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Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)

Master

END SEM. EXAM. 14-15

Sub. : Elective-I Advanced Computational Techniques
Class: B. E. Civil Sem.-VII

Marks: 100
Duration: 3 hr.

- Attempt any FIVE questions out of seven questions.
- Answer to all sub questions should be grouped together.
- Figures to right indicate full marks.
- Assume suitable data if necessary and state them clearly.

Q.1 a) Define statistics and explain its role in Civil Engineering field? (07)

b) If one card is drawn from a standard deck, what is the probability that the card is a face card? If two cards are drawn, without replacement, what is the probability that both are face cards? If five cards are drawn, without replacement, what is the probability that all five are face cards? (06)

c) The meeting of Project Management team was held to fix regular schedule for commercial building project. On the basis of previous experience mean time of completion was fixed as 18 months and standard deviation as 1.30. If team decided to work with effective equipments, completion time is reduced to 14 months which was considered as crash duration. Find the probability of completion of the project if project is scheduled two weeks before mean time? Also find probability of completion of the project for crash duration. (07)

Q.2 Answer the following questions (20)

a) Solve the following LP problem using Simplex Method

$$\text{Maximize } Z = 5X_1 + 3X_2 + 7X_3$$

$$\begin{aligned} \text{Subjected to } & X_1 + X_2 + 2X_3 \leq 22 \\ & 3X_1 + 2X_2 + X_3 \leq 26 \\ & X_1 + X_2 + X_3 \leq 18 \\ & X_1, X_2, X_3 \geq 0 \end{aligned}$$

b) Explain the different techniques of sampling?

Q.3 a) How test statistics is useful in inference techniques? Explain with practical Example (08)

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- b) A coin is tossed 10 times to determine if it is balanced. The coin will be declared "fair," i.e., balanced, if between 2 and 8 heads, inclusive, are obtained. Otherwise, the coin will be declared "unfair." The null hypothesis corresponding to this test is H_0 : (the coin is fair), and the alternative hypothesis is H_a : (the coin is unfair). Identify the test statistic, the critical values, and the rejection and non-rejection regions. Describe how a Type I and a Type II error would occur. Find the level of significance. (12)

Q.4 Answer the following questions

- a) Solve the following assignment problem using Hungarian Method. The matrix entries are processing times in hours. (08)

	1	2	3 Operator	4	5
1	20	22	35	22	18
2	4	26	24	24	7
3	23	14	17	19	19
4	17	15	16	18	15
5	16	19	21	19	25

- b) A study was conducted to find whether there is any relationship between the weight & blood pressure of an individual. The following set of data was arrived at from a clinical study. Find Coeff. of Correlation. (04)

Sr. No.	Weight	Blood pressure
1	80	140
2	84	160
3	74	134
4	84	144
5	80	180
6	86	176
7	84	174
8	89	178
9	68	128
10	73	132

- c) Explain the different types of Correlation & how is it differ from regression? (04)
 d) Form the Dual of primal problem of question no. 6 (a). (04)

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Q.5.a) What are the types of decisions? Explain them with suitable examples. (08)

b) Consider the details of two competing alternatives as shown in following table.

The initial outlay of each of the alternatives is Rs. 50, 00,000. The life of each alternative is 15 years. Find the best alternative when interest rate is 0% using

expected value criterion.

(12)

Alternative 1		Alternative 2	
Annual Revenue(Rs.)	Probability	Annual Revenue (Rs.)	Probability
12,00,000	0.25	22,00,000	0.20
19,00,000	0.45	24,00,000	0.45
28,00,000	0.30	32,00,000	0.35

Q.6 Answer the following questions

(20)

a) Solve the following LP problem using Simplex Method

$$\text{Maximize } Z = 5X_1 + 3X_2 + 7X_3$$

Subjected to

$$X_1 + X_2 + 2X_3 \leq 22$$

$$3X_1 + 2X_2 + X_3 \leq 26$$

$$X_1 + X_2 + X_3 \leq 18$$

$$X_1, X_2, X_3 \geq 0$$

b) solve following transportation problem by N-W Corner cell method, Least Cell Method & Vogel Approximation Method.

	Market					Supply
	1	2	3	4	5	
1	10	2	16	14	10	300
2	6	18	12	13	16	500
3	8	4	14	12	10	825
4	14	22	20	8	18	375
Demand	350	400	250	150	400	

Q.7 Answer the following questions

(20)

a) What is decision tree? Illustrate with suitable example.

b) Briefly explain the theory about "Genetic Algorithm"? Also explain what steps to be followed in GA analysis?

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SARDAR PATEL COLLEGE OF ENGINEERING
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November, 2014

Total Marks : 100

CLASS/SEM : BE (CIVIL) SEM VII

Duration : 3 Hours

SUBJECT : ADVANCED STRUCTURAL ANALYSIS

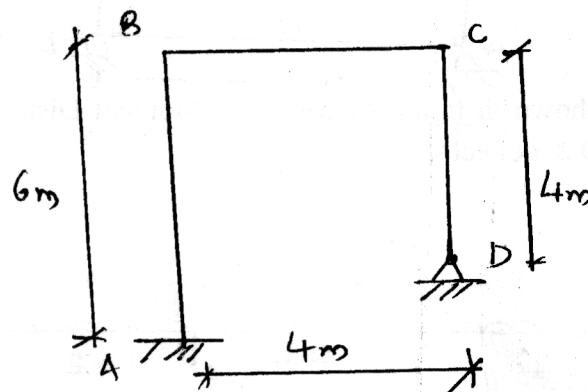
Master

- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.

Q.1 (a) (i) Define and explain the meaning of symmetric structure with the help of example. 2

(ii) Distinguish between: Symmetric and Anti-symmetric loading. 2

(b) Analyse the frame shown in figure by flexibility method if the inner temperature of all members rise by 50°C while there is no change in ~~inner~~^{outer} temperature and draw BMD. $E = 2 \times 10^4 \text{ N/mm}^2$, $\alpha = 12 \times 10^{-6} \text{ per } ^{\circ}\text{C}$. 8



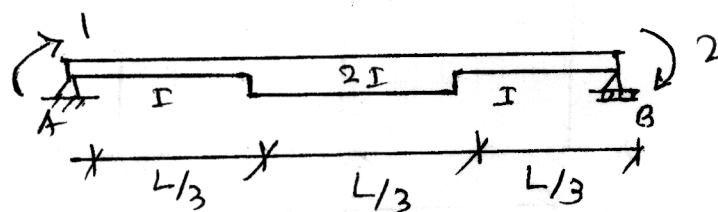
c/s for all members

b = 230 mm

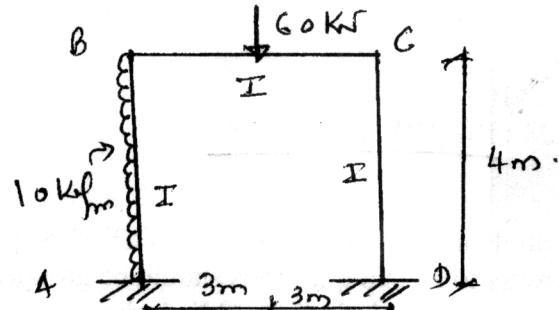
d = 600 mm.

Neglect axial deformations

(c) For the non-prismatic beam element shown in figure calculate the stiffness coefficients K_{11} and K_{21} . Also calculate the COF from A to B 8

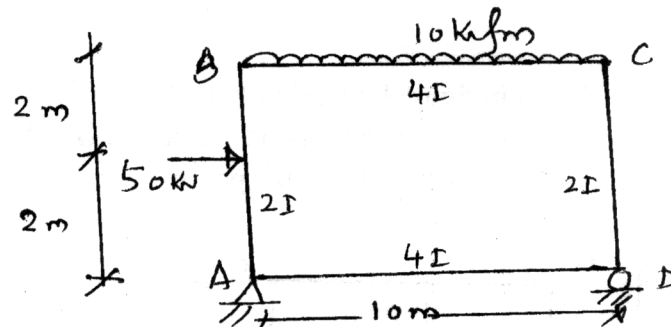


- Q.2 (a) Using Column Analogy Method, analyse the frame shown in figure and draw BMD and deflected shape. 15

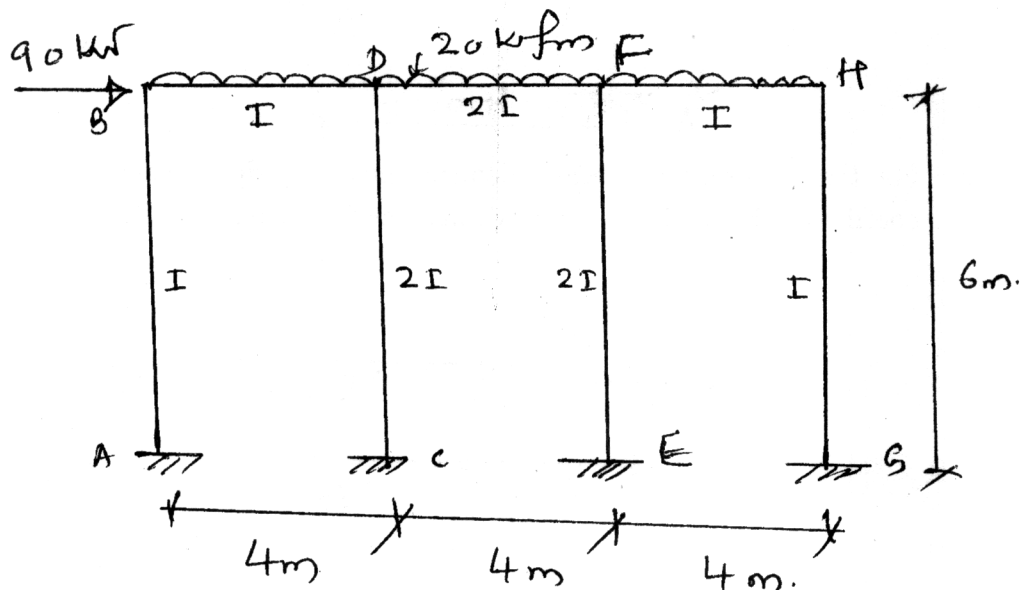


- (b) Derive the modified stiffness and carry over factor for a column of a single storey, single bay symmetric frame subjected to Anti-symmetric loads 5
- Columns with fixed support
 - Columns with hinge support

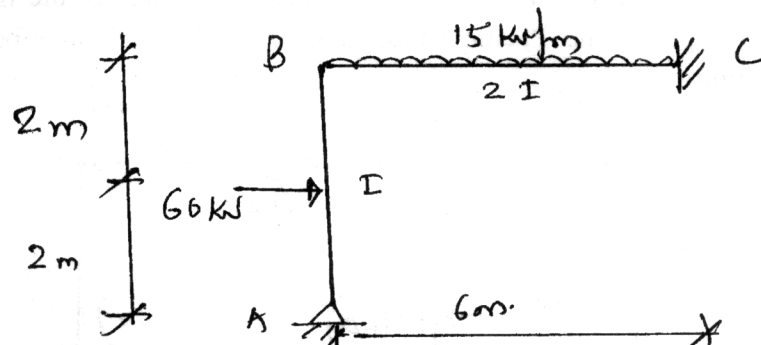
- Q.3 Analyse the frame shown in figure by Elastic Centre Method and draw BMD, SFD and deflected shape. 20



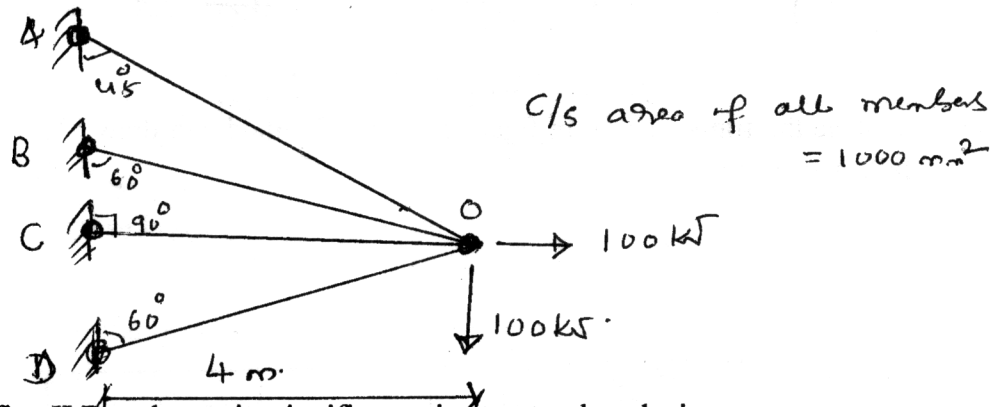
- Q.4 Analyse the frame shown in figure by Modified Moment Distribution Method and draw SFD, BMD & deflected shape. 20



- Q.5(a) Analyse rigid jointed plane frame shown in figure by Matrix Stiffness Method and draw BMD and deflected shape. 10



- (b) Analyse the pin-jointed frame shown in figure by matrix stiffness method and compute the member forces and displacements. Take $E = 2 \times 10^5 \text{ KN/m}^2$. 10



- Q.6 (a) (i) Define ILD and state its significance in structural analysis 2

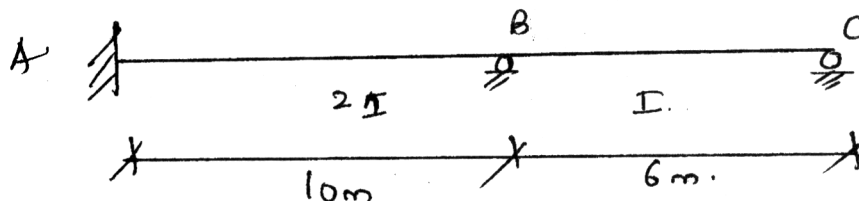
- (ii) State and explain Muller Breslau's Principle 2

- (b) For the beam shown in figure, construct the ILD for: 16

- (i) Reaction at 'C' R_c

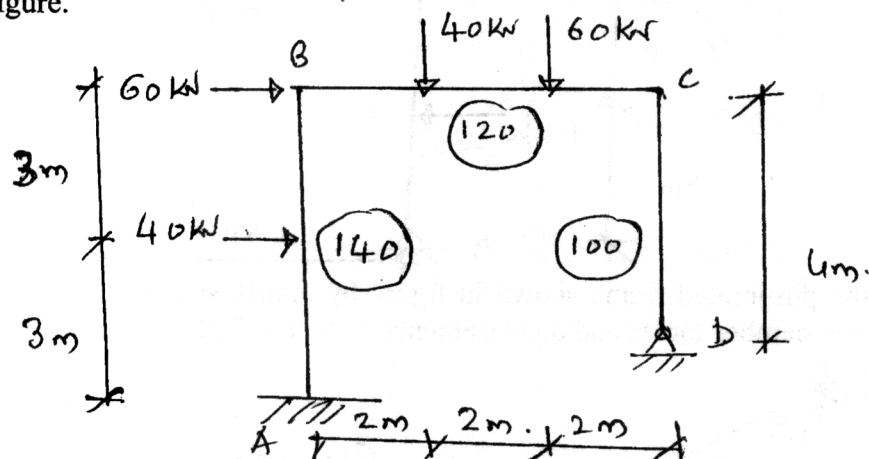
- (ii) Moment at 'A' M_A

Show the ordinates of ILD at 2m intervals



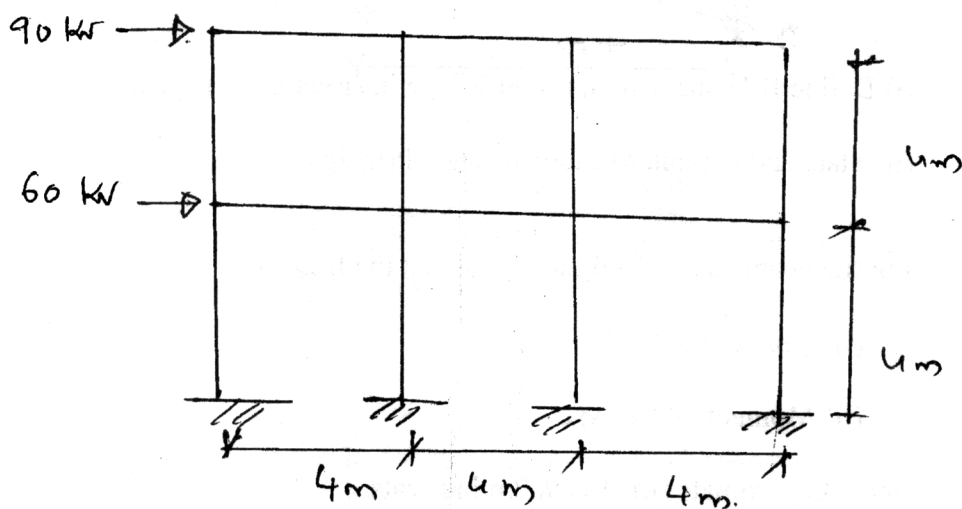
- Q.7 (a) Using plastic analysis, determine the load factor for the frame loaded as shown in figure. The Plastic Moment capacity of each member is indicated in the figure.

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- (b) Analyse the frame shown in figure by Portal Method and draw SFD, BMD and deflected shape.

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RE-EXAM

BE (CIVIL), Sem-~~VII~~, Re-exam, Date: 16th December 2014

Total Marks: 100

Duration: 3 Hours

CLASS/SEM: B. E. Sem. VII (CIVIL)

SUBJECT: Construction Engineering

- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- Figure to right indicate full marks.
- Make suitable assumptions where necessary and state them clearly.

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Q1.	a)	Suggest suitable machinery and techniques for the construction of a fly-over bridge using pre-cast girders and justify its use.	(10)
	b)	What is economic life of an equipment? Illustrate with a typical graph	(05)
	c)	State the importance of providing ventilation in tunnels	(05)
Q2.	a)	Explain with neat sketches following pan type mixers: Center shaft, dual shaft, counter current motion and planetary motion mixers	(10)
	b)	A trenching machine is purchased at a cost of Rs. 32 lakhs. Assuming its useful life to be 4 years and salvage value as 2 lakhs, calculate the depreciation and book value at the end of each year using double declining method.	(05)
	c)	Draw and label a line diagram of a dragline. Explain its working	(05)
Q3.	a)	Explain the heading and benching method of tunneling with neat sketches.	(10)
	b)	Explain the precautions to be taken while handling and transportation of explosives used for blasting.	(05)
	c)	Write a short note on the working of any one pile driving hammer and illustrate with a neat sketch.	(05)
Q4.	a)	Differentiate between standard and special equipment	(05)
	b)	Draw the line diagram of a tower crane and explain its working	(05)
	c)	Illustrate five different cross-sections of a tunnel with a neat sketch.	(05)
	d)	How does one decide whether to own an equipment or to hire the same? Explain.	(05)
Q5.	Write a short note on the following:		(20)
	i.	Sand drain	

	ii.	Rock anchor	
	iii.	Pitching, angling and tilting of a dozer blade	
	iv.	Factors affecting production of a power shovel.	
Q6.	a)	Determine the owning and operating cost per hour for an excavating equipment from the following data: Purchase cost = Rs. 30 Lakhs Useful life = 10 years (2000 hours/yr) Engine HP = 30, diesel Salvage value = Rs. 3 Lakhs Assume: Maintenance and Repair cost = 100% of Depreciation Investment cost = 12% of average annual investment Operating factor = 0.8 Lubrication cost = 25% of fuel cost	(10)
	b)	List the various stages of construction of a diaphragm wall with neat sketches	(05)
	c)	When is vacuum concreting used? State the precautions that need to be taken during vacuum concreting.	(05)
Q7.	a)	Differentiate between the following i. Sheepsfoot roller and tamping foot roller ii. Track mounted equipment and tire mounted equipment	(10)
	b)	List various types of formwork used in construction projects. Explain any one.	(05)
	c)	Draw the sketch of a jaw crusher and explain its working.	(05)

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Total Marks: 100 *B.E(CIVIL), sem - VII* Date: 29th October 2014
Duration: 3 Hours

CLASS/SEM: B. E. Sem. VII (CIVIL) SUBJECT: Construction Engineering

- Question 1. in compulsory.
- Attempt any FOUR questions out of remaining SIX questions.
- Answers to all sub questions should be grouped together.
- Figure to right indicate full marks.
- Make suitable assumptions where necessary and state them clearly.

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- Q1. a) Suggest suitable machinery, equipment and techniques for the construction of a high rise residential building in a congested, urban area. (10)
- b) Explain the need of studying various construction equipments for a civil engineer. (05)
- c) Name five different companies that manufacture or sell construction equipment in India. (05)
- Q2. a) How are concrete mixers classified? Explain the working of any one mixer in detail. Illustrate with a neat sketch. (10)
- b) What are the types of cladding and explain its maintenance. (05)
- c) If a scraper hauls a heaped load of 31 cubic yards of dry sand, determine its bank volume. The % swell for dry sand is 15. (05)
- Q3. a) Explain the forepoling method of tunneling with neat sketches. (10)
- b) What are misfires in blasting? What are its causes? (05)
- c) Explain with a neat sketch the working of a double acting steam hammer. (05)
- Q4. a) What is breakdown maintenance of a construction equipment? How is it different from preventive maintenance? (05)
- b) Draw the line diagram of a belt conveyor and explain its working (05)
- c) What is the NATM method of tunneling? List the steps involved. (05)
- d) Differentiate between standard and special equipment (05)
- Q5. a) A 0.6 cubic meter capacity shovel excavates soil and uses trucks with a loading time of 21 s. Cycle time excluding loading time for all truck sizes is 6 min. Select proper hauling units for truck sizes of 4.6 cubic meters (10)

and 11.5 cubic meters based on operating efficiency.

b) Write a short note on the following:

(10)

- i. Forklifts
- ii. mass concreting

Q6. a) Write a short note on California Crossing type muck transportation system in tunneling. Illustrate with a neat sketch. (05)

b) What is curtain grouting? State its applications. (05)

c) Explain how the production of a dozer can be determined. (05)

d) Explain dynamic compaction. State its suitability. How is its depth of influence determined? (05)

Q7. a) Determine the owning and operating cost per hour of a backhoe purchased for a cost of Rs. 20 lakhs with a useful life of 8 years. The crane operates on a 92HP diesel engine and has an operating factor of 0.78. The working hours per year are estimated at 2000, salvage value as 8 lakhs, investment cost as 12% of average annual investment repair and maintenance cost same as annual depreciation, lubrication cost as 25% of fuel cost and operator is paid a salary of Rs. 400 per hour. (10)

b) Explain the various functions served by geosynthetics in the construction industry. (05)

c) Explain the importance of safety with respect to use of cranes on a construction project. (05)

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B.E. (Civil) sem VII - Re-exam -
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Total Marks: 100

Duration: 3 Hours

Paper - Re-exam
CLASS - B.E. CIVIL, SEM-VII
SUBJECT: Environmental Engineering II

- Question No. 1 is compulsory
- Attempt any four more questions from the remaining six
- Make suitable assumptions if necessary and state them clearly. MASTER FILE -
- Draw neat sketches where necessary and show all supporting calculations

Q1) Answer the following questions:

(20)

a) Draw the flowsheet of conventional sewage treatment plant WITH suspended growth process in secondary treatment in detail. Explain in detail the function of each unit with reduction of BOD in each unit. If the water is to be reused for irrigation purposes will this provision suffice. Explain with reasons

b) Answer in short :

(10)

- 1) What is a septic tank? Describe the design criteria for the same.
- 2) What is an oxidation pond?
- 3) Give difference between attached and suspended growth process
- 4) What is self cleansing velocity? Write the formula for the same.
- 5) What are the four effects of air pollution on plants?

Q2) Solve any three problems:

(20)

a) Design a sewer to serve a population of 30,000 people, daily per capita demand is 180 litres, of which 75% finds its way into the sewer. Slope available for sewer to be laid is 1 in 700 and sewer should be designed to carry 3 times the DWF when running full. What would be the velocity of flow in sewer when running full? Assume $n=0.012$ in Manning's formula

b) A 2% solution of sewage sample is incubated for 5 days at 20°C . Initial dissolved oxygen in sample and control is 7.5 mg/l. After 5 days incubation the dissolved oxygen in sample falls to 3 mg/l and that in control to 7.2 mg/l. Determine BOD_5 of the sample What will be 5 day BOD at 20°C ? Calculate the BOD at 3 days at 15°C . Assume value of K as 0.18 per day at 20°C .

c) A food industry processes 10000 kg of canned food daily. It produces 800 m^3 of water daily with a BOD of 1020 mg/L Compute

- i) The wastewater flow per 1000kg of leather received
- ii) BOD/1000kg of leather received and

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B.E. civil - Sem VII

Environmental Engineering - II

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iii) BOD population equivalent and hydraulic equivalent population

Assume 25 gm BOD/person/day of wastewater at a flow rate 150 litres/person/day.

d) Derive v/V and q/Q for a circular sewer section running partially full.

Q3) Answer the following questions:

(20)

a) Describe self cleansing velocity and derive an expression for it.

b) Define

(i) SOR, (ii) Relative Stability, (iii) Population Equivalent (iv) BOD_5 (v) WLR

Q4) Write short notes on any four:

(20)

a) Operational problems in activated sludge process b) Anaerobic digestion process

c) Types of drainage systems d) Ozone depletion e) Modifications of activated sludge process

Q5) Solve any two of the following:

(20)

a) Design a conventional activated sludge plant for a city of 50,000. Sewage contribution is 160 lpcd. Settled sewage BOD_5 is 350 mg/l and effluent BOD_5 is 30 mg/L

b) Design a two stage high rate trickling filter with following data

Flow = 8 MLD, RR = 1.5, BOD influent = 350 mg/L, BOD removed = 25 % in PST, Final BOD = 20mg/L.

c) Average operation data for activated sludge is

Sewage flow = 40 MLD, Volume of aeration tank = 15000 m³, Influent BOD = 250 mg/L, Effluent BOD = 30 mg/L, MLSS = 4000 mg/L, Effluent SS = 50 mg/l, Waste solids = 15000 mg/l, Quantity of waste sludge = 20 m³.

Based on the above data find: Aeration period, F/M, % efficiency and Sludge age

Q6) Answer the following questions:

(20)

a) What is noise pollution? State the sources and effects of noise pollution? Write a note on control methods of noise pollution.

b) What is air pollution? State the sources and effects of air pollution? Write a note on control devices of air pollution for particulate and gaseous pollutants

Q7) Solve any two problems:

(20)

a) Convert the following:

i) 65 ppm of SO_2 to mg/L ii) 30 ppm of CO to mg/L iii) 805 mg/L of NO_2 to ppm
iii) 300 mg/L of HC to ppm

b) Write a note on (i) Air Act, 1981 (ii) ISO 14001

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Total Marks: 100

B.E. (Civil), Sem - VII
CLASS - B.E. CIVIL, SEM-VII
Year 2014-15

Duration: 3 Hours

SUBJECT: Environmental Engineering II

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- Question No. 1 is compulsory
- Attempt any four more questions from the remaining six
- Make suitable assumptions if necessary and state them clearly
- Draw neat sketches where necessary and show all supporting calculations
- Unless

Q1) Answer the following questions:

(20)

a) Fill in the blanks

- 1) _____ and _____ are the air pollutants released in air from vehicles.
- 2) _____ is a process to convert ammoniacal nitrogen to nitrates.
- 3) _____ are used to remove floatables in wastewater treatment.
- 4) _____ and _____ are used to remove oil and grease in wastewater treatment
- 5) Roof top harvesting can be done by _____ and _____.
- 6) _____ and _____ are plant injuries caused due to air pollution
- 7) Two devices used to control particulates in air pollution devices are _____ and _____
- 8) The provision of secondary settling tank in wastewater is done to remove _____
- 9) The limit for disposal for BOD in mg/L (as per schedule VI of EPA, 1986) to surface water is _____.
- 10) _____ is defined as percentage of sludge by volume to percentage of SS by weight.

b) Illustrate with the flowsheet of conventional sewage treatment plant in detail. Explain in detail the function of each unit. What are the reductions of BOD and suspended solids after each unit should be mentioned. If advanced wastewater treatment is to be provided to use the treated wastewater as boiler water what units are required to be added

Q2) Solve any four problems:

(20)

a) Define population equivalent. A dairy processes 80,000 kg of milk daily. It produces 1000 m³ of water daily with a BOD of 1000 mg/L Compute:

- i) The wastewater flow per 1000kg of milk received
- ii) BOD/1000kg of milk received and
- iii) BOD equivalent population hydraulic equivalent population

Assume 25 gm BOD/person/day of wastewater at a flow rate 150 litres/person/day

b) A 5% solution of sewage sample is incubated for 5 days at 20°C. Initial dissolved oxygen in sample and control is 9 mg/l. After 5 days incubation the dissolved oxygen in sample falls to 4 mg/l and that in control to 8.8 mg/l. Determine BOD₅ of the sample What will be 5 day BOD at 20°C? Calculate the BOD at 4 days at 27°C. Assume value of K as 0.2 per day at 20°C.

c) Design a sewer to serve a population of 35,000 people, daily per capita demand is 150 litres, of which 50% finds its way into the sewer. Slope available for sewer to be laid is 1 in 750 and sewer should be designed to carry 3.5 times the DWF when running full. What would be the velocity of flow in sewer when running full? Assume n=0.013 in Manning's formula. For a circular sewer and a rectangular sewer to be hydraulically equivalent, find the relation between depth of rectangular sewer and diameter of circular sewer. Take width of rectangular sewer as 2.5 times its depth and assume that only 3 sides of rectangular sewer are wetted.

d) Calculate velocity of flow and discharge in a sewer of circular section having diameter 1.2 m laid at a gradient of 1 in 550. The sewer runs partially full at 0.7 depth. Use Manning's formula taking $n=0.012$

e) Design grit chamber to treat a peak flow of 75 MLD to remove particles upto a size of 0.15 mm and specific gravity as 2.65. Minimum temperature is 15°C and $\nu=1.141 \times 10^{-6} \text{ m}^2/\text{s}$ at 15°C .

Q3) Answer any four of the following questions:

(20)

- Describe greenhouse effect and its enhancement in detail.
- Explain with a note air pollution explaining definition, sources, and effects on humans, material and plants.
- Explain with a note episodes in air pollution. Explain various conditions giving rise to episodes. Explain in short the plume behavior
- Explain soil pollution and how is it remediated.
- Explain conventional activated sludge process
- Problems associated with activated sludge process and their remedies

Q4) Explain with short notes on any four:

(20)

- Self purification of streams
- trickling filters
- Velocity control in grit chamber
- Self cleansing velocity
- Sewer appurtenances with explanation of any two

Q5) Solve any two of the following:

(20)

- A sewage treatment plant produces 600 kg of dry solids per day at a moisture content of 95%. The solids are 70 % volatile with specific gravity of 1.05 and 30 percent non-volatile with a sp gravity of 2.5. Determine the sludge volume
 - In raw sewage
 - After digestion which reduces volatile solids content by 50 % and decreases moisture content to 92%
 - After dewatering to 70% moisture
 - After drying to 10% moisture
 - After incineration when only non-volatile solids remain
- Determine the dimensions of a high rate trickling filter for the following data:
 - Flow = 3 MLD
 - RR= 1.5
 - BOD of raw sewage = 250 mg/L
 - BOD removed in primary tank =25%
 - Final desired BOD =30 mg/LBy what percent the diameter of filter will have to be modified if it is to be designed as a standard rate filter for the above requirements?
- Design a continuous flow complete mix activated sludge process to yield an effluent BOD₅ of 20 mg/L. The influent BOD₅ following primary clarification is 210 mg/L. The waste flow is 10 m³/min.

Take $Y=0.60$, $k_d=0.06$, $\theta_c=12$ days, $MLVSS=3000 \text{ mg/L}$ and return sludge concentration is 14000mg/L of SS and $MLSS/MLVSS=0.75$

Q6) Answer any four the following questions :

(20)

- a) Explain noise pollution? Describe the sources and effects of noise pollution? Enumerate and explain control methods of noise pollution.
- b) Give a brief description of air pollution control devices for particulates and gaseous air pollutants.
- c) Describe the salient features of Water act, 1972 and Air act, 1981.
- d) Explain EMS and ISO 14001
- e) Functions of State Board as per Water act, 1974

Q7) Answer the following questions:

(20)

- a) Explain in short any two
 - i) Modification of activated sludge process (ii) BOD and COD (iii) Stabilization ponds (iv) Pumping station
- b) Convert the following:
 - i) 50 ppm of SO_2 to mg/L ii) 10 % of CO to mg/L.
- c) Design a manually cleaned bar screen for peak sewage flow of 35 MLD. Assume any suitable data required.

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RE- EXAM.2014-15

Total marks: 100

Duration: 3 Hours

CLASS/SEM: B.E.CIVIL / SEM-VIISUBJECT: IRRIGATION ENGINEERING

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- Attempt any FIVE questions out of seven questions.
- Answer to all sub questions should be grouped together.
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- 1 a) What do you understand by term irrigation? Explain necessity in a country like India. Discuss environmental effects of irrigation. (10)
- b) Explain duty and also relation between duty and delta. How duty can be improved? (10)
- 2 a) A loam soil has field capacity 27 % and permanent wilting percentage 12 %. The dry weight of soil is 13.73 KN/m^3 . If the depth of root zone is 1 m, Determine the storage capacity of soil. Irrigation water is applied when moisture content drops to 15 %. If water application efficiency is 75 %, determine the depth of water required to be applied in the field. (10)
- b) The following data refers to various crops grown under a canal system. Determine maximum discharge; given time and capacity factors as 0.70 and 0.80 respectively. Also determine the reservoir capacity; if transmission and evaporation losses are 11 % and 14 % respectively. (10)

Crop	Season	Duty (Ha/cumecs)	Base period (Days)	Area(Ha)
Rice	Kharif	850	180	60
Wheat	Kharif	1350	180	30
Maize	Rabi	1350	120	75
Cotton	Hot weather	850	200	40
Sugarcane	Perennial	1200	365	40

B.E. Civil - Sem VII

17/12/14.

Irrigation Engineering.

3 a) What are the methods of measurement of rainfall? Explain any two methods in detail. (10)

b) Followings are the observed flows from a storm of 6 Hr. duration on a stream with a drainage area of 316 km^2 . Assume a constant base flow of 17 cumecs, derive and plot 6 hr unit hydrograph. (10)

Time (hrs.)	0	6	12	18	24	30	36	42	48	54	60	66	72
Flow (cumecs)	17	113.2	254.2	198	150	113.2	87.7	67.9	53.8	42.5	31	22	17

4 a) Explain the terms: i) Aquifer, ii) Confined Aquifer, iii) Semi Confined Aquifer, iv) Aquitard, v) Well efficiency. (10)

b) A 45 cm diameter well penetrates 30 m below the static water table. After 24 hours of Pumping at 6000 lit/min the water level in the test well at 90 m is lowered by 0.53m and in a well at 30 m away the drawdown is 1.11m i) What is the transmissibility of aquifer? ii) Also drawdown in the main well. (10)

5 a) How are reservoirs classified? Describe briefly various types of reservoirs. (08)

b) A Gravity dam 50 m above the deepest foundation has 8 m top width 4.8 m free board suggest a suitable section and check stability for full reservoir condition. Assume necessary data. (12)

6 a) What are the causes of failure of earthen dam? (08)

b) Determine Canal dimension and discharge flowing through it with the help of following (12)

Data: i) B/D ratio= 3.5, $N = 0.0225$, $m = 1.0$ and $S = 1/3500$, side slope of channel $\frac{1}{2}$ horizontal to 1 vertical.

7 Write short notes on: a) Diversion head works, b) Canal outlets, c) Bandhara Irrigation

d) Water Logging

page no. 2.

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Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Permanently Affiliated to University of Mumbai)

END SEM EXAM.2014-15

Total marks: 100

B.E(CIVIL), Sem-VII
Duration: 3 Hours

MASTER.

CLASS/SEM:B.E.CIVIL SEM-VII

SUBJECT: IRRIGATION ENGINEERING

- Attempt any FIVE questions out of seven questions.
- Answer to all sub questions should be grouped together.
- Figures to right indicate full marks.
- Assume suitable data if necessary and state them clearly

- a) How irrigation systems are classified? Explain each system in detail. (10)
 - b) Describe in detail about water resources in India. What is command area development? (10)
- a) The root zone of a certain soil has field capacity of 24 % and permanent Wilting percentage is 8 %.i) what is the depth of moisture in the root zone at field capacity and permanent wilting point. ii) How much water is available if root zone depth is 1.1 m? The dry weight of soil is 13.75 KN/m^3 . (10)
 - b) The following data refers to various crops grown under a canal system. Determine the peak discharge; given time and capacity factors as 0.75 and 0.85 respectively. Also determine the reservoir capacity; if transmission and evaporation losses are 12 % and 15 % respectively. (10)

Crop	Season	Duty (Ha/cumecs)	Base period (Days)	Area(Ha)
Rice	Kharif	900	180	60
Wheat	Kharif	1400	180	30
Maize	Rabi	1400	120	75
Cotton	Hot weather	900	200	40
Sugarcane	Perennial	1200	365	40

- a) What are different methods of measurement of average rainfall? Explain in detail (10)

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B.ECC) Sem VII Irrigation Engg. 2/10/16

- b) The ordinates of 2-hr unit hydrograph for a particular basin are given below. Derive the ordinate of i) S-curve hydrograph ii) 4-hour unit hydrograph and plot them, area of basin is 630 km^2 (10)

Time(Hr)	0	2	4	6	8	10	12	14	16	18	20	22	24
Discharge(Cumec)	0	25	100	160	190	170	110	70	30	20	6	1.5	0

- 4 a) What are the methods of ground water exploration? Explain each in detail. (12)
- b) A 0.4 m diameter well fully penetrates an unconfined aquifer whose bottom is 80 m Below the undisturbed groundwater table .When pumped at a steady rate of $1.5 \text{ m}^3/\text{min}$ The drawdown observed in two observation wells at radial distances of 5m and 15 m are respectively 4m and 2m. Determine drawdown in the well. (08)
- 5 a) How reservoirs are classified? Discuss various investigations required for reservoir planning. (10)
- b) Explain with illustrative sketch how you would determine capacity of reservoir to avoid draught. How would you find dead and live storage? (10)
- 6 a) A concrete gravity dam non-overflow section with 205.00 m R.L. and 56 m width at foundation, R.L at top is 289 m and its width is 6m. R. L of spillway is 280 m, R.L of max. water level on upstream face is 285m and tail water level is 211.00 m and its width is 4.00m. Downstream face inclined with slope 2H: 3V. Drainage gallery is provided at distance 8.00 m from upstream face. Calculate i) Maximum vertical stresses at toe and heel of dam .ii) The major principle stress at toe and heel of dam. iii) intensity of shear stress on a horizontal plane near the toe. Assume suitable data if necessary. (12)
- b) Draw cross section of earthen dam and explaining their functioning in detail. (08)
- 7 a) Design a regime channel for discharge 40 cumec and silt factor 1.1. (10)
- b) Write short notes on (any two): a) Bandhara irrigation, b) canal outlets, c) Canal regulation works. (10)

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Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)

Subject : Limit state method of Reinforced concrete design

CLASS: BE (CIVIL) SEM VII

Total Marks : 100

Date: 8/12/2014

Duration : 3 Hour

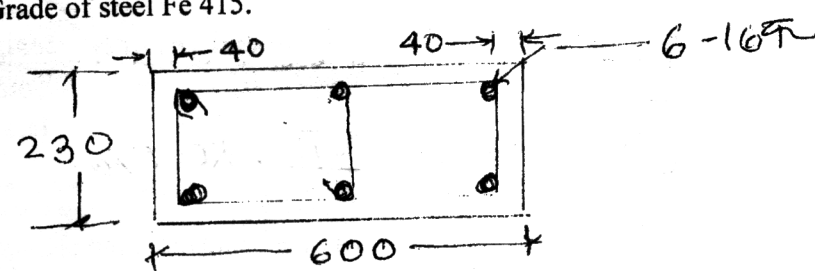
BE (CIVIL), Sem - VII, Re-Exam

- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.
- Solve any **Five** questions.

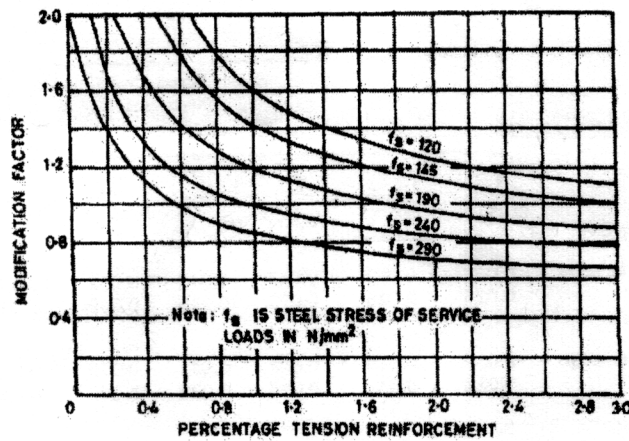
Master

Q.1 (a)	Design an isolated square flat footing for 300 mm x 300 mm column with 8- 16 dia reinforcement, subjected to service axial load of 1000 KN.S.B.C. of soil 150 KN/m ² . Grade of concrete for column M 25 and for footing M 20. Grade of steel Fe 415. Draw Reinforcement details	(16)
(b)	Explain with neat sketches concept of equivalent depth of flange y_f in case of flanged section.	(04)
Q.2	Design combined pad type footing for following data, Column C ₁ 400mm x 400mm with 8- 16 dia bars is subjected to an axial load of 1000 Kn, Column C ₂ 500mm x 500mm with 8- 20 dia bars is subjected to an axial load of 1550 Kn. Column C ₁ is on property line and centre to centre distance between columns is 4.0 M. S.B.C. of soil 250 KN/m ² . Grade of concrete for column and footing is M 20. Grade of steel Fe 415. Draw reinforcement details in section and in plan.	(20)
Q.3	A reinforced concrete beam 300 mm wide and 500mm effective depth is subjected to factored BM of 100 Kn-m, factored torsional moment of 20 Kn-m and factored shear force of 95 Kn, design flexural as well as shear reinforcement for the beam. Grade of steel Fe 415. Grade of concrete M20.	(20)
Q.4(a)	Calculate MR for flanged RC section for given data $b_f = 800$ mm $D_f = 90$ mm $D = 550$ mm $b_w = 250$ mm. $A_{st} = 2000$ mm ² Grade of concrete M20, Grade of steel Fe 415.	(14)
(b)	Design a short rectangular column of effective length 3.0 m subjected to an axial force of 1500 Kn Grade of concrete M20, Grade of steel Fe 415. Show reinforcement details	((06)

15/12/24

Q.5	<p>Calculate ultimate capacity of column section 230 x 600 mm shown below in axial compression and uni-axial bending if $x_u / D=1.1$ (along depth). M20 concrete grade, Grade of steel Fe 415.</p> 	(20)															
Q.6 (a)	<p>Explain characteristic strength and characteristic load used in case of Limit state design for RC sections.</p>	(04)															
(b)	<p>Design a two way slab of effective span 4.5 M x 3.5M ,the slab is discontinuous on two adjacent edges and is subjected to LL of 3.0 KN/m², Floor finish of 1.0 KN/m² in addition to its self weight. Show all relevant checks. Draw section showing reinforcement arrangement. Concrete grade M20, Grade of steel Fe 415.</p>	(16)															
Q.7 (a)	<p>Design a doubly reinforced section of dimension 230mm x 500 mm with effective cover for compression and tension steel as 50 mm subjected to ultimate design moment 250 Kn-m. Assume grade of concrete M20 and grade of steel Fe415.</p> <p style="text-align: center;">Table for F_{sc}</p> <table border="1"> <tr> <th>Grade of steel</th> <th colspan="4">d_c/d</th> </tr> <tr> <th></th> <th>0.05</th> <th>0.1</th> <th>0.15</th> <th>0.2</th> </tr> <tr> <td>Fe 415</td> <td>355.1</td> <td>351.9</td> <td>342.4</td> <td>329.2</td> </tr> </table>	Grade of steel	d_c/d					0.05	0.1	0.15	0.2	Fe 415	355.1	351.9	342.4	329.2	(12)
Grade of steel	d_c/d																
	0.05	0.1	0.15	0.2													
Fe 415	355.1	351.9	342.4	329.2													
(b)	<p>A singly reinforced concrete beam of section 250 mm x 600 mm effective depth is reinforced with 3-20 dia bars. Calculate ultimate moment of resistance of section. Use Ultimate load method. $f_{ck}= 200 \text{ kg/cm}^2$ and $f_y= 2600 \text{ kg/cm}^2$</p>	(08)															

15/12/14



$$f_s = 0.58 f_y \frac{\text{Area of cross-section of steel required}}{\text{Area of cross-section of steel provided}}$$

FIG. 4 MODIFICATION FACTOR FOR TENSION REINFORCEMENT

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Table 19 Design Shear Strength of Concrete, τ_v , N/mm^2
(Clauses 40.2.1, 40.2.2, 40.3, 40.4, 40.5.3, 41.3.2, 41.3.3 and 41.4.3)

$100 \frac{A_s}{bd}$	Concrete Grade					
	M 15	M 20	M 25	M 30	M 35	M 40 and above
(1)	(2)	(3)	(4)	(5)	(6)	(7)
≤ 0.15	0.28	0.28	0.29	0.29	0.29	0.30
0.25	0.35	0.36	0.36	0.37	0.37	0.38
0.50	0.46	0.48	0.49	0.50	0.50	0.51
0.75	0.54	0.56	0.57	0.59	0.59	0.60
1.00	0.60	0.62	0.64	0.66	0.67	0.68
1.25	0.64	0.67	0.70	0.71	0.73	0.74
1.50	0.68	0.72	0.74	0.76	0.78	0.79
1.75	0.71	0.75	0.78	0.80	0.82	0.84
2.00	0.71	0.79	0.82	0.84	0.86	0.88
2.25	0.71	0.81	0.85	0.88	0.90	0.92
2.50	0.71	0.82	0.88	0.91	0.93	0.95
2.75	0.71	0.82	0.90	0.94	0.96	0.98
3.00 and above	0.71	0.82	0.92	0.96	0.99	1.01

NOTE — The term A_s is the area of longitudinal tension reinforcement which continues at least one effective depth beyond the section being considered except at support where the full area of tension reinforcement may be used provided the detailing conforms to 26.2.2

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15/12/14

Table 26 Bending Moment Coefficients for Rectangular Panels Supported on Four Sides with Provision for Torsion at Corners
(Clauses D-1.1 and 24.4.1)

Case No.	Type of Panel and Moments Considered	Short Span Coefficients α_x (Values of l_y/l_x)							Long Span Coefficients α_y for All Values of l_y/l_x	
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	l_y/l_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	Interior Panels: Negative moment at continuous edge Positive moment at mid-span	0.032 0.024	0.037 0.028	0.043 0.032	0.047 0.036	0.051 0.039	0.053 0.041	0.060 0.045	0.065 0.049	0.032 0.024
2	One Short Edge Continuous: Negative moment at continuous edge Positive moment at mid-span	0.037 0.028	0.043 0.032	0.048 0.036	0.051 0.039	0.055 0.041	0.057 0.044	0.064 0.048	0.068 0.052	0.037 0.028
3	One Long Edge Discontinuous: Negative moment at continuous edge Positive moment at mid-span	0.037 0.028	0.044 0.033	0.052 0.039	0.057 0.044	0.063 0.047	0.067 0.051	0.077 0.059	0.085 0.065	0.037 0.028
4	Two Adjacent Edges Discontinuous: Negative moment at continuous edge Positive moment at mid-span	0.047 0.035	0.053 0.040	0.060 0.045	0.065 0.049	0.071 0.053	0.075 0.056	0.084 0.063	0.091 0.069	0.047 0.035
5	Two Short Edges Discontinuous: Negative moment at continuous edge Positive moment at mid-span	0.045 0.035	0.049 0.037	0.052 0.040	0.056 0.043	0.059 0.044	0.060 0.045	0.065 0.049	0.069 0.052	— 0.035

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27/10/14

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)

Subject : Limit state method of Reinforced concrete design

CLASS: BE (CIVIL) SEM VII

Date: 27/10/2014

Total Marks : 100

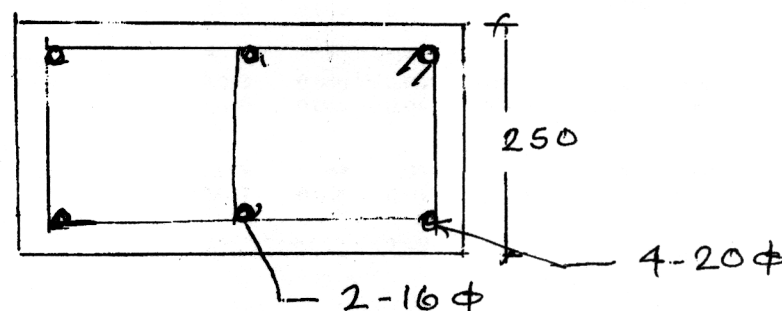
Duration : 3 Hour

B.E (CIVIL), Sem - VII

Master.

- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.
- **Question no. 1 is compulsory.**
- Solve any **Four** questions out of remaining questions.

- Q.1 (a) Define limit state and explain various limit states involved in design of R. C. Structures. (06)
- (b) Why minimum shear reinforcement is provided in RC beam section? State different clauses governing spacing of shear reinforcement requirement (06)
- (c) Explain the difference in behavior of short column and long column. (04)
- (d) Why is it that γ_c is applicable at all stress levels for concrete whereas γ_s is applicable only near the 'yield stress' level for steel? Draw stress strain diagram for concrete and steel used in design. (04)
- Q.2 (a) Design a two way slab of effective span 4.0 M x 3.5M, the slab is discontinuous on one long edges and is subjected to LL of 3.0 KN/m², Floor finish of 1.0 KN/m² in addition to its self weight. Show all relevant checks. Draw section showing reinforcement arrangement. Concrete grade M20, Grade of steel Fe 415. (14)
- (b) A singly reinforced concrete beam of section 250 mm x 500 mm effective depth is subjected to ultimate moment of 20 Ton-m. Calculate reinforcement required. Use Ultimate load method. $f_{ck} = 200 \text{ kg/cm}^2$ and $f_y = 2600 \text{ kg/cm}^2$ (06)
- Q.3 Calculate ultimate capacity of column section 250 x 600 mm shown below in axial compression and uni-axial bending if $x_u / D = 1.5$ (along depth). M25 concrete grade, Grade of steel Fe 415. *clear cover = 40 mm* (20)



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page ①

pg 1

Q.4 Design combined pad type footing for following data, Column C_1 300mm x 300mm (20)
with 4 - 20 dia bars is subjected to factored axial load of 750 Kn, Column C_2 450mm
x 450mm with 8- 20 dia bars is subjected to factored axial load of 1300 Kn. Column
 C_1 is on property line and centre to centre distance between columns is 4.5 M. S.B.C.
of soil at a depth of 1.5M is 200 KN/m². Grade of concrete for column and footing is
M 25 and M20 respectively. Grade of steel Fe 415. Draw reinforcement details in
section and in plan.

Q.5 (a) Design an isolated square trapezoidal sloping footing for 350 mm x 350 mm column (14)
with 8- 20 dia reinforcement, subjected to service axial load of 1000 KN. S.B.C. of
soil at a depth of 1.2 M is 175 KN/m². Grade of concrete for column M 25 and for
footing M 20. Grade of steel Fe 415.

(b) Design a doubly reinforced section of dimension 230mm x 600 mm with effective (06)
cover for compression and tension steel as 50 mm subjected to ultimate design mo
ment 300 Kn-m. Assume grade of concrete M20 and grade of steel Fe415.

Table for F_{sc}

Grade of steel	d_c/d			
	0.05	0.1	0.15	0.2
Fe 415	355.1	351.9	342.4	329.2

Q.6 A reinforced concrete beam 300 mm wide and 550mm effective depth is subjected to (20)
factored BM of 100 Kn-m, factored torsional moment of 25 Kn-m and factored shear
force of 85 Kn, design flexural as well as shear reinforcement for the beam.

Q.7(a) Calculate MR for flanged RC section for given data (14)

$$b_f = 900 \text{ mm } D_f = 80 \text{ mm } D = 550 \text{ mm } b_w = 250 \text{ mm. } A_{st} = 2500 \text{ mm}^2$$

Grade of concrete M20, Grade of steel Fe 415.

(b) Design a short rectangular column of effective length 4.0 m subjected to an axial ((06)
force of 1750 Kn Grade of concrete M25, Grade of steel Fe 415. Show reinforcement
details.

Table 19 Design Shear Strength of Concrete, τ_c , N/mm²
(Clauses 40.2.1, 40.2.2, 40.3, 40.4, 40.5.3, 41.3.2, 41.3.3 and 41.4.3)

$100 \frac{A_s}{bd}$	Concrete Grade					
	M 15	M 20	M 25	M 30	M 35	M 40 and above
(1)	(2)	(3)	(4)	(5)	(6)	(7)
≤ 0.15	0.28	0.28	0.29	0.29	0.29	0.30
0.25	0.35	0.36	0.36	0.37	0.37	0.38
0.50	0.46	0.48	0.49	0.50	0.50	0.51
0.75	0.54	0.56	0.57	0.59	0.59	0.60
1.00	0.60	0.62	0.64	0.66	0.67	0.68
1.25	0.64	0.67	0.70	0.71	0.73	0.74
1.50	0.68	0.72	0.74	0.76	0.78	0.79
1.75	0.71	0.75	0.78	0.80	0.82	0.84
2.00	0.71	0.79	0.82	0.84	0.86	0.88
2.25	0.71	0.81	0.85	0.88	0.90	0.92
2.50	0.71	0.82	0.88	0.91	0.93	0.95
2.75	0.71	0.82	0.90	0.94	0.96	0.98
3.00 and above	0.71	0.82	0.92	0.96	0.99	1.01

NOTE — The term A_s is the area of longitudinal tension reinforcement which continues at least one effective depth beyond the section being considered except at support where the full area of tension reinforcement may be used provided the detailing conforms to 26.2.2

Table 26 Bending Moment Coefficients for Rectangular Panels Supported on Four Sides with Provision for Torsion at Corners
(Clauses D-1.1 and 24.4.1)

Case No.	Type of Panel and Moments Considered	Short Span Coefficients α_s (Values of l_y/l_x)								Long Span Coefficients α_y for All Values of l_y/l_x
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	Interior Panels:									
	Negative moment at continuous edge	0.032	0.037	0.043	0.047	0.051	0.053	0.060	0.065	0.032
	Positive moment at mid-span	0.024	0.028	0.032	0.036	0.039	0.041	0.045	0.049	0.024
2	One Short Edge Continuous:									
	Negative moment at continuous edge	0.037	0.043	0.048	0.051	0.055	0.057	0.064	0.068	0.037
	Positive moment at mid-span	0.028	0.032	0.036	0.039	0.041	0.044	0.048	0.052	0.028
3	One Long Edge Discontinuous:									
	Negative moment at continuous edge	0.037	0.044	0.052	0.057	0.063	0.067	0.077	0.085	0.037
	Positive moment at mid-span	0.028	0.033	0.039	0.044	0.047	0.051	0.059	0.065	0.028
4	Two Adjacent Edges Discontinuous:									
	Negative moment at continuous edge	0.047	0.053	0.060	0.065	0.071	0.075	0.084	0.091	0.047
	Positive moment at mid-span	0.035	0.040	0.045	0.049	0.053	0.056	0.063	0.069	0.035
5	Two Short Edges Discontinuous:									
	Negative moment at continuous edge	0.045	0.049	0.052	0.056	0.059	0.060	0.065	0.069	—
	Positive moment at mid-span	0.035	0.037	0.040	0.043	0.044	0.045	0.049	0.052	0.035

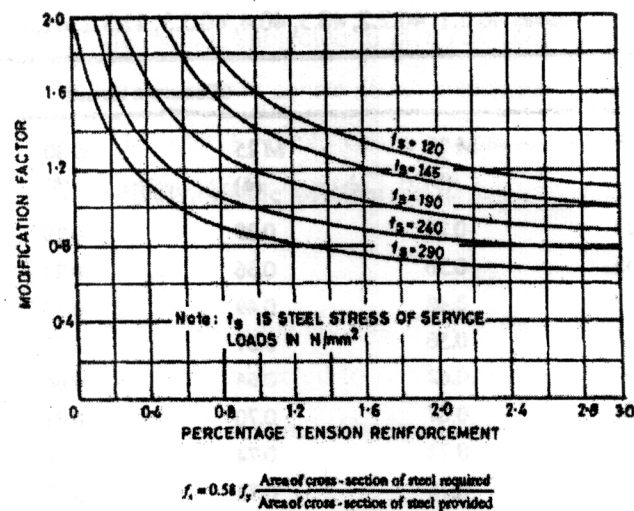


FIG. 4 MODIFICATION FACTOR FOR TENSION REINFORCEMENT

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Table 3.2 Design stresses at specific

Fe 415	
Strain	Stress (MPa)
0.000 00	0.0
0.001 44	288.7
0.001 63	306.7
0.001 92	324.8
0.002 41	342.8
0.002 76	351.8
$\geq 0.003 80$	360.9

Design Stresses at specified strain values

Page (4)

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7-11-14

BHARARATIYA VIDYA BHAVAN'S
SARDAR PATEL COLLEGE OF ENGINEERING
Munshi Nagar Andheri (West), Mumbai 400 058
(An Autonomous Institution Affiliated to University of Mumbai)
END SEM EXAM

CLASS/SEM: **BE / VII** *Civil*,
Subject: **Restructuring & Deregulation**

Total Marks : 100
Duration : 3 hour
Date: 07/11/2014

B.E (Civil), Sem - VII

Master

- Attempt any **FIVE** out of the **SEVEN** questions.
- Answer to all sub questions should be grouped together.
- Assume **suitable data** where required.

Q.1	A) State the different types of regulation. Explain rate of return regulation with example. Also state its advantages and disadvantages.	(10-Marks)
	B) Explain regulatory process in India in detail.	(10-Marks)
Q.2	A) Name the various institutions in Indian power sector and explain the functions of any four institutions in brief.	(10-Marks)
	B) Differentiate between regulated power industry and deregulated power industry.	(5-Marks)
	C) Write a short note on Indian Energy Exchange and its working.	(5-Marks)
Q.3	Write International experience with electricity reform of following countries: i)India ii)USA iii)Write Energy Crises in India.	(20-Marks)
Q.4	A) Explain Tariff setting principles and choice of rate structure. Also explain in brief concept of subsidy & cross subsidy.	(10-Marks)
	B) What is ABT and also mention the advantages of it?	(10-Marks)

Q.5	<p>A) How the electricity market is peculiar than other commodity markets?</p> <p>B) Explain different types of structural models of electricity markets?</p>	<p>(10-Marks)</p> <p>(10-Marks)</p>
Q.6	<p>A) Explain three models of trading arrangement model and also mention the advantages of each?</p> <p>B) What are the information required to do retail access settlements and whom do you think should be settlement agent and why?</p>	<p>(10-Marks)</p> <p>(10-Marks)</p>
Q.7	<p>Write short note on the following.</p> <p>A) Explain the terms</p> <ul style="list-style-type: none">i) Typical cost components of utility.ii) Debt and Equityiii) Net profit valueiv) Profitability Indices. <p>B) What do you mean by reform in power sector? State the rationale behind it.</p> <p>C) State the different methods of transmission pricing and transmission services.</p>	<p>(8-Marks)</p> <p>(6-Marks)</p> <p>(6-Marks)</p>

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7-11-14

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)

Total Marks: 100

Duration: 3 Hours

CLASS – B.E. CIVIL, SEM-VII, 2014-15

SUBJECT: Solid Waste Management

- Question No. 1 is compulsory
 - Attempt any four more questions from the remaining six
 - Make suitable assumptions if necessary and state them clearly.
 - Draw neat sketches where necessary and show all supporting calculations
 - Figure on right indicate maximum marks for the given question
- Master*

Q1 Answer any four of the following:

(20)

- a) Explain transfer stations and their types
- b) Estimate total theoretical amount of gas (CH_4 and CO_2) that could be produced in a landfill per unit weight of solid waste. Assume that decomposable organic waste is 500 kg and chemical formula of waste is $\text{C}_{70}\text{H}_{80}\text{O}_{40}$.
- c) Draw two options of material recovery sheet showing front end and rear end system for municipal solid waste consisting of 50-55 % organic matter
- d) Explain the process of incineration with a figure. Explain how the heat produced can be trapped to generate electricity (Hint: Explain water wall construction with other methods to generate vapour)
- e) Write a note on HCS and SCS. Explain total time for trip, pick up time, haul time and at site time. Derive equations for total trip time for both the system.

Q2 Answer any two of the following questions

(20)

- (a) Explain what are solid wastes? What are the various sources of municipal solid wastes? Explain the factors affecting generation rates of solid waste?
- (b) What are biomedical wastes? What are their characterization? How they can be treated?
- (c) Explain construction wastes and how to reuse/recover them?

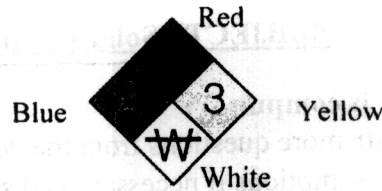
Q3 Write notes on any four

(20)

- (a) ISO 14001
- (b) Solid Waste Management of Mumbai City
- (c) Composting and factors affecting it
- (d) Functional elements of integrated solid waste management
- (e) Radioactive wastes and their disposal
- (f) Responsibility chart given in solid waste management rules, 2003

Q4 Answer following Questions (20)

- (a) What is hazardous waste? Describe the characteristics of hazardous wastes? How would you treat them? (10)
- (b) Describe main points of hazardous waste management rules, version 2001 (06)
- (c) Explain NFPA symbol terminology and then derive what each of the following symbol means? (04)



Q5 Answer the following Questions (20)

- (a) Explain landfills? State their types? Discuss the construction of secured landfill? Explain the procedure for landfilling (10)
- (b) Explain with a note on any two thermal recovery methods used to recover energy from solid wastes and two volume reduction methods of solid waste management (10)

Q6 Answer the following : (20)

- (a) Find a trade-off distance between the stationary container System and hauled container system for the following data : (10)

Hauled container system	Stationary container system
Quantity of waste = 800 m ³ /wk	Quantity of solid wastes = 800 m ³ /wk
Container size = 5 m ³ /d	Container size = 2.5 m ³ /location
Container utilization factor = 0.7	Container utilization factor = 0.75
Container pick up time = 0.04 hrs/trip	Collection vehicle capacity = 16 m ³ /trip
Container unloading time = 0.04 hrs/trip	Compaction ratio = 3
At site time = 0.05 hr/trip	Container unloading time = 0.05 hr/container
Overhead costs = Rs 60,000/wk	Overhead cost = Rs 80,000/wk
Operational costs = Rs 5000/hr of operation	Operational cost = Rs 4000/hr of operation
	At site time = 0.2 hr/trip

Location characteristics

- a. Average distance between container locations = 0.2 km
- b. Constants for estimating driving time in both the systems
HCS : a' = 0.06h/trip and b' = 0.06h/km
SCS : a' = 0.06 hr/location and b' = 0.06hr/km
- c. Constants for estimating haul distance a = 0.03 hr/trip, b = 0.03h/km
- (b) Explain refused derived fuels with the material flow sheet for the same (05)
- (c) Conversion of low fuel gas to high fuel gas (05)

Q7 Solve the following :

(20)

(06)

- (a) Draw and Fill the material balance sheet for the following sorting problem:
Assume 1000 kgs of waste described in Table 1 are processed as shown in Figure 1. Using data from Figure 1, calculate the amount of waste recovered by the air classifier, magnet, and screen as well as the amount landfilled. Complete Table 1. What is the % Composition of the landfilled waste?

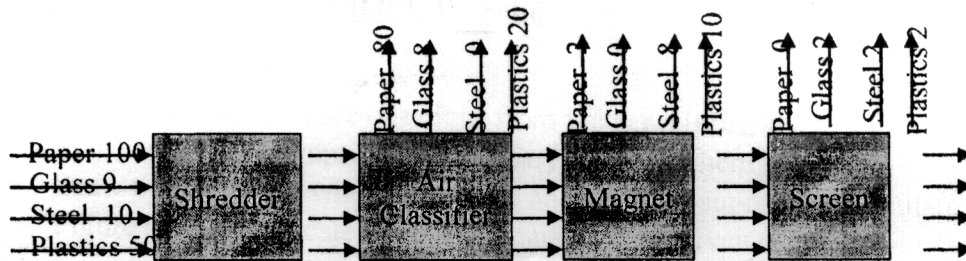


Fig 1.

Table 1.

Component	Collected, % by wt.	Recovered			Pass Through			To Landfill	% Comp.
		AC	M	S	AC	M	S		
Food Waste	10								
Paper	30								
Glass	8								
Steel	9								
Plastics	6								
Wood	8								
Yard Waste	22								
Leather	2								
Rubber	5								
Total									

(10)

- (b) Write the basic equations for complete aerobic and anaerobic reaction if the initial compound is $\text{Ca H}_b \text{O}_c \text{N}_d$. Estimate the amount of oxygen required to compost 400 kg of solid waste. Assume initial composition of material to be composted given by $[\text{C}_6\text{H}_3\text{O}_2(\text{OH})_8\text{N}]_5$ and that the final composition of the waste is $[\text{C}_6\text{H}_3\text{O}_2(\text{OH})_8\text{N}]_2$ and 200 kg of material remains after composting. Perform a mass balance on the same

- (c) Determine the break even time for a hauled and stationary container system as compared to a system using transfer and transport operation for transporting wastes collected from a city to a landfill site. Following data is given:

(04)

Transportation costs

- Hauled container system using a hoist truck with 4 m³ contained = Rs 30/hr
- Stationary container system using 3m³ compactor = Rs 40 /hr
- Tractor trailer transport unit with a capacity of 30 m³ = Rs 50 /hr
- Other costs :
 - Transfer station operation cost including amortization = Rs 3/m³
 - Cost of extra unloading time for tractor trailer trailer = Rs 1/m³

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7-11-14

SARDAR PATEL COLLEGE OF ENGINEERING

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END SEMESTER EXAM

Master

B.E(CIVIL), Sem. VII

Total Marks-100

Date: 07/11/2014

Class/Sem: B.E(CIVIL), Sem VII

Duration-1 hour

Subject: Traffic Engineering and control

1. Attempt any five out of seven.
2. Answers to all sub questions should be grouped together.
3. Illustrate answer with neat sketches wherever required.
4. Make suitable assumptions where necessary and state them clearly.
5. Figure to right indicate full marks.

Q1. a) Define LOS , Time mean speed , Space headway, Flow, 98 percentile speed. (5)

b) Write down the purpose and describe the methods for conducting spot speed study. (10)

c) Table below indicates the values of spot speeds observed at location. Classify data into a frequency table. Also find a) 85% speed b) Modal speed (5)

Speed Class	Frequency
24.45-29.45	1
29.45-34.45	3
34.45-39.45	6
39.45-44.45	9
44.45-49.45	12
49.45-54.45	10
54.45-59.45	5
59.45-64.45	1
64.45-69.45	1

Q2 a) What are the factors affecting LOS? Explain (5)

b) Define:- Effective Green Time, Intergreen Period, Weaving length, Practical capacity, Density (5)

c) What is shockwave? Derive Lightill and Whitams expression and explain all its three cases with proper sketch and conditions. (10)

Q3 a) Enlist the methods for traffic volume count and explain them. (10)

b) One lane of a 2 lane one way carriageway is closed for repairs. The maximum mean free speed is 65 kph, the average space headway is 12.5 m. The volume of traffic on 2 lane road is 1600 veh/hr. Find (10)

i) Average speed of traffic in bottleneck.

ii) Average speed of traffic at the approach of bottleneck.

iii) Speed of shockwave.

Q4. a) A fixed 2-phase signal is to be provided at an intersection having a North-South and East-West road with through traffic permitted. Calculate optimum cycle length, draw phase diagram.

Take Red period = 2 sec/phase, initial delay (I) = 2 sec (10)

	North	South	East	West
Flow (q) PCU/hr	600	450	800	810
Saturation flow (s) PCU/hr	2400	2000	3000	3000

b) write down the purpose of Accident studies. (5)

c) Describe Car Following Theory. (5)

Q5. a) The free speed on a highway was found to be 90 km/hr and the jam density was 60 vehicles/km. What is the maximum flow (q) and Speed (V) which could be expected on highway? (5)

b) What are the control devices meant for regulating the traffic flow? Explain all the types of signs with three diagrams each. (10)

c) Write the objectives for carrying out Origin-Destination survey. (5)

Q6. a) What are the various types of signals and their significance. Why coordination is necessary in signals? (10)

b) At an uncontrolled T-junction, the probability of a vehical arrival on side road and turning right into the main road is 1/5. Find the probability that in n=3 (no of intervals), there will be 0,1,2,3, vehicles arriving and turning right. (5)

c) What are the assumptions in queuing theory? (5)

Q7. a) A toll plaza handles 140 veh/hr, the flow of vehicles arriving at the toll plaza is 80 veh/hr.

Find i) the length of queue ii) Expected no of customers in system iii) Average time spent by vehicle in system iv) Average time spent by vehicles in a queue. (10)

b) What is Simulation? Classify it, explain microsimulation with its models. Also explain VISSIM. (10)