



Rajarambapu Institute of Technology, Rajaramnagar
(An Autonomous Institute)

Enrol. No	
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First Year M.Tech. Civil-Cont.mgt (SEMESTER - I) Examination, Dec.2011.

EM-005

Construction Planning Scheduling & Control (CEC-501)

Day and Date: Monday, 19/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

- Instructions –
- i) All questions are compulsory.
 - ii) Figures to the right indicate full marks.
 - iii) Assume suitable data wherever necessary.
 - iv) Use separate answer book for each section.
 - v) Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION-I

Q.1 a. Explain objectives and functions of construction management with suitable example.

10

b. Prepare work breakdown structure for residential building.

06

or

b. Explain project work breakdown levels in detail.

06

Q.2 a. The following are the activities and their durations of a small project. Draw the network and mark critical path. Prepare activity table showing EST, EFT, LST, LFT and all floats.

Activity	1-2	1-3	1-6	2-5	2-3	3-4	4-5	4-7	5-6	6-8	6-7	7-8
Duration in days	3	5	7	6	0	4	0	4	6	4	0	7

14

b. Explain different types of schedules used in construction management.

04

or

b. Explain types and stages of construction.

04

Q.3 a. Following data refers to a project. Carry out resource leveling as per EST schedule so that not more than six men are used on any day.

Activity	Duration	Resources (Men)
1-2	3	2
1-3	3	4
1-4	6	3
2-3	6	3
3-4	3	5

12

b. Enlist advantages of precedence network over CPM network with suitable example. 04

SECTION-II

Q.4 a. Carryout step by step network compression and determine optimum cost and optimum duration of the project if the indirect cost is Rs. 60.00 per day.

Activity	Duration in days		Cost in Rs.	
	Normal	Crash	Normal	Crash
1-3	6	3	300	360
1-5	6	4	450	500
1-7	4	2	360	420
1-9	6	3	600	675
3-5	3	2	325	350
5-7	2	1	250	285
7-9	2	1	310	350

14

b. Comment on effect of direct and indirect cost on total cost of project. 04

Q.5 a. Following table shows the activity and its duration pertaining to a small construction project.

Activity	1-2	1-3	1-4	2-5	3-6	4-7	5-7	6-7	6-8	7-9	8-9
Duration in days	3	2	2	4	5	8	3	3	3	7	4

Review of the progress was made 8 weeks after the start of the project. Following progress was reported.

- Activity 1-2, 1-3, 1-4 and 2-5 have been completed as originally scheduled.
- Activity 3-6, 4-7 and 5-7 are in progress and will require 4,2,3 more days respectively for its completion.

- iii. Activities 6-7, 6-8, 7-9 and 8-9 are yet to start and the durations are re estimated as 3, 4, 9 and 4 days respectively. Update the network and determine what the total increase is in the project duration. **12**
- b. Prepare an organization structure for a construction company. **04**
- Q.6** a. Prepare site layout for a earthen dam and explain points to be considered while preparing it. **08**
- b. Justify the importance of method study with suitable example. **08**
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First Year M.Tech. Civil-Str. (SEMESTER - I) Examination, Dec.2011.

EM-004

Mechanics of Structures (CES-501)

Day and Date: Monday, 19/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

Instructions –

- i) All questions are compulsory.
- ii) Figures to the right indicate full marks.
- iii) Assume suitable data wherever necessary.
- iv) Use separate answer book for each section.
- v) Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION I

- Q.1(a) Define ILD and state its uses 5
(b) Construct influence line diagram for horizontal thrust, bending moment and radial shear at a quarter span for two hinged parabolic arch of span L and rise h 12
- Q.2. A uniform cross section having radius r, a rigid horizontal bent ABC (Angle $B=90^\circ$) in plan is fixed at A and simply supported at C. It carries uniformly distributed load 10 KN/m over the entire length. $AB=BC=4m$. Draw BMD and TMD. Take $EI=2.5 GJ$ 16
- Q.3. Find the equations for deflection, foundation pressure, slope, bending moment and shear force for a long beam (semi-infinite) rest on elastic foundation, subjected to clockwise bending moment M_0 acting at one end which is hinged. Also draw corresponding diagrams. 17

OR

- Q.3. A long beam of wood with cross section 100mm wide by 200mm deep rests on a soil bed having spring constant of $4.5 N/mm^2$. The modulus of elasticity of wood is $10.5kN/mm^2$. The wooden beam supports a uniformly distributed load of $36kN/m$ extending over a length of 3m. Calculate the maximum values of deflection, flexural and shear stresses in the beam. 17

SECTION II

- Q.4. A beam- column simply supported at the ends is subjected to an axial compressive force P at both the ends and a lateral beam load is uniformly distributed over the entire length of intensity w per unit length. Develop the equation for the elastic curve; also find maximum deflection, and bending moment. Assume the beam-column is prismatic. 17

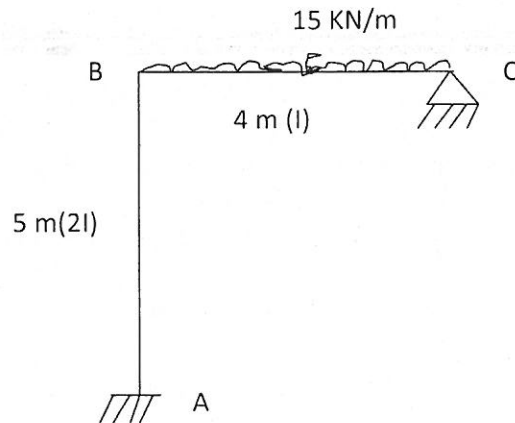
H.S. Jadhav

S.N. Tamde

- Q.5. a) Show that the flexibility and stiffness matrix are inversely proportional to each other, with suitable example. 5
- b) A beam ABC is fixed at A and roller supported at B and C such that $AB=BC=10\text{m}$. It is subjected to point load of 24 KN and 12KN at center of each span. Analyse the beam by using flexibility method. Also draw BMD. $EI=\text{constant}$ 12
- Q.6. A continuous beam ABCD is fixed at A, simply supported at B and C such that $AB = BC = 4\text{m}$ and overhang $CD = 1\text{m}$. It carries a UDL of 10 KN/m over span AB, central point load of 50KN over span BC and a 20KN load at D. Analyze beam by using stiffness method. 16

OR

- Q.6. Analyze a frame loaded as shown in figure, by using stiffness matrix method. Also draw B.M.D. 16



c



Rajarambapu Institute of Technology, Rajaramnagar
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First Year M.Tech.Civil-Str. (SEMESTER - I) Examination, Dec.2011.

EM-013

Dynamics & Structure (CES-503)

Enrol. No	
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Day and Date: Tuesday, 20/12/2011
Time: 10.00am to 01.00pm

Max Marks- 100

- Instructions –
- i) All questions are compulsory.
 - ii) Figures to the right indicate full marks.
 - iii) Assume suitable data wherever necessary.
 - iv) Use separate answer book for each section.
 - v) Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION I

Q. 1. A mass of 2 kg is supported by a damped spring, where the damping constant is 2.8 Nsm⁻¹. The mass is displaced 20 mm from its equilibrium position and released from rest, and the frequency is observed to be 2.5 Hz. Find (a) the displacement after 5 complete cycles (b) the time taken for the displacement to be reduced to 5% of the initial displacement. 16

Q. 2. Using Duhamel's Integral determine the maximum response of a SDOF system subjected to a rectangular pulse of intensity 60KN and duration of 0.50 sec. The natural frequency of the system is 0.3 Hz. 18

OR

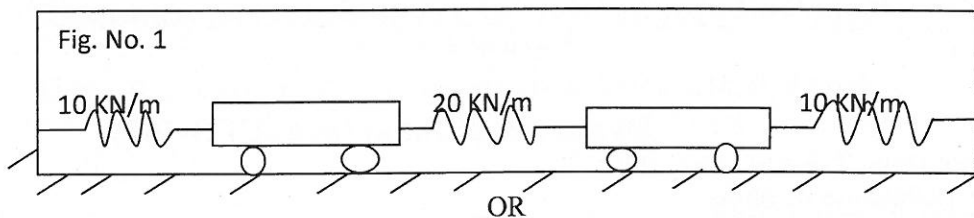
A) Define the term logarithmic decrement. Show that damping ratio $\xi = \frac{1}{2\pi n}$ $e \ln \left(\frac{x_i}{x_{i+1}} \right)$. Where n number of cycles, Xi amplitude of vibration at ith cycle and Xi+1 amplitude of vibration at (i+1)th cycle. 09

B) A 25 N weight is suspended from a spring which has a stiffness $k = 0.42 \text{ Nmm}^{-1}$. The weight is given an upwards velocity of 5 ms^{-1} when it is 40 mm above its equilibrium position. Determine the equation for the motion of the weight, and its maximum upward displacement. Assume positive displacement is downward. 9

Q. 3 A machine part weighing 40N vibrates in a viscous medium. Determine the damping coefficient when a harmonic exciting force of 50N results in resonant amplitude of 1.25cm with a period of 0.2 sec. if the system is excited by a harmonic force of frequency 4 cycles/sec, what will be the % increase in the amplitude of forced vibration when damper is removed? 16

SECTION II

Q. 4 If mass m_1 is displaced 1 cm from its static equilibrium position and released, determine the resulting displacements of the masses as shown in figure. Take $m_1 = m_2 = 1000\text{kg}$ 16



Two blocks of mass m_1 and m_2 connected together by spring of the constant K , are resting on a smooth horizontal surface. Obtain the expression for natural frequencies of the system. 16

Q. 5 Use Stodola's method to find the fundamental mode of vibration and its natural frequencies of the spring mass system. Take $K_1 = K_2 = K_3 = 10 \text{ N/cm}$, $M_1 = M_2 = M_3 = 1\text{Kg}$ 16

Q. 6 A) Explain Dunkerley's method to find fundamental frequency. 09

B) Derive the equation of motion for a uniform beam in flexure starting from first principle. 09



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First Year M.Tech.Civil- Const.Mgt (SEM. - I) Examination, Dec.2011.

EM-014

Project Economics & Financial Management (CEC-503)

Day and Date: Tuesday, 20/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

Instructions –

- i) All questions are compulsory.
- ii) Figures to the right indicate full marks.
- iii) Assume suitable data wherever necessary.
- iv) Use separate answer book for each section.
- v) Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION-I

Q.1 a. What are the various methods of selecting the alternatives? Explain any one method .06

b. A person deposit RS.90000 now is in account. How much amount he will get every year upto 10 years, if the rate of interest is 9%? **06**

c. A couple plans to start saving money by depositing Rs.5000.00 in to their saving account 1 year from now. They estimate that the deposits will increase by Rs.1000.00 each year for 9 years thereafter. What would be the present worth of the investments if the rate of interest is 8% per year? **06**

Q2. a. Compare machines below by using annual worth method. Rate of interest 12%

	Machine A	Machine B
Initial cost	Rs.12 lakhs	Rs.16 lakhs
Annual disbursements	Rs.1.5 lakh	RS.1.2lakh
Salvage value	Rs.4 lakhs	Rs.4.5 lakhs
Annual returns	3 years	6 years
Life in years	8	10

12

b. What do you mean be IRR?

04

Q.3 A company decided to invest Rs. 1, 00000/- in new machinery whose estimated life is 5 years and scrap value is Rs. 30,000.

Assume 50% as tax rate, given below is cash flow **before tax and interest.**

Year	Cash flow	10% P.V
1	80,000	0.909
2	1,00,000	0.826
3	1,05,000	0.751
4	1,10,000	0.683
5	1,10,000	0.620

Find - i) payback period ii) NPV at 10% discounting rate **16**

OR

Explain the concepts of capital budgeting

i) Payback period ii) NPV **16**

SECTION-II

Q.4) From the following information prepare a statement showing requirement of working capital budgeted sells (Rs.10perunit) (Rs.2 Lakhs per annum)

Particulars	Amount
Raw Material	0.30
Direct labour	0.40
Overhead	0.20
Total cost	0.90
+ Profit	0.10
Selling Price	1.00

It is estimated that

Raw material is carried in stock for three weeks & finished goods for two weeks.

Factory processing will take 3 weeks.

Supplier will give 5 weeks credit.

Customer will require 8 weeks credit

Managers salary Rs.10000/-

Lag in Payment of overheads 2 weeks & labour 3 weeks

Assume 10 % as contingency

It may be assume that wages & overheads accrued evenly throughout the year. **18**

OR

a) Determinates of working capital?

b) What is working capital cycle?

18

Q.5) Attempt any Two.

a) What is meant by balance sheet?

b) What is meant by venture capital?

c) What is meant by ratio analysis

16

Q.6) Attempt any two.

a) What is BOOP?

b) What are different sources of finance?

c) Difference between equity shares and Deventer?

16



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First Year M.Tech.Civil-Const.Mgt) (SEMESTER - I) Examination, Dec.2011.

EM-024

Construction Techniques (CEC-505)

Day and Date: Wednesday, 21/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

Instructions –

- i) All questions are compulsory.
- ii) Figures to the right indicate full marks.
- iii) Assume suitable data wherever necessary.
- iv) Use separate answer book for each section.
- v) Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION ONE

- Q. 1 (a) State work cycle for drill and blast method of tunnelling. Explain how work cycle can be expedited for on time completion? 6

OR

Explain and justify different thumb rules for blast design?

- (b) Enlist various problems encountered in conventional underwater blasting and suggest suitable remedial measures. 6

OR

Write a note on underwater drilling.

- (c) Explain step wise procedure of construction of a Diaphragm wall. 6

- Q. 2 (a) Explain the Tremie method of underwater concreting. 6

- (b) List out the advantages of and difficulties faced in Pre-fabricated construction work. 6

OR

Discuss the importance of prefabrication Technology in underwater construction.

- (c) Compare Concreting by RMC and Site mix. 4

- Q. 3 (a) List out various grouting methods used for grouting. Write the need of grouting. 6

- (b) Write the parameters for selection of proper grouting method. 6

OR

Suggest the best grouting in contaminated soil. Explain it in detail.

- (c) List out advantages and disadvantages of Series grouting and Stop grouting. 4

SECTION TWO

- Q. 4 (a) List out the selection parameters for dewatering system in various types of soil. 6

OR

Draw a schematic diagram of Well point system of dewatering. List out its advantages and disadvantages.

- (b) Write a note on Piezometer. How does it help evaluate performance of dewatering system? 6

OR

What are the selection parameters of dewatering pumps? Discuss the problems to be faced in wrong selection of dewatering pump.

- (c) List out various groundwater control methods. Explain Vacuum dewatering. 6
- Q. 5 (a) What are various pile driving methods? Discuss piling by Vibration. 6
(b) Write applications of – 6
a) Precast reinforced concrete piles;
b) Raker piles and
c) Anchor piles.

OR

Suggest suitable type of pile for – a) Granular soil with boulders underlain by stiff clay and b) Black cotton soil. Justify your answers.

- (c) What is Underream? Write the applications of Underreamed piles. 4
- Q. 6 (a) List out various types of Caisson and Cofferdam. Write applications of each of them. 6
(b) Compare Pneumatic caisson and Open caisson. 6

OR

List out –i) selection parameters of cofferdam, and ii) loads considered for designing of cofferdam.

- (c) Write situations where following traditional sheet pile cofferdams are suitable. 4
i) U shaped, ii) Z shaped, iii) Flat, and iv) Arch shaped.



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First Year M.Tech. Civil –Stru. (SEMESTER – I) Examination, Dec.2011.

EM-023

Theory of Elasticity & Plasticity (CES-505)

Day and Date: Wednesday, 21/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

- Instructions –
- All questions are compulsory.
 - Figures to the right indicate full marks.
 - Assume suitable data wherever necessary.
 - Use separate answer book for each section.
 - Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION- I

1.a) Derive the expressions for Lamé's constants μ and λ from strain- stress relations and obtain set of stress- strain relations for isotropic elastic solids. (08)

b) At a point the state of strain is as follows. $\epsilon_x = C_1 z(x^2 + y^2)$; $\epsilon_y = x^2 z$ and $\gamma_{xy} = 2C_2 xyz$, where C_1 and C_2 are constants. If this strain field is a compatible one, find the value C_1 and C_2 . (08)

2.a) Define stress function, harmonic function and biharmonic function. (06)

b) Prove that the following are Airy's stress functions and examine the stress distribution represented by them

i) $\phi = Ax^2$, ii) $\phi = Ax^2 + By^2$, iii) $\phi = Cxy$, iv) $\phi = Ax^3$. (12)

OR

2.a) From known expressions for radial and circumferential stresses in a thick cylinder of external and internal radii 'a' and 'b' respectively subjected to internal and external pressures p_i and p_o respectively, derive the expressions for above mentioned stresses when

i) only internal pressure p_i is acting

ii) only external pressure p_o is acting with external radius 'b' $\rightarrow \infty$, (problem of tunnel) and hence find stress concentration factor for circumferential stress at inner surface. (10)

b) Write the expressions for radial stress, circumferential stress and shearing stress around a small circular hole in a large plate subjected to tension in one direction and then prove that the stress concentration factor due to small circular hole is 3. (08)

- 3.a) Derive the differential equation $\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = -2G\theta$ for a torsion problem in elasticity where $\phi(x,y)$ is Prandtl's stress function and show that $\phi(x,y)$ is constant along the boundary of the cross section. (12)
- b) What is membrane analogy, explain with neat sketch. (04)

SECTION- II

4. The of stress $\sigma_{ij}^{(1)}$ and $\sigma_{ij}^{(2)}$ at two different points in a body are given as below. Determine which state is more critical to yielding according to Tresca yield criterion and von-Mises yield criterion

$$\sigma_{ij}^{(1)} = \begin{bmatrix} 10 & 0 & 3 \\ 0 & 3 & 0 \\ 3 & 0 & 2 \end{bmatrix} \text{ units} \qquad \sigma_{ij}^{(2)} = \begin{bmatrix} 3 & 0 & 0 \\ 0 & -7 & 0 \\ 0 & 0 & -5 \end{bmatrix} \text{ units} \qquad (18)$$

5. Discuss Tresca and von-Mises yield criteri in Haigh- Westergaard stress space. Explain how they will get changed for plane -stress condition. (16)

OR

5. a) Write on Drucker's postulate. (04)
- b) Find the collapse load for a simply supported circular plate of radius 'a' subjected to a ring load radius 'b' ($0 < b < a$). Use Tresca's yield criterion. (12)
6. A beam of length L, simply supported at the ends carries a central point load P. The stress-strain diagram for the beam material is given by $\sigma = H\epsilon^n$ where H is the Tangent Modulus. Determine the deflection of the beam under the load. (16)



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First Year M.Tech. Civil- Stru. (SEMESTER - I) Examination, Dec.2011.

EM-034

Research Methodology & Mathematical Modeling (CES-507)

Day and Date: Thursday, 22/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

- Instructions –
- All questions are compulsory.
 - Figures to the right indicate full marks.
 - Assume suitable data wherever necessary.
 - Use separate answer book for each section.
 - Use of non-programmable calculator, Steam Table, IS Code are allowed.
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SECTION – I

- Describe the technique involved in selecting Research Problem with suitable example. 8
 - Compare
1) Quantitative v/s Qualitative research 2) Conceptual v/s Empirical research 8
- State & explain basic principles of experimental design . 9
 - Discuss various features of good design 8

OR

 - Discuss various types of sampling design used in research 8
 - Illustrate with example finite & infinite universe in random sampling 6
 - Define Sampling fundamentals 3
- Describe techniques used in scale construction 7
 - Explain the parameters causing errors in research 6
 - State different scales for measuring attitudes of people 4

SECTION – II

- State different methods of collection of primary data . How it is Correlated with various type of research 9
 - Discuss measures of central Tendency 8

OR

 - State & explain importance of regression analysis in research 8
 - Explain the role of statistics' in research with example 9
- What is basic concept of parametric & non-parametric test in hypothesis. State the circumstances when & where they are necessary 9
 - Discuss limitations of tests of hypothesis 4
 - What precautions are necessary while using Chi square Test 4
- What are basic concept of ANOCOVA . Explain the technique of analysis 8
 - Write note on Path Analysis 8



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First Year M.Tech. Civil –Stru. (SEMESTER – I) Examination, Dec.2011.

EM-042

Elective-I Design of Foundation (CES-509)

Day and Date: Friday, 23/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

Instructions –

- i) All questions are compulsory.
- ii) Figures to the right indicate full marks.
- iii) Assume suitable data wherever necessary.
- iv) Use separate answer book for each section.
- v) Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION – I

1. a) Explain Meyerhof's general theory of bearing capacity of soils under strip footing for cohesionless and cohesive soils. (17)
b) Describe 'Plate load test' for evaluation of safe bearing capacity. (8)
2. Design a combined column footing with a strap beam for two reinforced concrete columns of size 300mm x 300mm spaced 4m c/c and each supported a service axial load of 500 KN. The safe bearing capacity of soil at site is 150 KN/m². Adopt M-20 grade concrete and Fe-415 HYSD bars. (25)
3. Design a raft foundation for six columns A, B, C, D, E and F, each of size, 350mm x 350mm. The coordinates of centres of columns are A(0,0), B(6m,0), C(12m,0), D(0,6m), E(6m,6m) and F(12m,6m). The load on each interior column B and E is 1200 KN where as on each exterior column A,C,D and F is 800 KN. Assume safe bearing capacity as 100 KN/m².
Use concrete M20 and steel Fe-415. (25)

SECTION – II

4. a) How load carrying capacity of pile is determined? (5)
- b) Discuss negative skin friction in piles and their determination. (5)
- c) Design a pile cap supported by two piles of 450mm diameter load carrying capacity of each piles is 500 KN and they are spaced @ 1200 mm c/c. Plan dimension of axial column is 400 x 400mm. Assume M20 concrete and Fe-415 steel (15)

5. a) Draw section through well foundation, showing its various components & explain each in brief.(10)
- b) Describe various types of drilled piers. (8)
- c) Explain the construction of open caisson. (7)

6. a) Write a note on
i) Types of machine foundation. (8)
ii) Vibration isolation of machine foundation. (7)
- b) Describe IS code method for design of M/c foundation for single degree of freedom. (10)



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First Year M.Tech.Civil-Const.Mgt) (SEMESTER - I) Examination, Dec.2011.

EM-043

TQM in Construction (CEC-511)

Day and Date: Friday, 23/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

- Instructions –
- All questions are compulsory.
 - Figures to the right indicate full marks.
 - Assume suitable data wherever necessary.
 - Use separate answer book for each section.
 - Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION- I

- Q 1) a) Give the graphical representation of Juran's trilogy and explain the terms 8
involved in it by relating it to suitable example.
- b) State the importance of following in TQM (any two) 8
- Contribution of F.W.Taylor.
 - Deming's 14 points
 - Contribution of Ishikawa.
- Q2) a) Explain the importance of TQM in context of construction industry. Quote 8
suitable example.
- b) What do you understand by the term 'Cost of Quality'? 8
- Q3) Following the table contains the data on the weight of a plastic component in 16
grams. This component is manufactured using a plastic injection modeling
process. Mean and range charts are required to be established for this process.
Determine the trial central line and control limits. Draw the mean and range
charts and plot the values. State whether the process is under statistical control or
not. If not assume that the deviation occurred due to assignable causes which are
rectified now. Revise the central line and control limits. Draw the received mean
and range charts and plot the values. State whether the process is now under
statistical control or not.

Sample Measurements

	X1	X2	X3	X4		X1	X2	X3	X4
1	6.35	6.40	6.32	6.37	6	6.41	6.40	6.29	6.34
2	6.46	6.37	6.36	6.41	7	6.38	6.44	6.28	6.34
3	6.34	6.40	6.34	6.36	8	6.35	6.44	6.28	6.58
4	6.69	6.64	6.68	6.59	9	6.56	6.55	6.45	6.48
5	6.38	6.34	6.44	6.40	10	6.38	6.40	6.45	6.37

- Q 4) a) Give the definition of Quality as per Juran and Crosby. Also enlist the characteristics of quality and explain any two of them. 8
- b) What is ISO 9000 and what are the benefits of it? 8
- Q 5) a) Discuss about the objectives, process, outcomes and benefits of quality function deployment (QFD). Also give suitable example. 8
- b) You are the project manager of a construction project. You recently completed a performance appraisal for one of your employees. The employee is not happy with the evaluation and has asked for an appointment to discuss the evaluation process. Discuss the following : 10
- (a) The purpose of the performance evaluation
- (b) The evaluation criteria
- (c) The employee's options regarding the evaluation
- Q 6) a) Consider the company involved in testing the strength of structural components. Currently 50 engineers are working in the company. Explain briefly the steps that the company should take to implement the ISO 9001:2000 based quality system. 10
- b) State the significance of Malcolm Baldrige National Quality Award and explain its process chart. 8



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First Year M.Tech.Civil-Const.Mgt (SEM. - I) Examination, Dec.2011.

EM-035

Optimization Techniques & Research Methodology (CEC-507)

Day and Date: Thursday, 22/12/2011

Time: 10.00am to 01.00pm

Max Marks- 100

- Instructions –
- All questions are compulsory.
 - Figures to the right indicate full marks.
 - Assume suitable data wherever necessary.
 - Use separate answer book for each section.
 - Use of non-programmable calculator, Steam Table, IS Code are allowed.

SECTION – I

- Explain with example different types of systems 8
 - What is system approach . Explain with suitable example 9
- Write detailed note on queuing theory. 8
 - Given below is a discrete distribution of past sales

Number of units sold	20	25	40	60
No of days occurred	10	30	50	10

If selling price is Rs -10 /unit & cost of purchase is Rs -6/ per unit. If 25 units are stocked. What will be the expected profit per day over a long period. 9

- What is Poission distribution & exponential distribution. 8
 - Discuss in detail Hungaran method 8
- OR
- Discuss theories used in construction practice 8
 - What is queue discipline. Explain with suitable example 8

SECTION – II

- Describe the technique involved in selecting Research Problem with suitable example. 8
 - Compare
1) Quantitative v/s Qualitative research 2) Conceptual v/s Empirical research 8
 - State basic concept of Heuristic model. Discuss method of solving the problem. 9
 - Write a note on process of simulation 8
- OR
- Discuss various types of models. State use of each with suitable example 8
 - Explain validation of simulation model 9
 - What are various points considered in writing the research proposal 8
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