CBCS SCHEME

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15CV81

Eighth Semester B.E. Degree Examination, July/August 2021
Quantity Surveying and Contracts Management

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions.

1 The details of a residential building is shown in Fig.Q1. Estimate the quantities and the cost of the following items of works.

a. Earth work excavation for foundation in or ordinary soil @ Rs. 250/- per cum.
b. UCRM in foundation in CM 1:6 @ Rs. 1200/- per cum
c. BBM in Superstructure in CM 1:6 @ Rs. 5500/- per cum.
d. Plastering to masonry inside in CM 1:6 12mm thick @ Rs 150/- per sqm. **(16 Marks)**

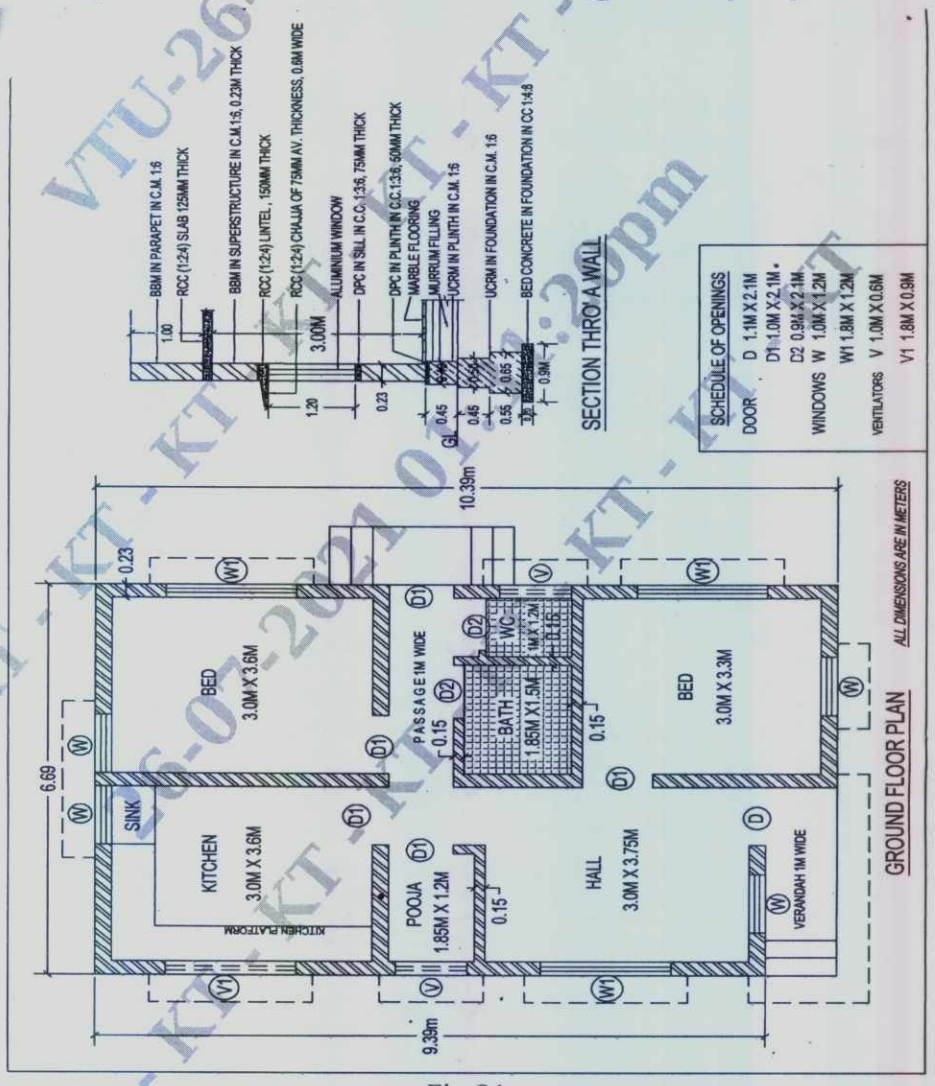

Fig.Q1

2 a. What do you mean by estimate? Why estimation is necessary? Discuss the documents involved for preparing an estimate. **(08 Marks)**

b. What are the types of estimate? Discuss any one of them. **(08 Marks)**

3 The details of septic tank are shown in Fig.Q3. Estimate the quantities of the following items of work and cost of abstract.

a. Earthwork excavation for foundation @ Rs. 200/- per cum

b. BBM in CM 1:4 for side walls @ Rs.5000/- per cum

c. RCC <1:1.5:8> slab without steel @ Rs.5290/- per cum.

d. Plastering to walls inside and floor @ Rs. 150/- per sqm. **(16 Marks)**

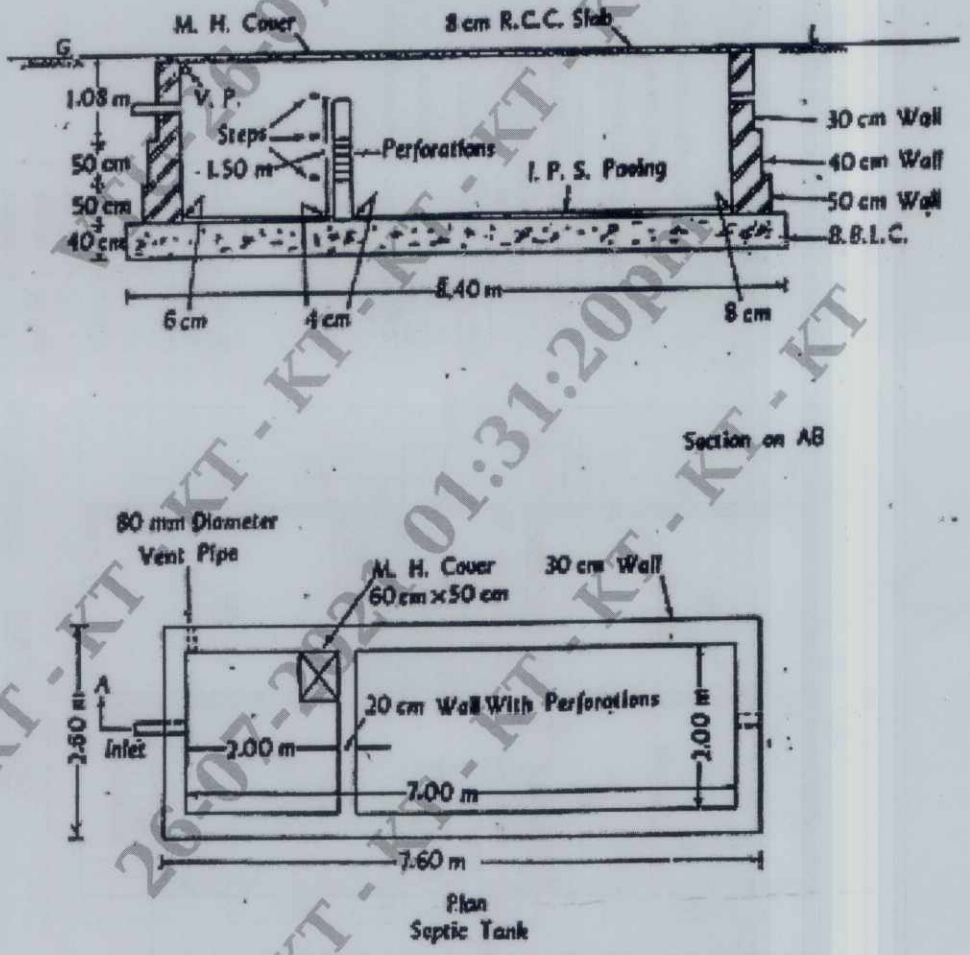

Fig.Q3

4 Prepare a detailed estimate for earthwork for a portion of road from the following data:

Distance in metres	RL of the Ground in m	RL of formation
0	114.50	115.00
100	114.75	↑
200	115.25	Upward
300	115.20	gradient
400	116.10	of 1 in 200
500	116.85	
600	118.00	↓
700	118.25	↑
800	118.10	Downward
900	117.80	gradient of
1000	117.75	1 in 400
1100	117.90	
1200	117.50	↓

Formation width is 10m, side slope in banking is 2:1 and side slope in cutting is 1.5 : 1. Formation level @ 0 chainage is 115.00. Cost of earthwork in banking @ Rs.300/- per cum cost of earth work in cutting is @ Rs. 400/- per cum. Draw longitudinal profile of the road. **(16 Marks)**

5 Write down the detailed specifications of the following :

a. Earthwork in excavation for foundation
b. Bed concrete in foundation in CC 1:4:8
c. Plastering work in CM 1:6, 12 mm thick
d. C.C. 1:3:6, flooring, 25mm thick. **(16 Marks)**

6 Work out from the first principles the rate per unit of the following items of works.

a. PCC 1:4:8 for foundation
b. Plastering in CM 1:6, 12 mm thick
c. RCC (1:1.5:3) for roof slab, 120mm thick without steel
d. BBM in CM 1:6, for Superstructure **(16 Marks)**

7 a. What are the features of the tender documents? **(10 Marks)**
b. What do you mean by breach of contract? **(06 Marks)**

8 a. What do you mean by contract? **(06 Marks)**
b. What are the types of contract? Explain any one of them briefly. **(10 Marks)**

9 Write short notes on :

a. EMD and SD
b. Market value, scrap value and salvage value
c. Sinking fund
d. Liquidated damages. **(16 Marks)**

10 a. What do you mean by Valuation? **(08 Marks)**
b. What is the purpose of Valuation? **(08 Marks)**

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CBCS SCHEME

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15CV82

Eighth Semester B.E. Degree Examination, July/August 2021
Design of Prestressed Concrete Elements

Time: 3 hrs. Max. Marks: 80

Note: 1. ***Answer any FIVE full questions.***
2. ***Use of IS 1343 is permitted.***

1 a. Define Prestressed Concrete. Explain briefly Pretensioned and Post tensioned members. **(03 Marks)**

b. A PSC unsummetrical I section beam span 8m support a load 20kN/m , Top flange 300 × 60mm ; Bottom flange 100 × 60mm ; Web 80 × 280mm ; P = 100kN located at 50mm from bottom. Find stress at mid span. Given A = $46.4 \times 10^3 mm^2$, NA 156mm from top $I_{xx} = 760.45 \times 10^6 mm^4$. **(05 Marks)**

c. A PSC inverted T section web 300 × 900mm , Flange 300 × 600mm , Simply supported over a span of 15m. It is tensioned by 3 cable each containing 12 wires of 7mm diameter placed at 150mm from Soffit. Calculate Max UDL the beam can carry if Max tension and compression is limited to 1MPa and 15Mpa. Loss of pre stress 15%. **(08 Marks)**

2 a. Explain Load Balancing Concept. **(03 Marks)**

b. A PSC section 400 × 600mm is prestressed by 1920kN by a parabolic cable having max eccentricity 200mm at mid span 100mm at support. Find stress at mid span only by load balancing concept. **(07 Marks)**

c. A PSC beam with single overhanging is simply supported at A, Continuous over B span AB 8m and over hanging BC 2m , C/S of beam 300 × 900mm , Live load at 3.52kN/m. Suggest a suitable cable profile. Take prestressing force 500kN. **(06 Marks)**

3 a. Define Loss of Pre-stress. Briefly explain different loss with suitable formula. **(05 Marks)**

b. A post tensioned PSC beam 250 × 400mm is prestressed by 12 wires of 7mm diameter stressed to $1200 N/mm^2$. The cable is parabolic with eccentricity 120mm at centre and zero at support span 10m. Calculate loss of pre-stress and % loss of pre-stress. Take $\mu = 0.55$, $K = 0.0015/m$, $\varepsilon_{cs} = 1.354 \times 10^{-4}$, $\phi = 1.6$, $E_s = 2 \times 10^5 N/mm^2$, $E_c = 31.6 \times 10^3 N/mm^2$. , Relaxation 5% , Slip 2mm. **(06 Marks)**

c. A post tensioned PSC member 400 × 400mm span 12m is pre-stressed by 4 – cable each having area $200mm^2$ initial pre-stress $1000 N/mm^2$. Find the loss of pre-stress when cable is tensioned one by one. Take $\varepsilon_{cs} = 0.003$, $\phi = 2.5$, $m = 6$, $\Delta = 3mm$, $E_s = 2.1 \times 10^5 N.mm^2$. Eccentricity of cable is zero. **(05 Marks)**

4 a. A simply supported 6m beam post tensioned by two cable having 100mm eccentricity below NA at centre. The first cable is parabolic with an eccentricity 100mm above NA at support. The second cable is straight. C/s of each cable is $100mm^2$, Initial pre-stress is $1200 N/mm^2$, $A = 2 \times 10^4 mm^2$, Radius of gyration 120mm. The beam support a load of 20kN each at middle third point $E_c = 38 kN/mm^2$. Calculate Short term and Long term deflection. Take $\phi = 2$. Loss of pre-stress 20%. **(10 Marks)**

b. A PSC beam 200 × 400mm span 10m is pre-stressed by a parabolic cable at 80mm from bottom at mid span and 125mm from top at support force in the cable 400kN , $E_c = 35 kN/mm^2$. Calculate i) Deflection at mid span to support its self weight.
ii) Point load to be applied at centre for zero deflection. **(06 Marks)**

5 a. A pretensioned T – section flange 1200mm × 150mm , Web 300mm × 1500mm , Steel area 4700mm^2 , located at a depth 1600mm M40 conc. Find Ultimate moment tensile strength of steel 1600N/mm^2. **(10 Marks)**

b. A post tension unbounded rectangular beam 400mm × 800mm effective depth cross sectional area of cable 2840mm^2 , Effective pre-stress 900N/mm^2 , Span 16m. Find Ultimate moment. Take M40 conc. **(06 Marks)**

6 Design a PSC beam E-span 15m live load 20kN/m , Loss of pre-stress 20% , Permissible comp stress in conc at transfer and at working load 15N/mm^2 and 12N/mm^2. No tensioned is allowed. Take b = 400mm. **(16 Marks)**

7 a. Explain Shear failure is PSC member. **(04 Marks)**

b. A post tensioned beam 200 × 400mm span 10m , Load 8kN/m , P = 500kN. The cable is parabolic with 140mm eccentricity at mid span and zero at support. Calculate
i) Principal stress at support ii) Find principal stress in absence of pre-stress. **(12 Marks)**

8 a. The cross section of a bridge girder T beam, top flange 600mm × 230mm , Web 150mm , NA is at 545mm from top of area 328500mm^2 , MI = 665 × 10^{8}mm^4 , Second moment of area , $a\bar{y}$ = 665 × 10^8 mm^3 , Span 25m , Cable area 2300mm^2 , Parabolic cable with e = 650mm at mid span and 285 at support effective pre stress 900N/mm^2 , Tensile stress is concrete 1.6N/mm^2. Find Max UDL the beam can support if load factor is 2.0. Assume no loss of pre-stress. **(08 Marks)**

b. A PSC beam 250mm × 1500mm carries an effective pre-stress 1362kN , Shear force 771kN Slope of cable at support $\theta = \frac{1}{6}$, Extreme fiber stress 7N/mm^2 at top and zero at bottom principal tensile stress 0.7N/mm^2. Design Shear reinforcement. **(08 Marks)**

9 a. Explain Anchorage Zone stresses and stress distribution in end block with suitable figure. **(04 Marks)**

b. What are the methods available for calculating Anchorage Zero stress? Explain Indian Code provision. **(04 Marks)**

c. The end block of a post tensioned beam 300 × 300mm subjected to a anchorage force of 32.8kN by a Freyssinet anchorage area 11720mm^2. Design Anchorage reinforcement. **(08 Marks)**

10 a. Explain Composite Construction in PSC. Mention the advantages of precast PSC member. **(04 Marks)**

b. A precast pre-tensioned beam 100mm × 200mm E-span 5m is pre-stressed by a force of 150kN. Loss of pre-stress 15%. The beam is incorporated in a composite T beam by casting a top flange of breadth 400mm thickness 40mm. Live load 8kN/m^2. Assuming unproved condition. Find the stress developed. **(12 Marks)**

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15CV833

Eighth Semester B.E. Degree Examination, July/August 2021
Pavement Design

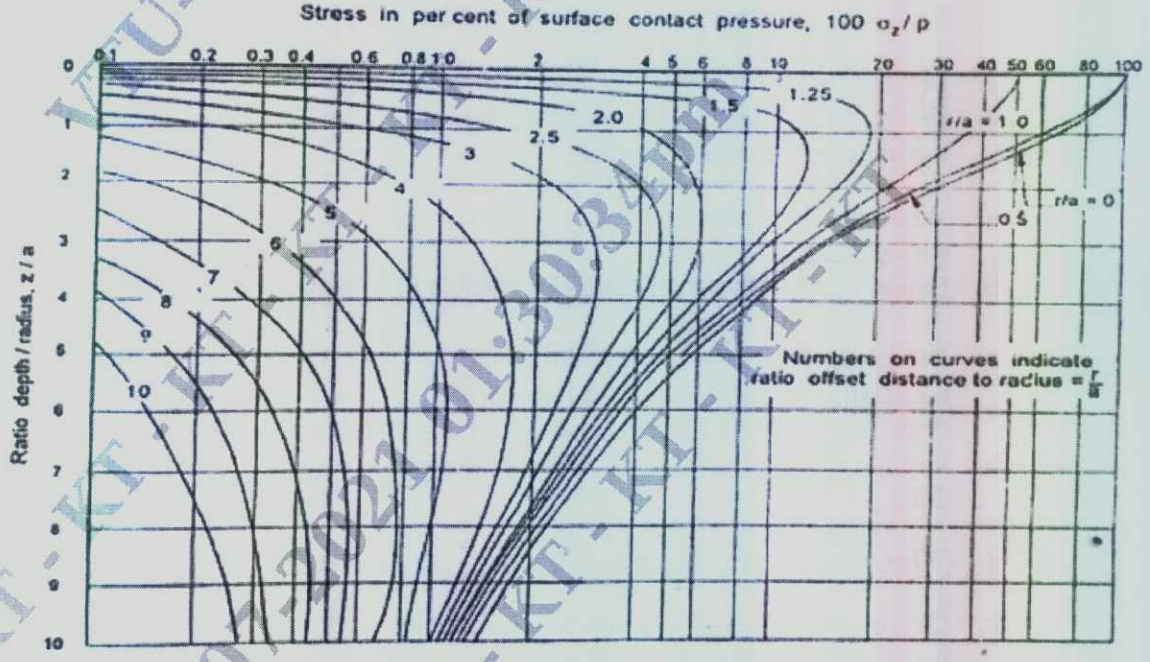
Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. Compare the properties of flexible and rigid pavement. **(08 Marks)**

b. Describe the functions of Granular sub base, base and wearing course in the pavement structure. **(08 Marks)**

2 a. A dual wheel load of 100 kN load on each wheel and a contact pressure of 0.7 N/mm^2 is applied on a homogeneous layer with E = 12 N/mm^2. If the centre to centre distance between the wheels is 600 mm determine the stress at a depth of 0.5 m at 4 points at the centre of dual wheels, at a radial distance of 300, 600 and 900 mm from the centre of the dual wheels. Use deflection chart given in Fig. Q2 (a). **(08 Marks)**



Vertical stress distribution chart

Fig. Q2 (a)

b. Distinguish between Boussinesq's and Burmister theory. **(08 Marks)**

3 a. Explain the relationship between the tyre pressure and contact pressure with a help of a graph. **(08 Marks)**

b. Determine the ESWL at depth of 15 cm, 20 cm and 25 cm if the dual wheel load assembly carries 2044 kg load on each axle, the centre to centre spacing between the wheels is 27 cm and the clear distance between the tyre walls is 11 cm. **(08 Marks)**

4 a. Explain the method of designing the pavement by Kansas and Mcleod method. **(08 Marks)**

b. Design the thickness of flexible pavement to be constructed on the subgrade soil with CBR 10%. The commercial vehicle traffic intensity is 700 cvpd, vehicle damage factor is 1.5, rate of growth of commercial traffic is 7.5% and design life of pavement is 15 years. Use IRC 37 : 2001 chart given in Fig. Q4 (b). **(08 Marks)**

CBR 9% & 10%					
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION			
		Bituminous Surfacing		Granular Base (mm)	Granular Sub-base (mm)
		Wearing Course (mm)	Binder Course (mm)		
1	375	20 PC		225	150
2	425	20 PC	50 BM	225	150
3	450	20 PC	50 BM	250	150
5	475	25 SDBC	50 DBM	250	150
10	540	40 BC	50 DBM	250	200

Pavement design catalogue recommended for traffic range 9-10 MSA as per IRC 37:2001

Fig. Q4 (b)

5 a. List the various types of flexible pavement failure. **(08 Marks)**

b. Explain the Benkalman beam deflection method of conducting test to design overlay thickness of flexible pavement. **(08 Marks)**

6 a. What are the various types of maintenance work that can be done on flexible pavement surface course? **(08 Marks)**

b. Explain the various approaches of flexible pavement evaluation. **(08 Marks)**

7 a. Calculate the stresses at interior, edge and corner of rigid pavement as per Westergaard's equation. Given : Wheel load = 5100 kg, $E = 3 \times 10^5$ kg/cm^2, Pavement thickness = 18 cm, Poisson's ratio = 0.15, K = 6 kg/cm^3 and radius of contact area = 15 cm. **(08 Marks)**

b. Explain the step by step procedure of designing the rigid pavement thickness as per IRC 58 : 2002. **(08 Marks)**

8 a. What are the different types of temperature stresses involved in the rigid pavement? Explain. **(08 Marks)**

b. Design the size and spacing of dowel bars at the expansion joints of a cement concrete pavement of thickness 25 cm with radius of relative stiffness 80 cm, for a design wheel load of 5000 kg. Assume load capacity of dowel system as 40% of the design wheel load. Joint width is 2 cm, permissible shear and flexural stress in dowel bar are 1000 and 1400 kg/cm^2 respectively and permissible bearing stress in CC is 100 kg/cm^2. **(08 Marks)**

9 a. Explain the various types of rigid pavement failures. **(08 Marks)**

b. Draw a neat figure representing all the joints involved in the rigid pavement and explain the concept involved in providing the joints. **(08 Marks)**

10 a. Explain the maintenance measures adopted for the rectification of cracks developed in the cement concrete pavements. **(08 Marks)**

b. Write a note on how to maintain the joints in rigid pavements. **(08 Marks)**

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