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INNOVATIVE TEACHING EXUBERANT LEARNING

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Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2017-18/ **Date:** _____

School: SoET-CBSGS **Branch:** CIVIL ENGG. **SEM:** VI

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following **Semester/Unit Test-I/Unit Test-II (Reg./ATKT)** question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Geotechnical Engg.-II	CE-C601			
2	Design & Drawing Of Steel Structure	CE-C602			
3	Applied Hydrolics – II	CE-C603			
4	Transportation Engg. – II	CE-C604			
5	Environmental Engg.	CE-C605			
6	Theory & Reinforced Prestressed Concrete	CE-C606			

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

149 T.E-sem-VI - Civil - CBSGS - GE-II 4/5/18

Q. P. Code: 39714

Time: 3 Hours **Marks: 80**

Note 1. Attempt any 4 out of six questions
2. Question 1 is compulsory
3. Assume any suitable data where ever required

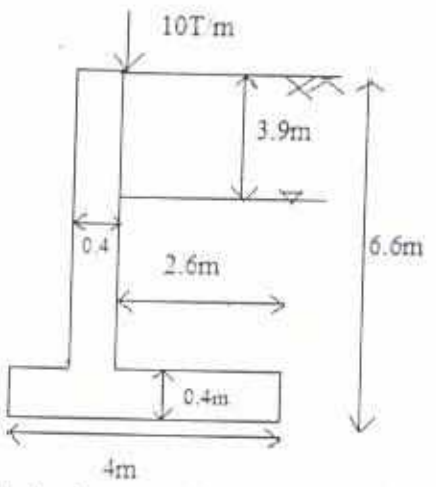
Q.1 Attempt any four

a. Explain different types of slope failures with its reason of failure. 05
b Derive the expression for Rankine's Active earth pressure for cohesive back fill 05
c. A square group of 16 piles penetrate through the filled up soil of 3 m depth. The pile diameter is 250 mm and pile spacing is 0.75m.The unit cohesion of material is 18kN/$m^2$and unit weight of soil is 15kN/m^3compute negative skin friction given adhesion coefficient as 0.4 05
d. Show the calculation of water table correction factors for shallow footing when water table rises to ground surface. 05
e. Write a short notes on imperfect ditch conduit 05

Q.2 a. A cut has to be made 14m deep, inclined at an angle 45^0 to the horizontal. The possible slip surface has a radius equal to 22m, and passing through the toe of cut slope and trough the point 3.6m away on the top ground from the edge of cut. The C.G of failure mass is 10.3m from the centre of failure circle. The properties of soil are C=50 kN/m^2, $\phi=15^0$ has γ=18 kN/m3. Find the factor of safety that would be available in slip surface. Use friction circle method 10
b. Describe briefly Culmann's graphical method for determining total active earth pressure also draw the change in Culmann's curve when there is a line load acting on backfill 06
c. A 30kN drop hammer was used to drive a R.C pile. It has free fall of 2.0 m.The average penetration recorded in the last few blows is 6mm/blow. Estimate the allowable load on pile according to Engineering news formula 04

Q.3 a. A Retaining wall 6m height retains sand with $\phi=30^0$and unit weight of 24 kN/m^3 up to a depth of 3m from top. From 3to 6m the material is cohesive soil with C=10 kN/m^2, $\phi=10^0$ γ_{sat}=20 kN/m^3.The water table is at 3m below ground level. And uniform surcharge of 10kN/m^2 acts on the top of soil. Draw the active earth pressure diagram detailing the values at the critical points. Also calculate the resultant thrust on the wall 10
b. Derive the equation for critical depth in cohesive soil for infinite slopes under dry, submerged and steady seepage condition 05
c. Explain the types of conduits with neat diagrams 05

Q.4 a. Details of a cantilever retaining wall are shown in figure. Calculate the maximum and minimum pressures under the base if the water table rises behind the wall to the level 3.9m from the top of wall. The shear parameters of soil are C=0, ϕ=38^0 γ_{sat}=20 kN/m^3.unit weight of concrete is 24kN/m^3 if wall friction is taken as 25^{0}on the base of wall ,check the stability of all for all conditions 10



b. Find the forces in 4 struts located at depths 2 m, 5 m, 8 m and 10 m from the top of the cut for a bracing system provided to support an open cut of 10 m depth in a clayey soil .the properties of soil are γ=19 kN/m^3, C=22 kN/m^{2}the centre to center spacing along the length of the cut is 2.8 m. 10

Q.5 a. Calculate the ultimate bearing capacity of a rectangular footing 1.8 mX3.6 m in plan founded at a depth of 1.6 m below ground level. The unit weight of soil is 18kN/m^3 and effective shear parameters are C=15 kN/m^2 ϕ=30^0 .the natural water table is at a depth of 2 m below ground level. Use IS method given for ϕ=30^0 N_c=30.1,N_q=18.4, N γ=22.4 10

b. Describe pile load test for calculating allowable load of single pile as IS 2911 Part 4. 05

c. Explain the mechanism of reinforced earth wall system 05

Q.6 a. A pile group of 25 piles has to be proportioned in a uniform pattern in soft clay with equal spacing in all directions. Assuming the value of cohesion is to be constant throughout the depth of piles, determine the optimum value of spacing of the piles in the group. Assuming adhesion factor 0.7. Neglect the end bearing effect given the diameter of pile as 0.5 m. Also calculate the efficiency of group using converse Labarre formula. 10

b. List out the assumptions made by Terzaghi for his bearing capacity theory. 05

c. Explain the advantages of reinforced soils. 05

(140) TE-sem-VI-CBSGS-Avi-DDSS 18/5/18

Q. P. Code: 21685

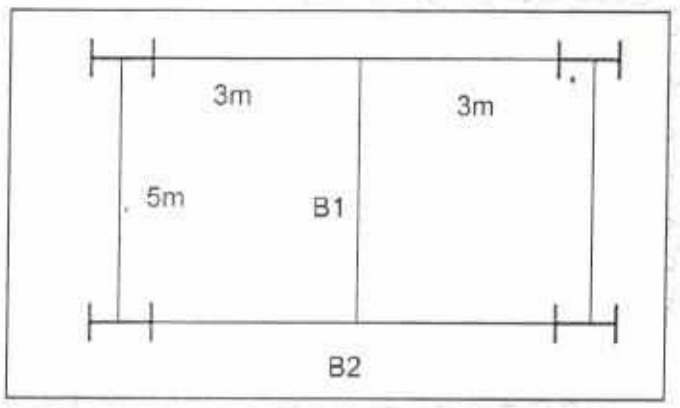
(4 Hr) **Maximum Marks - 80**

N.B.
1. Question **No.01 is compulsory**, attempt any **three** out of remaining questions
2. Draw neat and proportionate **sketches** whenever necessary.
3. Use of **IS 800:2007 and steel table** is permitted.
4. Assume **suitable data** if necessary and justify the same.
5. Use steel of **Grade Fe410** and bolt of **grade 4.6**

Q.1 Design **Beam B1 and B2** using ISMB section and **beam to beam connection**, assuming top flange of beam embedded in slab. The flooring plan is as shown, Design flooring system for following data, provide cover plates to Beam B2 if Necessary **32**

- Thickness of Slab - 15cm
- Thickness of wall - 200mm
- Height of wall over all beams - 1.3m
- Unit weight - (Concrete-25 N/mm^3 , Brick Wall - 20 N/mm^3)

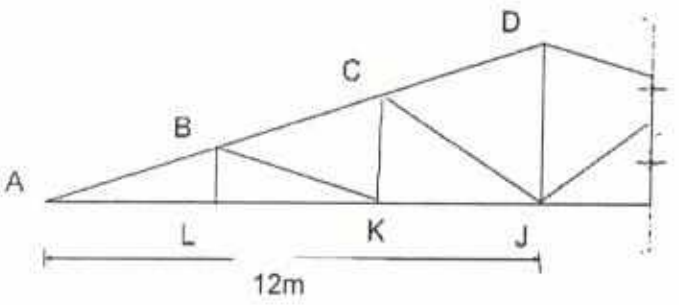
Q.1



OR

Q.1 Find panel point load for given roof truss for DL,LL and WL and design member AB,AL and BL. the structure is situated in Mumbai industrial area with rise 1/4. **32**

-Spacing between trusses - 3m,
-Span of truss – 12 m
-Self weight of Purlin - 220 N/m
-wt of GI sheets - 150 N/m^2
The values of $K_1 = 1.0$, $K_2 = 0.98$, $K_3 = 1.0$ and $(C_{pe} - C_{pi}) = -0.3$,



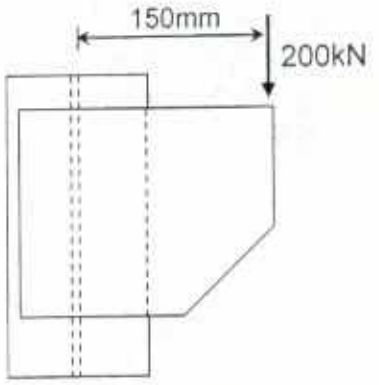
Q.2 a) Design a **built -up column** with two channel sections which are placed face to face to support factored axial compressive load of 1600 kN, If the effective length of column is 6.0 m, Design appropriate section, spacing between channel and suitable bolted lacing system for d=20mm. **10**

b) **Design a column** using ISHB Section. Column is of length 4.8m supports factored load of 700kN, the column is effectively held in position and direction at both the ends. **06**

Q.3 a) A Column ISHB 300@576.83 N/m strengthened with two cover plates of size 350 x 20mm to carry factored axial load of 2000kN, calculate Size, Thickness and number of bolts required for the **Gusset base** assuming M20 concrete grade and 24mm bolt diameter, draw diagrams showing all details. **10**

b) A column is Consisting of ISHB 300@576.83 N/m carries axial factored load of 800kN, Design **a Square and a Rectangular slab base** considering M15 concrete grade . Comment which one is economical. **06**

Q.4 a) A column of ISHB 150 @ 300N/m carries factored end reaction of 200kN due to a Beam. **Design Welded bracket connection** with an eccentricity of 175 mm from web of column, the thickness of bracket plate is 12mm, and Provide welding on 3 sides of bracket plate. **08**



Q.5 b) A ISLB 350 @486 N/m used to design a laterally unsupported beam with length of 3.5, Determine design bending strength (M_d) by using IS code table, also determine **safe UDL** that can be applied over beam. **08**

a) A simply supported **welded plate Girder** of span 24m is subjected to UDL of 50 kN/m over the span excluding self weight, Design cross section, give check for shear buckling and design bending strength, also provide 2-step curtailment assuming plate girder is laterally supported throughout and no intermediate stiffeners are provided. (No need to design welded connections and stiffeners) **16**

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Correction inQP code 21685

1. **Q.1** Unit weight (Concrete – 25KN/m^3, Brick wall – 20KN/m^3)

Instead of Unit weight (Concrete – 25N/mm^3, Brick wall- 20N/mm^3)

OR
2. **Q1** Span of truss- 24m **instead of 12m.**

2. **Correct Q5 b as Q4 b**

3. **Correct Q 5a as Q 5**
4. **Q4 a** Value of Eccentricity shall be 150mm **instead of 175mm.**

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144 T.E-sem-VI- Civil- CBSGS - A.M-II 24/5/18

Q. P. Code: 21639

(3 hours) Total marks : 80

N.B:(1)Question no. 01 is compulsory.

(2)Attempt any 3 questions out of the remaining 5 questions.

(3)Assume data wherever necessary and clearly mention the assumption made.

(4)Draw neat figures as required.

Q1 : Attempt any Four (20)

a) Explain boundary layer separation .
b) Explain the terminal velocity of a body.
c) Derive conditions for most economical trapezoidal channel.
d) Explain specific energy curve with neat sketch.
e) Differentiate Keneddy's and Lacey's theory for alluvial channel.

Q2:-

a) For velocity profile for laminar boundary $\frac{u}{U} = \frac{3}{2}(\frac{y}{\delta}) - \frac{1}{2}(\frac{y}{\delta})^3$. (10)
Determine the boundary layer thickness , shear stress , drag force and co-efficient of drag in terms of Reynold number.

b) Water is flowing over a thin smooth place of length 4m and width 2 m at a velocity of 1.0 m/s. If the boundary layer flow changes from laminar to turbulent at a Reynold number 5×10^5 , Find (i) the distance from leading edge upto which boundary layer is laminar , (ii) the thickness of the boundary layer at the transition point , and (iii) the drag force on one side of the plate . Take viscosity of water $u = 9.81 \times 10^{-4}$ Ns/m^2 . (10)

Q3:-

a) A cylinder whose axis is perpendicular to the stream of air having a velocity of 20 m/s , Rotates at 300 r.p.m. The cylinder is 2 m in diameter and 10 m long . (a)Find : (i)the circulation ,(ii) theoretical lift force per unit length , (iii) position of stagnation points . and (iv)the actual lift , drag and direction of resultant force. Take density of air 1.24 kg/m^3. For actual drag and lift , take $C_L = 3.4$, $C_D = 0.65$ and $u_\theta / U = 1.57$. (b) Find the speed of rotation of the cylinder which will give only a single stagnation point. (10)

b) (i)Calculate the diameter of a parachute to be used for dropping an object of mass 100 kg so that the maximum terminal velocity of dropping is 5 m/s . The drag co-efficient for the parachute which may be treated as hemispherical is 1.3 . the density of air is 1.216 kg/m^3. (5)

(ii) An airfoil of chord length 2m and span 15m has an angle of attack as 6^0 . The airfoil is moving with a velocity of 80 m/s in air whose density is 1.25 kg/m^3. Find the weight of the airfoil and the power required to drive it. The values of co-efficient of drag and lift corresponding to angle of attack are given as 0.003 and 0.0 respectively. (5)

Q4:-

a) A trapezoidal channel has side slopes 1 to 1 . It is required to discharge 13.75 m^3/s of water with a bed gradient of 1 in 1000. If unlined the value of Chezy's C is 44 . If lined with concrete ,its value is 60. The cost per m^3 of excavation is four times the cost per m^2 of lining. The channel is to be the most efficient one. Find whether the lined canal or the unlined canal will be cheaper. What will be the dimensions of that economical canal ? **(10)**

b) Derive an expression for depth of hydraulic pump. **(10)**

Q5:-

a) Derive Vor Karman momentum integral equation. **(10)**

b) Determine the length of the back water curve caused by an afflux of 1.5 m in a rectangular Channel of width 50 m and depth 2.0 m . The slope of the bed is given as 1 in 2000 . Take Manning's , N=0.03 **(10)**

Q6:-

a) A stable channel is to be designed for a discharge of 40 m^3 /s and silt factor 1 . calculate the dimensions of the channel using Lacey's regime equation. Also calculate the dimensions of the channel if it were to be designed on the basis of Kennedy's method with critical velocity ratio equal to 1 , and the ratio of bed width to depth if flow is same as obtained from Lacey's method. **(10)**

b) (i)The ratio of flow through a circular channel of diameter 0.6 m is 150 liter/s. Find the Slope of the bed of the channel for maximum velocity . Take C=60 **(05)**

(ii)Find the slope of the free water surface in a rectangular channel of width 20 m, having Depth of flow 5m . the discharge through the channel is 50 m^3/s . The bed of the channel is having a slope of 1 in 4000. Take the value of Chezy's constant c=60. **(05)**

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Correction in T2626 - T.E.(CIVIL)(SEM VI) (REV-2012) (CBSGS) / T0840 - APPLIED HYDRAULICS-II QP Code: 00021639

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24 May at 4:16 PM

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Correction in T2626 - T.E.(CIVIL)(SEM VI) (REV-2012) (CBSGS) / T0840 - **APPLIED HYDRAULICS-II** **QP Code: 00021639**

Q.3 b (ii) The value in the last line is 0.03 and 0.5 instead of 0.003 and 0.0

Q4 b Read as Derive an expression for depth of hydraulic jump instead of pump

Q6 a Read as in last line the ratio of bed width to depth 'of' flow instead of 'if' flow

Q6b Read in first line as 'The rate of flow' instead of 'the ratio of flow'

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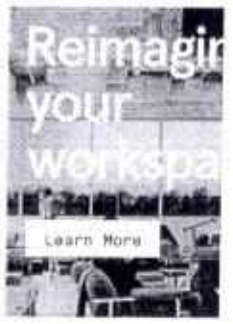
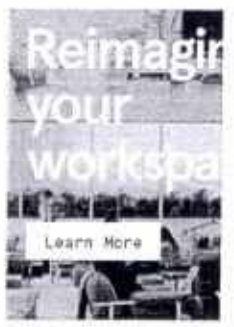




TE - sem - V - Civil - CBSGS - TE-II 30/5/18

Q. P. Code : 39251

(3 Hours) **[Total Marks: 80**

N. B. i. **Q. No. 1** is **compulsory**
ii. Attempt **any 3** out of **remaining 5**
iii. Support all **theory and numerical** with **neat sketch**

1 **Solve any four.** **(20 M)**

A. Compare Rigid and Flexible pavement on basis of Material, load transfer and cross section.
B. Explain PCU and give the values of PCU for various vehicle category at midblock.
C. What is Overlay? Enlist types of Overlays.
D. Discuss the role of IRC and MORTH.
E. On a highway, due to fog, only 20 meters of road was visible. Find the speed to be permitted for the vehicles to avoid accidents if reaction time is 2 sec and f=0.13.

2 **A.** Design a rigid pavement considering only load stress for wheel load of 7000 kg, tyre pressure 7.5 kg/cm^2, spacing between longitudinal joints is 3.75 m & spacing between contraction joints is 4.2 m. Take E = 3 x 10^5 kg/cm^2, μ = 0.15, e = 1 x 10^{-5}, k = 30 kg/cm^3, flexural strength = 45 kg/cm^2 take minimum F.O.S as 1.1. **(10 M)**

assume (20 kg/cm^2)

Thickness (cm)	22	24	26	30
Temperature Difference in ^{0}C	14.8	15.6	16.2	16.8

B. Write a note on Highway Drainage. **(05 M)**
C. Explain various types of bearings. **(05 M)**

3 **A.** 1. Find Space Mean Speed, Time Mean Speed, Median Speed, design speed, upper limit & lower limit speed for the following data **(10 M)**

Speed Range (KMPH)	Frequency
0-5	1
5-10	3
10-15	8
15-20	13
20-25	19

Speed Range (KMPH)	Frequency
25-30	16
30-35	11
35-40	9
40-45	2
45-50	1

B. Explain the construction of WBM roads. **(05 M)**
C. What is Camber? Find out the amount of camber to be provided on a 2-lane divided State Highway. **(05 M)**

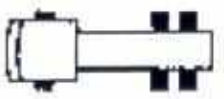
4 **A.** Derive formula for Overtaking Sight Distance. Also calculate and draw Overtaking zone for 1way road having design speed of 80 kmph. Reaction time is 2.5 sec **(10 M)**
B. Find percentage increase in CSA if rate of growth of traffic increases from 7% to 12%. The traffic after end of construction period is 300 cvpd design life is 10 years, VDF is 2.5 and LDF is 0.75. **(05 M)**

TURN OVER

C. Determine Economical Span for the following data. **(05 M)**

Span	Cost of one pier (Rs.)	Cost of one SS (Rs.)
10	25000	7000
15	28000	13815
20	32500	31000
25	33700	36000

5 A. Calculate ESWL of a RMC Mixer carrying 6 M^3 of concrete. The weight of empty transit mixer along with crew is 4200 kg. Assume that front axle carries only 20% of the total load and the remaining load is equally shared by rear axles. Take the trial depth as 150, 200, 250 mm. Consider center to center spacing of tires is 270 mm & clear gaps is 110 mm. weight of concrete is 2500 kg/M^3. The arrangement of axle is as shown below. **(10 M)**



B. Compare Road signs on the basis of purpose and shape. Also draw 2 examples of each. **(05 M)**

C. A bridge is proposed above a river having discharge of 250 m^3/sec, Lacey's Silt factor is 1.00 find the scour depth when: a) 4 span of 20 m each and b) 3Span of 20 m each are used. **(05 M)**

6 A. Find out the Characteristic deflection for a NH. Take least count = 0.01 mm & k = 2.80 **(10 M)**

Point A	00	46	44
Point B	00	33	39
Point C	05	60	59
Point D	03	42	38
Point E	00	51	46

B. Explain Q-K-V Curve **(05 M)**

C. **Fill in the blanks and discuss on the answers.** **(05 M)**

i. Abrasion value of aggregate used in pavement should be less then _____

ii. Sum of Flakiness and Elongation Index value as per MORTH for Bituminous concrete road should not increase _____

iii If reading on penetration gauge is 450, the penetration grade of bitumen shall be _____

iv IRC code related to design of rigid pavement is _____

v. In softening point test, heat is increased at the rate of _____ ^{0}C per minute.

_____

140

TE - sem-VI - CBSGS - Civil - EE - I

5/6/16

Q.P. Code : 21640

[Time: Three Hours] **[Marks:80]**

N.B: 1. Question.No.1 is compulsory.
2. Answer any three questions out of remaining five questions.
3. Assume suitable data wherever required
4. Figures to the right indicate full marks.

Q. 1 **(20)**

a) Explain the importance & necessity for planned water supplies.
b) What is per capita demand? What are the factors which affect per capita demand?
c) Explain : i) Coagulation ii) Flocculation
d) Write a note on well water disinfection.

Q. 2 **(10)**

a) Two primary setting basins are 26m in diameter with a 2.1m side water depth single effluent weirs are located on the peripheries of the tank for a water flow of 26,000 m^3/day calculate,
i) Surface area & volume
ii) Overflow rate in $m^3/m^2.d$.
iii) Detention time in hr.
iv) Weir loading in $m^3/m.d$.

b) Explain with neat sketch working & operation of pressure filters. **(10)**

Q. 3

a) Determine the quantity of alum required in order to treat 10 million liters of water per day at a treatment plant, where 10 ppm of alum dose is required. Also determine the amount of CO_2 gas which will be released per liter of water treated. **(10)**

b) Explain in brief methods of removing permanent hardness. **(10)**

Q. 4 Write short notes on any 4. **(20)**
a) River intake
b) Tube settlers
c) Reverse osmosis
d) Hazardous waste
e) Fixtures & Fittings

Q. 5 a) Explain physical properties of municipal solid waste. **(05)**
b) Enumerate the difference between slow sand filters & rapid gravity filters. **(05)**
c) What are the requirements of good distribution systems? **(05)**
d) Draw a neat sketch of water connection from the municipal main. **(05)**

Q. 6 a) Explain with neat flow sheet treatment given to the river water for potable purpose. **(10)**
b) Design a rapid sand filter unit for 4 million liters per day of water supply. Assume the suitable data required. **(10)**

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Q. P. Code : 26287

[Time : 3 hours] [Marks : 80]

N. B. 1. Question **No.1** is compulsory

2. Answer **any three** questions out of remaining

3. Assume any data, if required and state them clearly.

4. Attempt sub questions in order.

5. Illustrate answer with neat sketches wherever required.

6. Figure to the right indicates full marks.

1. Attempt Any Four.
   - **a.** What is the need for the use of high strength concrete and tensile steel in Pre stressed concrete? **05**
   - **b.** Derive expression for the position of neutral axis & moment of resistance of balanced rectangular section. **05**
   - c. State span to depth ratios of two-way slabs for different support conditions to be considered for the control of deflection. **05**
   - d. What are the critical sections of determining the bending moment, one way shear and two way shear in isolated footing? **05**
   - e. Determine axial load carrying capacity of column 6.5m unsupported length and 500 mm in diameter. Use M20 grade Concrete and Fe 415 grade steel. If the helical reinforcement is provided then what is the load carrying capacity of the same column. **05**

2.
   - A. Determine the following for a rectangular beam section of width **b** mm and effective depth **d** mm. Use M20 grade Concrete and Fe 415 grade steel.
     - a. The position of the neutral axis
     - b. Lever arm
     - c. Moment of resistance
     - **d.** Percentage of steel. **10**
   - B. A concrete beam is prestressed by a cable carrying an initial prestressing force of 500 kN. The C/S area of the wire in the cable is 300mm^2. Calculate the percentage loss of stress in the cable due to shrinkage of concrete. Assuming the beam to be
     - a. Pre-tensioned
     - b. Post-tensioned **10**

3.
   - A. A 300mmX650mm reinforced concrete beam section is reinforced with 4-20mm diameter tension steel at d= 600mm, and 2-20mm diameter compression steel at d^1= 40mm. The section is subjected to a bending moment of 180 kN-m, use m=18
     - a. Find the maximum stress in concrete
     - b. Calculate the stress in tension and compression steel **10**
   - B. State different methods of post –tensioning and pre-tensioning methods. Discuss any one post-tensioning method in detail. **10**

4 A. A simply supported beam of effective span 5.5 meter is 300mm x 600mm effective, carries a UDL of 60 KN/m. It is reinforced with 4 bars of 20mm diameter in tension zone. Design shear reinforcement. Use M20 concrete & Fe415 steel. **10**

Pt %	0.25	0.50	0.75	1.0	1.25	1.50	1.75	2.0	2.25	2.5
Tc N/mm^2	0.22	0.3	0.35	0.39	0.42	0.45	0.47	0.49	0.51	0.51

B. The roof of a cycle parking stand consist of a reinforced concrete slab which cantilevers 4m on each side of a central reinforced concrete beam supported on columns. Design and detail the cantilever slab. Use M 20 and Fe 415. **10**

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5 A. A pre-stressed concrete beam with a rectangular section 250mm wide by 350mm deep supports a uniformly distributed load of 5.5 kN/m, which includes the self weight of the beam. The effective span of the beam is 4.5 m. The beam is concentrically prestressed by a cable carrying a force of 200 kN. Locate the position of the pressure line in the beam **10**

B. Design a sloped footing for a square column of 500 mm x 500 mm with 8 longitudinal bars of 16 mm diameter carrying a service load of 1200 kN. Use M 20 and Fe 415 both for column and footing slab. The safe bearing capacity of soil is 150 kN/m^2. 10

6

A. Design and detail an interior panel 4.5mx5m of simply supported floor slab resting on brick wall on all four sides of thickness 200 mm. Subjected to live load of 3 kN/m^2 & floor finish 1 kN/m^2. Adopt M20 & Fe415. Use $\alpha x = 0.089$, $\alpha y = 0.056$ **10**

B. Design a R.C. column to carry an axial load of 300 kN. The size of the column is restricted to 400mmX400mm. The effective height of the column is 5.5m. Use M20 concrete and Fe 500 steel. **10**

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