug.
- B Discuss the method for scour level, according to IRC & 9  
 explain the Lacey's design for,  
 i. Grip length  
 ii. Normal scour depth
- OR**
- Q. 10 A Discuss the provisions made as per IRC for Caisson 8  
 design.
- B Explain 'Banerjee' & 'Gangopadhyay' Analysis 9
- Q. 11 A Design a circular, cellular cofferdam of 16m high resting 8  
 on rock. The FB=1m & ground is 4m above the base on  
 either sides. The allowable Int. tension is 1600 kN/m,  
 $\phi=30^\circ$ ,  $\delta=250$ ,  $k=0.60$  &  $f=0.60$   $\gamma_w =10$  kN/m<sup>3</sup>. Give  
 all stability checks.
- B Explain the steps for 'Anchor sheet pile design' 8
- OR**
- Q. 12 A Discuss construction of common types of 'cofferdams' 8  
 B Compute the embedded depth & pull in anchor nod, for 8  
 a sheet pile cofferdam of 6.5 m high, retaining soil as a  
 backfill & below D.L is same with following properties.  
 $\phi = \phi' = 30^\circ$ ,  $\gamma_{sat}=22$  kN/m<sup>3</sup>,  $\gamma =19$ kN/m<sup>3</sup>. Anchor  
 rod is 1.5m below the top. GWT=3m above D.L. Use  
 'Free earth support' method.

[Total No. of Questions: 6]

[Total No. of Printed Pages: 3]

**UNIVERSITY OF PUNE**

[4364]-418

**B. E. (Civil Engg) Examination - 2013**

*Advanced Engineering Geology with Rock Mech. (2008 Course)*

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 *All questions are compulsory.*
- 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.*

**SECTION -I**

- Q.1 A Explain width and off shoots of a dyke. 04  
B Region I and II in DTB area. 06  
C Significance of Kaladgis, Vindhyan rocks of Maharashtra state with examples. 08

**OR**

- Q.1 A Varieties of Basalts. 04  
B Field characters of Deccan trap basalts. 06  
C Significance of Archaean & Dharwarian rocks of Maharashtra state with examples. 08

- Q. 2 A Discuss in detail the relationship between local geology and location of spillway in Deccan trap area. 08  
B Treatment to be given to a fractures & dykes crossing dam alignment. 08

**OR**

- Q. 2 A How economy has been achieved by interpreting correctly the local geological conditions in Deccan trap area? Explain with examples. 08  
B Origin of tachylytic basalts. 08

- Q. 3 A Write note on:  
a. Chances of getting ground water along flow contacts. 04  
b. Water bearing characters of Amygdaloidal basalts. 04  
c. Residual soils of Maharashtra state. 04  
d. Granular disintegration. 04

**OR**

- Q. 3 A Water bearing characters of dykes. 04  
B Influence of climate on soil formation. 04

C Artificial recharge of ground water. 08

**SECTION II**

- Q. 4 A Explain Rock structural Rating (RSR) system of classification of rock masses in detail. 08  
 B Electrical Resistivity method. 04  
 C Compressive strengths of rock masses. 06

**OR**

- Q. 4 A Define Rock Mechanics. Describe RMR system of classification of rock masses. 08  
 B Answer the questions on the basis of core log given below from basaltic terrain & Calculate. 10  
 a. Core Recovery  
 b. RQD of each run  
 c. On the basis of core obtained which rocks are likely to be occurring at different levels & discuss its feasibility from dam foundation.

Run in m	Piece No.	Length in cm.	Nature of feacture
0-3 m	1	10	J
	2	11	J
	3	8	M
	4	7	M
	5	10	M
	6	13	J
	7	90	J
	8	52	J
	9	99	J
3-6	10	90	M
	11	80	M
	12	120	M
	13	10	M

- Q. 5 A Discuss engineering significance of feactures from tunneling point of view with case histories. 08  
 B What should be the minimum depth of drilling for bridge foundations investigations. 04  
 C Stand up time of a rock mass during tunneling. 04

**OR**

- Q. 5 A Tunneling through Amygdaloidal basalts with suitable examples. 08  
 B Explain importance of subsurface investigations for foundation of a bridge. 04  
 C Tunnel associated with dyke/dykes. 04

- Q. 6 A Suitability of Amygdoloidal basalt as a construction material. 04

- |  |   |   |    |
|--|---|---|----|
|  | B | Occurrence of zeolites in natural sands.      | 04 |
|  | C | Problems with open excavations in city areas. | 04 |
|  | D | Engineering significance of Active faults.    | 04 |

**OR**

- |      |   |  |    |
|------|---|--|----|
| Q. 6 | A | Dam building activity and earthquakes in Deccan trap area. | 08 |
|      | B | Fault zone treatment.                                      | 04 |
|      | C | Problems with made ground in cities.                       | 04 |

[Total No. of Questions: 12]

[Total No. of Printed Pages: 2]

**UNIVERSITY OF PUNE**

**[4364]-419**

**B. E. (Civil) Examination - 2013**

*Advanced Environmental Management. (2003 Course)*

**[Time: 3 Hours]**

**[Max. Marks: 100]**

***Instructions:***

- 1 *Answer 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 *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**

- |     |   |  |    |
|-----|---|--|----|
| Q.1 | A | Discuss the background and development of ISO 14000 series.                    | 08 |
|     | B | Explain the principles and elements and environmental management system (EMS). | 08 |

**OR**

- |      |   |   |    |
|------|---|---|----|
| Q.2  | A | Explain in details how the National Environmental Policy was developed during various five years plans. | 08 |
|      | B | Write the links between ISO 14000 and ISO 9000 in a tubular form.                                       | 08 |
| Q. 3 | A | Discuss the municipal Solid waste rules-2000  | 08 |
|      | B | Discuss the Environment protection Act-1986 as an Umbrella act.   | 08 |

**OR**

- |      |   |   |    |
|------|---|---|----|
| Q. 4 | A | Discuss the salient features of water Act of 1974.  | 08 |
|      | B | Discuss the rote of cost benefit analysis in controlling environmental pollution.                   | 08 |
| Q. 5 | A | What are the causes of global warming? What remedial measures are suggested by developed countries. | 08 |
|      | B | Discuss pollution indices in air monitoring and air quality assessment.                             | 10 |

**OR**

- Q. 6 A The ambient air quality for Mumbai, Pune and Nagpur are given below. 10
- | Sr. No. | City   | SPM ( $\mu\text{g}/\text{m}^3$ ) | SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ ) | CO( $\mu\text{g}/\text{m}^3$ ) |
|---------|--------|----------------------------------|--|--------------------------------|
| 1.      | Mumbai | 170                              | 78   | 2200                           |
| 2.      | Pune   | 230                              | 72   | 2600                           |
| 3.      | Nagpur | 210                              | 87   | 1700                           |
4. Determine the air pollution index for each city and thereby mane the city having more air pollution.
- B Discuss the role of meterological parameters in the dispersion of air pollutants in the atmosphere. 08

### SECTION II

- Q. 7 A Explain the effect of thermal and organic water pollution on a aquatic life. 08
- B Explain advanced waste water treatment. Why it is necessary. How it is different from conventional treatment. Give in a tabular form, important AWT processes. 10

### OR

- Q. 8 A Explain details biological nitrification and denitrification process for removal of nitrogen from wastewater. 10
- B Discuss the treatment and reuse options for industrial waste water management. 08

- Q. 9 A Explain colour coding system for biomedical waste management and their collection in different coloured bins or bags. 07
- B Explain with reference to hazardous waste. 09
1. Toxicity
  2. Reactivity
  3. Corrosivity

### OR

- Q. 10 A Explain Biomedical waste. Discuss the different methods for collection and disposal of biomedical waste. 12
- B Write a short note on sanitary landfills. 04

- Q. 11 A Explain in details, role of EIA to minimize, Environmental risk and hazards due to thermal power plant. 12
- B Discuss the principles of EIA. 04

### OR

- Q. 12 A Explain any two types of check list method for EIA. 08
- B Discuss the EIA of construction activities. 08

[Total No. of Questions: 12]

[Total No. of Printed Pages: 2]

**UNIVERSITY OF PUNE**

[4364]-420

**B. E. (CIVIL) Examination - 2013**

**CONSTRUCTION MANAGEMENT Elective III (2008 Course)**

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 Answer 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 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**

- |     |   |  |    |
|-----|---|--|----|
| Q.1 | A | Explain in detail project monitoring systems with reports to be generated at every stage of construction?  | 10 |
|     | B | Infrastructure development in India has contributed majorly in the country's economic transformation and growth during the last decade justify this statement. | 8  |
| OR  |   |  |    |
| Q.2 | A | What do you mean by Project Management Consultant? Explain its role in case Super Thermal Power Plant  | 9  |
|     | B | Describe the nature of Construction industry in India and explain the necessity & applications of Construction Management?                                     | 9  |
| Q.3 | A | What is WBS? Explain the WBS levels with suitable example?   | 8  |
|     | B | Write different types of activity charts & explain any one with suitable example?  | 8  |
| OR  |   |  |    |
| Q.4 | A | Define work study. Explain in detail the procedure for method study?   | 8  |
|     | B | What is Vertical Production Method? Give example where it is used and also state advantages and disadvantages of it.   | 8  |
| Q.5 | A | Write the need & Importance of labour laws?  | 6  |

	B	Write a note on Interstate Migrant Worker Act	4
	C	Explain the concept of project balance sheet?	6
		OR	
Q. 6	A	Explain in detail the Workman's compensation act 1923?	6
	B	Write a note on working capital?	4
		Explain following terms	6
		i) Term loans	
		ii) Debentures	
		iii) Deferred credit	
		<b>SECTION II</b>	
Q. 7	A	As a Owner, Consultant and Contractor for a private construction, explain the risk faced by them with examples wherever possible.	9
	B	Apply Value engineering in the context of Road construction project and Building project.	9
		OR	
Q. 8	A	What is Job Plan? Explain in detail phases in the job plan.	10
	B	Write short note on	8
		i) Risk Mitigation	
		ii) Quantitative risk analysis	
Q. 9	A	Define Supply Chain Management (SCM). Explain SCM in context with construction materials management?	8
	B	What is training? What are the objectives of the training? How training for construction supervisor and executives is carried out in big project?	8
		OR	
Q. 10	A	Write down functions of materials management and explain them.	8
	B	What is procurement cost and Inventory carrying cost? A construction company purchases 10000 bags of cement annually. Each bag of cement costs Rs 356 and cost incurred in procuring each lot is Rs 100. The cost of carrying is 25%. What is EOQ? What is the average inventory level?	8
Q. 11	A	What do you understand by Artificial Intelligence? And write its applications in Construction management.	12
	B	Explain the analogy between Biological neuron and Artificial neuron.	4
		OR	
Q. 12	A	What are the applications of Artificial Neural networks in construction management?	6
	B	What is an Expert system? How Artificial Intelligence is useful in the development of Expert system. Explain with suitable example.	10

**4364-421**

**B.E. (Integrated Water Resources and planning )**

**(2008 Pattern)**

**Time: 3 Hours**

**Max. Marks : 100**

**Instructions to the candidates:**

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *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*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION I**

- Q1) a) What is an integrated water resource planning? Discuss its components and methods [8]  
 b) What are different laws in water resources engineering? Explain any one of them [8]

**OR**

- Q2) a) Discuss the latest national water policy. [8]  
 b) Explain present institutional framework for water management [8]

- Q3) a) Annual flood flow series of a river were analyzed and was found to follow log normal distribution. The frequency analysis of the data yielded the following results [10]

Return period T (yr)	Peak flood (m <sup>3</sup> /s)
100	12500
200	15000

The following table of variation of frequency factor with the return period in log normal distribution is available. Estimate the flood magnitude in the river with a return period of 1000 years.

Return period (T)	50	100	200	1000
Frequency factor (Kz)	2.054	2.326	2.576	3.090

- b) Write in brief about (i) linear programming (ii) non-linear programming (iii) dynamic programming (iv) soft computing techniques. [8]

**OR**

- Q4) a) The mean annual flood of river is 600m<sup>3</sup>/s and the standard deviation of the annual flood series is 150m<sup>3</sup>/s. What is the probability that a flood of magnitude 1000m<sup>3</sup>/s occurring in the river within next five years? Use Gumbel’s method and assume the sample size to be very large [10]

- b) Define the mean, mode, median, standard deviation and skewness coefficient. Sketch the probability density function of a random variable with positive, negative and zero skewness coefficients. [8]

- Q5) a) What is geo-informatics? What are its applications in flood management [8]  
 b) Discuss flood control reservoirs using following points (i) purpose (ii) location (iii) Size (iv) Types [8]

**OR**

- Q6) a) Explain criteria for flood damage assessment. [8]  
 b) What is severity index? How drought forecasting is done? [8]

## SECTION II

- Q7) a) Explain the following irrigation efficiencies (i) water conveyance efficiency (ii) water application efficiency (iii) water use efficiency (iv) water storage efficiency (v) water distribution efficiency. [8]
- b) Discuss the rational method for qualitative determination of urban storm water runoff. What are limitations of the method? [8]

### OR

- Q8) a) What are the commonly used methods to access the recharge of groundwater in an area? Explain briefly any one of the methods. [8]
- b) Write a short note on demand patterns for various types of reservoirs. [6]
- c) Write short note on estimation of domestic water demand. [4]

- Q9) a) Explain management of rehabilitation and resettlement required due to development of water resources. [8]
- b) Explain steps to be taken for protection of environment while allowing the water resource development of an area. [8]

### OR

- Q10) a) Discuss the social impact of water resource development like construction of dam in an area with fertile land. [8]
- b) Explain various methods of controlling sedimentation of reservoirs. [8]

- Q11) a) Artificial neural networks are termed as black box models. Discuss. [6]
- b) What is a decision support system in water resources management? What are its components? Discuss a decision support system for flood control. [10]

### OR

- Q12) a) Write a short note on use of GIS for estimation of runoff [6]
- b) Discuss a study about application of Artificial Neural Networks in Water Resources management giving details about problem definition, objective, data, inputs, outputs, algorithm used and results. [10]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE

[4364]-424

B. E. (CIVIL ENGINEERING)(SEM- II) Examination - 2013

FINITE ELEMENT METHOD IN CIVIL ENGINEERING

(Elective-IV) (2008 Course)

[Time: 3 Hours]

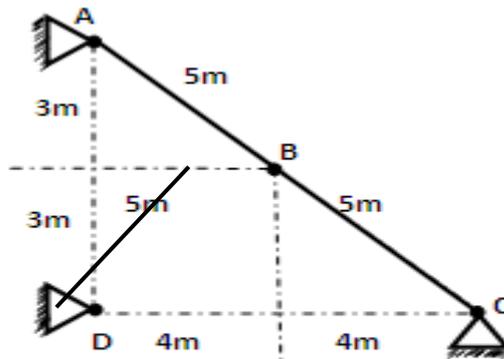
[Max. Marks: 100]

**Instructions:**

- 1 Answers to the two sections should be written in separate answer-books.
- 2 Black figures to the right indicate full marks.
- 3 Neat diagrams must be drawn wherever necessary.
- 4 Assume suitable data, if necessary.
- 5 Use of non programmable calculator is allowed

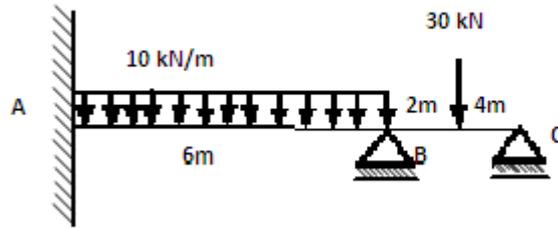
**SECTION -I**

- Q.1      A)      Write the 4 x 4 stiffness matrix of truss element. Hence, obtain the global stiffness matrix of truss as shown in Fig.1. Also, by imposing the boundary conditions, write reduced stiffness matrix. Take EI constant. 16



OR

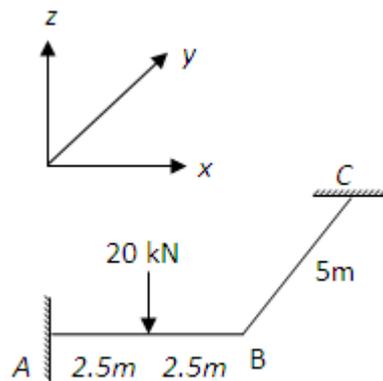
- Q.2      A)      Analyse the prismatic beam ABC loaded and supported as shown in Fig. 2 using finite element approach. Support B is sink by 25mm. Draw SFD and BMD. Take EI constant 16



Q. 3 A) Derive stiffness matrix of plane frame element considering axial force, shear force and bending moment. When do you need transformation matrix? Write transformation matrix of frame element. 18

OR

Q. 4 A) Analyse and draw bending moment diagram of grid structure as shown in Fig.3 using finite element method. Take  $GJ = 0.4 EI$ . 18



Q. 5 A) Derive the differential equations of equilibrium in case of three-dimensional stress system. 10  
 B) Derive compatibility conditions in-terms of stresses. 6

OR

Q. 6 A) State and Explain Generalized Hook's law. 6  
 B) Explain plane stress and plane strain elasticity problem with example. 10  
 Write stress strain relationship.

**SECTION II**

Q. 7 A) Explain principle of minimum potential energy with example. 8  
 B) Using finite element approach, show that, stiffness matrix for one-dimensional axially 10

loaded bar element is  $[K] = \frac{AE}{L} \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$

OR

Q. 8 A) Explain two dimensional and three dimensional Pascal's triangle. 8  
 B) Derive natural coordinate of 2D constant strain triangular element in-terms of area coordinates. 10

Q. 9 A) Determine the shape function for 4 noded rectangular elements used 8

		in plane stress problems.	
	B)	Obtain strain-displacement matrix for a three noded triangular element with coordinates of node 1(1,1), node2 (4,3) and node 3(2,5).	8
		OR	
Q. 10	A)	Explain subparametric, superparametric and isoparametric elements.	8
	B)	Derive connectivity matrix [A] for 4 noded tetrahedron element.	8
Q.11	A)	Derive shape functions for nine noded rectangular element using Lagrange Polynomials. Use natural coordinate system $(\xi, \eta)$ .	8
	B)	State and explain three basic laws on which isoparametric concept is developed.	8
		OR	
Q. 12	A)	Explain step by step procedure of finite element analysis	6
	B)	Explain Jacobian matrix in cases of four noded isoperimetric quadrilateral element. Obtain strain displacement matrix.	10

**BE Civil**  
**Geoinformatics (Civil)**  
**Open Elective (2008 Course)**  
**4364-425**

**Time: 3 Hours]**

**[ Max. Marks 100**

**N.B.:**

- **Answers to the two sections should be written in separate books.**
- **Neat diagrams must be drawn wherever necessary.**
- **Assume suitable data if necessary.**

**SECTION- I**

- Q 1) a) What is Electromagnetic Radiation? Describe Electromagnetic Spectrum in detail. [08]  
b) State and Explain 'Wien's' Displacement law. Draw a neat sketch [08]

OR

- Q 2) a) Discuss in detail interaction of EMR with 'Atmosphere' [08]  
b) Define 'Remote Sensing'. Describe stages of RS with neat sketch. [08]

- Q 3) a) Describe 'Cross-Track' scanning system. Discuss its advantages. [08]  
b) Describe characteristics of LANDSAT 1, 2 & 3. [08]

OR

- Q 4) a) Write a note on 'System Pour 1' Observation de la Terre. [08]  
b) Describe 'Along – Track' Scanning system. Discuss its advantages. [08]

- Q 5) a) What is false colour composite (FCC) Images? What are its advantages? [10]  
b) State and Explain Elements of Image Interpretation in brief. [08]

OR

- Q 6) a) 'Geometric' Corrections in Images under processing. [10]  
b) Describe Characteristics of IR Images. [08]

**SECTION- II**

Q 7) a) Define GIS. Explain its components. [08]

b) What is 'MAP'? Describe different types of maps in brief. What are its limitations? [08]

OR

Q 8) a) Describe supervised & unsupervised classification. [08]

b) Write a note 'Buffering'. [08]

Q 9) a) What is map projection? Describe in brief. [08]

b) Describe 'Raster' data structure. Write advantages and disadvantages. [08]

OR

Q 10) a) Write a note on 'Interaction between RADAR Microwaves and Earth's surface'. [08]

b) Write short notes on [08]

i) Sources of Errors in GPS      ii) Resolution

Q 11) a) Write a brief note on 'Role of GIS in Terrain Analysis'. [10]

b) Explain [08]

i) Hardware & Software requirement for GIS

ii) Primary Key

OR

Q 12) a) Explain RS application in Land Use Land Cover mapping with flow chart. [10]

b) Softwares use in GIS. [08]

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[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

**UNIVERSITY OF PUNE**

[4364]-427

**B. E. (Civil Engineering) Examination - 2013  
INDUSTRIAL WASTE WATER MANAGEMENT  
(OPEN ELECTIVE)-SEM II (2008 Course)**

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 *Answers to the two sections should be written in separate answer-books.*
- 2 *Your answer will be valued as a whole*
- 3 *Neat diagrams must be drawn wherever necessary.*
- 4 *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5 *Assume suitable data, if necessary.*
- 6 *Answer any three questions from Section I and any three questions from Section II*

**SECTION -I**

- Q.1      A)      Explain the process for removal of color & odour from waste water by activated carbon filtration. [9]
- B)      Briefly explain the process of Electro- dialysis for the removal of colloidal & dissolved solids in waste water [9]

OR

- Q.2      A)      Discuss in detail the application & Design parameters for activated carbon filtration for the removal of colloidal & dissolved solids from waste – water. [10]
- B)      Explain the process for removal of color & odour from waste water by Ultra – filtration. [8]

Q. 3 A) Discuss in detail the processes of precipitation with lime & ferrous – Sulphate for removal of iron & heavy metal from waste water [9]

B) Discuss in detail about the biological process for wetland treatment to treat the waste water? [7]

OR

Q. 4 A) Explain briefly the root zone cleaning system for waste water treatment. [8]

B) Discuss in detail about the chemical oxidation with ozone for the reduction in COD & colour in waste water? [8]

Q. 5 A) Explain briefly about the biological process for removal of heavy metals from industrial waste water? [8]

B) Discuss in details about the activated sludge process? [8]

OR

Q. 6 A) write in brief about : [16]

a) Membrane reactor with submerged membrane

b) Nitrification & Denitrification by aerobic & anaerobic process

## SECTION II

Q. 7 A) Explain different methods of three R principle to convert waste into wealth. [10]

B) Discuss about the reuse of sewage in residential complexes [8]

OR

Q. 8 A) Explain how waste water could be used for irrigation? [10]  
Also discuss about preventive measures & health

aspects?

B) Explain the mechanism of metal recovery in electroplating industry? [8]

Q. 9 A) Explain the Zero Discharge technology of waste based on 3R principal? [8]

B) Discussed the application of zero discharge technology based on three R principle for pulp & paper industries. [8]

OR

Q. 10 A) Draw & discuss the flow sheet for the zero discharge of waste water produced in sugarcane processing industries? [8]

B) Explain the zero discharge of solid waste from residential complex? [8]

Q.11 A) Write in details about the water requirement of dairy & food industry? [8]

B) Explain the sorption mechanism using the BDST model? [8]

OR

Q. 12 A) Discuss the pollution hazards due to radioactive materials? [8]

B) Discuss in details the green processes adopted in the industries? [8]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

**UNIVERSITY OF PUNE**  
**[4364]-428**  
**B.E. (Civil) Examination - 2013**  
***Mechanics Of Waves (Elective iv – Open Elective)***  
**(2008 Course)**

[Time: 3 Hours]

[Max. Marks: 100]

**Instructions:**

- 1 *Your answer will be valued as a whole*
- 2 *Answer 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.*
- 3 *Answers to the two sections should be written in separate answer-books.*
- 4 *Neat diagrams must be drawn wherever necessary.*
- 5 *Assume suitable data, if necessary.*
- 6 *Use of electronics pocket calculator is allowed*
- 7 *Black figures to the right indicate full marks.*

**SECTION - I**

- Q.1    A    Draw definition sketch a of a propagation wave naming various parts    [4]  
      B    Explain working of a wave rider buoy in brief.    [4]  
      C    Obtain the values of significant wave height and period in deep water generated by a wind (corrected) speed of 22 m/s and lasting for 4 hours over a fetch of 12.5 km. State whether the sea is fetch controlled or duration controlled. Use SMB curves    [8]

**OR**

- Q.2    A    Define wave number, wave length, wave steepness,    [6]  
      B    Write a short note on Darbyshire and Draper technique for wave prediction    [4]  
      C    What are the types numerical models. Explain any one of them in detail    [6]

- Q.3    A    Derive equation for wave particle displacement from mean position    [6]  
      B    What are the assumption in linear wave theory    [4]  
      C    For a wave of height 3 meter and period 10 sec propagation over a depth of 20 m find expression for vertical and horizontal velocities of particles at 1.5 m below the trough    [8]

**OR**

- Q. 4    A    Derive expression for group velocity of waves    [6]  
      B    Write short note on Stokes wave theory    [4]  
      C    A subsurface pressure gauge located at 0.8 m above sea level in 15 m water depth records average maximum pressure of 130 kN/m<sup>2</sup> and average pressure frequency of 0.0666 Hz. Obtain height of wave. Take specific weight of water as 10.06 kN/m<sup>3</sup>    [8]

- Q. 5 A Prove that  $s(f) = 4 \int_0^{\infty} R(\tau \cos 2\pi f \tau) d\tau$  where  $s(f)$  is spectral density function,  $R(\tau) =$  auto correlation. [6]
- B Enumerate various theoretical wave spectra. Explain any one of them in detail [4]
- C What is long term wave height statistics? Name various distribution used to achieve the same while explaining Log-Normal distribution in detail [6]

**OR**

- Q. 6 A Annual data of significant wave heights were collected for a site along west coast of India is given below [10]

Hs(m)	0	1	2	3	4	5
Observations	1256	823	321	191	8	1

- B Define stationary process, ergodic process, probability density function [6]

**SECTION II**

- Q. 7 A A wave of 10 sec period and 4 m height in deep water travels shoreward over shoaling bottom. Calculate its height in 5 m depth. Assume no refraction. [6]
- B Explain with neat sketch the wave diffraction. What are assumptions made in theory of diffraction [6]
- C Write short note on wave set up [4]

**OR**

- Q. 8 A A wave has 3 m height and 6 second period in deep water. It travels towards shore on parallel bed contours. If its crest makes an angle of  $30^\circ$  with the bed contour 12 m before refraction, calculate wave height after crossing this contour [10]
- B Write a detail on wave breaking [6]

- Q. 9 A Draw sketches for pressure distribution of non breaking wave forces using Miche-Rundgren method. Write expressions for  $y_c$  and  $y_t$  with usual notations [8]
- B For a smooth faced vertical wall the incident wave height is 1.5 m and depth at the structure of the toe is 3 m. For a wave period of 7 sec find the height of the clapotis crest and trough above the bottom ( $y_c$  and  $y_t$ ) [8]

**OR**

- Q. 10 A What is effect of angle of wave approach on forces due to waves? Explain with sketch [8]
- B For a smooth faced vertical wall the incident wave height is 1.5 m and depth at the structure of the toe is 3 m. for a wave period of 10 sec the height of the clapotis crest and trough above the bottom ( $y_c$  and  $y_t$ ) is 5.85 m and 2.85 m respectively. Find the horizontal wave forces ( $F_c$  and  $F_t$ ). Also calculate the total wave forces. [8]

- Q. 11 A Derive equation for Keulegan-Carpenter number [8]  
B A one meter jacket leg is subjected to an attack of waves which are 6 m high, 75 m long and 8 seconds in period. Determine the maximum drag force, maximum Inertia force, Total Force at  $\theta = \pi/4$  at a location 10 m below SWL. The water depth is 60 m. The  $C_D = 1$ ,  $C_m = 2$ ,  $\rho = 1030 \text{ kg/m}^3$ . Use linear theory [10]

**OR**

- Q. 12 A Derive equation for variation of drag force along the total member length of vertical member [8]  
B How the wave forces on small diameter members are measured using stokes theory [4]  
C What are limitations of Morrison's equation? [6]