

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATION, JANUARY-2018

PROGRAM : B.TECH.

FIRST SEMESTER

COURSE CODE : AMS107

COURSE TITLE : ELEMENTS OF MATERIAL SCIENCE

[Time allotted: Two hours]

[Max. Marks: 50]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(1 x 10 = 10)

- a. What is Lorentz force?
- b. What are waves associated with moving particle?
- c. What are un-doped semiconductors?
- d. What is diamagnetic property of materials?
- e. Give practical applications of nanomaterials.
- f. Give physical dimensions of single-walled carbon nanotubes.
- g. What do you understand by hardness of materials?
- h. What is tensile strength of a material?
- i. List main effects of fatigue in material.
- j. What is fracture in materials?

Section (B)

Q. 2. Attempt any 4 questions.

(4 x 5 = 20)

- a. Discuss origin of orbital magnetic moments in materials.
- b. What are different kinds of electric polarizations possible in dielectric materials?
- c. Describe synthesis of materials using sol-gel technique.
- d. Describe working mechanism of atomic force microscope.
- e. Plot and discuss stress-strain behavior for elastic materials.
- f. Explain difference between real and engineering stress.

Section (C)

Attempt any 2 questions.

(2 x 10 = 20)

Q. 3. a. Explain PVD and CVD techniques to prepare thin films.

(5)

b. How is imaging done in electron microscopes?

(5)

Q. 4. a. What is the common technique to study fatigue in materials?

(5)

b. Explain variation of creep behavior in materials with temperature.

(5)

Q. 5. a. Describe working of junction diode under forward and reverse bias conditions.

(5)

b. Discuss practical applications of thin films.

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END SEMESTER EXAMINATIONS, JUNE-2018
PROGRAM : B.TECH. SECOND SEMESTER

COURSE CODE : AMS107**COURSE TITLE : ELEMENTS OF MATERIAL SCIENCE****[Time allotted: Two hours]****[Max. Marks: 50]****Note:** Attempt all Sections and Questions.**SECTION A****Q. 1.** Attempt all questions.**(1 x 10 = 10)**

- a. What is Hall potential?
- b. What are de Broglie waves?
- c. What are different kinds of semiconductors?
- d. Draw energy bands for insulator and semiconductors.
- e. Name impurities that are used to make p-type and n-type semiconductors.
- f. What is the main difference between single-walled and multiwalled carbon nanotubes?
- g. What do PVD and CVD stand for?
- h. Draw Hysteresis plot for ferromagnetic materials.
- i. Name different kinds of modulus of elasticity.
- j. Write definitions for stress and strain.

SECTION B**Q. 2.** Attempt any 4 questions.**(4 x 5 = 20)**

- a. Plot orientation of magnetic moments in dia, para and ferromagnetic materials in the presence of an external magnetic field.
- b. What do you understand by retentivity of magnetic materials?
- c. Explain physical vapor deposition technique.
- d. What are common practical applications of thin films?
- e. What do you understand by fracture of a material?
- f. What do you understand by true stress in stress-strain plot?

SECTION C

Attempt any 2 questions.

(2 x 10 = 20)**Q. 3.** a. Write common applications of single and multi-walled carbon nanotubes.**(5)**

b. Describe working principle of scanning electron microscope.

(5)**Q. 4.** a. Describe working principle of atomic force microscope?**(5)**

b. What are practical applications of transmission electron microscope?

(5)**Q. 5.** a. Explain different kinds of dipole moments.**(5)**

b. Draw variation of total electric dipole moment with the frequency of an inducing ac field.

(5)

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END SEMESTER EXAMINATIONS, JUNE-2018
PROGRAM : B.TECH. SECOND SEMESTER

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SECTION C

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END SEMESTER EXAMINATION, JANUARY-2018

PROGRAM : B.TECH.(CE) THIRD SEMESTER

COURSE CODE : CCE202

COURSE TITLE : FUNDAMENTALS OF SURVEYING

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

- What is magnetic declination?
- What is the difference between bearing and angle?
- Convert the following WCB into QB and QB into WCB
 - $32^{\circ}30'$
 - $201^{\circ}30'$
 - $S41^{\circ}36'E$
 - $S48^{\circ}6'W$
- What do you mean by contour interval?
- If magnetic bearing of two consecutive lines AB and BC are $28^{\circ}24'$ and $S40^{\circ}30'E$. Calculate the true bearings of the lines if magnetic declination is $9^{\circ}38'W$ and $9^{\circ}38'E$ of the lines AB and BC respectively
- The following consecutive readings were taken with a dumpy level: 0.695, 1.525, 2.395, 0.635, 0.805, 0.125 If the instrument was shifted after the third and fifth readings, then find the no. of stations
- What is the difference between a plan and a map?
- What do you mean by local attraction?
- What is closing error in a traverse?
- Find the value of X below-

Station	B.S.	I.S.	F.S.	H.I.	R.L.	Remarks
A	2.30			102.30	100.00	B.M.
B		1.30			101.00	
C			2.30		X	

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Explain the following
 - Isogonic line
 - Secular variation
 - Diurnal variation
 - Agonic line
 - Magnetic bearing
 - Magnetic declination
 - Contour gradient
- Solve the problem in a situation at a bridge site
 - How can you measure the width of Wide River if only chain survey is possible?
 - How can you find the level difference between given points on both side of river?
- Explain the classification of survey
- Explain any one indirect method of locating contours with arithmetic interpolation
- Find the missing values

Line	AB	BC	CD	DE	EA
Length	204	226	187	192	?
Bearing	$87^{\circ}30'$	$20^{\circ}20'$	$280^{\circ}0'$	$210^{\circ}3'$	?

- The following bearings were observed in running a closed traverse

Line	Fore bearing	Back bearing
AB	$71^{\circ}05'$	$250^{\circ}20'$
BC	$110^{\circ}20'$	$292^{\circ}35'$
CD	$161^{\circ}35'$	$341^{\circ}45'$
DE	$220^{\circ}50'$	$40^{\circ}05'$
EA	$300^{\circ}50'$	$121^{\circ}10'$

Determine the correct bearing of the line

- What is reciprocal leveling? In leveling between two points A and B on opposite banks of a river, the following readings were taken. R.L. of A is 100.00 m, find the R.L. of B if both points (A&B) is above the line of sight

Level Position	Staff readings	
	A	B
A	1.500	1.000
B	1.350	0.850

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3. a. Explain the intersection method of plane table surveying (7)
b. Calculate the closing error for the traverse (8)

Line	Length	Bearing
AB	89.31	N45°10'E
BC	219.76	N72°05'E
DC	151.18	S18°08'E
DE	159.10	S48°43'W
EA	232.26	N59°18'W

- Q. 4. a. A steel tape 30 m long standardized at 55° F with a pull of 15 kg was used for measuring a base line. Find the correction per tape length, if the temperature at the time of measurement was 80° F and pull exerted was 21 kg. Weight of 1 cubic cm of steel is 7.86 g, weight of tape is 0.8 kg and $E = 2.1 \times 10^6 \text{ kg/cm}^2$. Coefficient of expansion of tape per 1° F is 6.2×10^{-6} . (7.5)
b. Explain the various characteristics of contour survey (7.5)

- Q. 5. a. Explain the obstacles in chaining. (7.5)
b. In an anticlockwise traverse ABCA, all the sides were equal. Magnetic fore bearing of side BC was obtained as 20°30'. Calculate the magnetic bearings of all the sides of the traverse. (7.5)

- Q. 6. a. Write difference between prismatic compass and surveyors compass. (5)
b. The following readings were extracted from a level field book. Some of the entries are missing because of exposure to rain. Insert the missing readings and check your results. (10)

Station	B.S.	I.S.	F.S.	Rise	Fall	R.L.	Remarks
1	3.250						Benchmark
2	1.755				0.750		Change Point
3		1.950					
4			1.920				
5		2.340		1.500			
6				1.000			
7	1.850		2.185			250.00	Change Point
8		1.575					
9							
10			1.895		1.650		Change Point
11			1.350	0.750			Last Point

- Q. 7. a. Explain the temporary adjustment of level. (7)
b. An open traverse was run from A to E in order to obtain the length and bearing of the line AE which could not be measured direct, with the following results find length and bearing of line AE. (8)

Line	Length	W.C.B.
AB	82m	261°41'
BC	87m	9°06'
CD	74m	282°22'
DE	100m	71°30'

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END SEMESTER EXAMINATION, JANUARY-2018**PROGRAM : B.TECH.(CE) THIRD SEMESTER****COURSE CODE : CCE204****COURSE TITLE : CONCRETE AND BUILDING MATERIALS****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**Section (A)****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- a. What are initial and final setting times of cement?
- b. Write the name of chemical compounds of cement which gives high early strength and high heat of hydration.
- c. What are the empirical tests used for assessing the workability of fresh concrete.
- d. Write the full form of RHPC and where it is used.
- e. Name any four applications for testing of maturity of concrete.
- f. Write the importance of admixtures in concrete.
- g. Explain drying shrinkage.
- h. What do you mean by pozzolanic materials? Name any two.
- i. Write about the retarders.
- j. Write about the accelerator.

Section (B)**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- a. Enlist the major compounds of ordinary Portland cement and briefly describe their importance.
- b. Explain the phenomenon of hydration of cements. How is the water cement ratio related to cement paste structure?
- c. Differentiate between:-
 - i. Setting and hardening of cement
 - ii. Ordinary Portland Cement and Pozzolana Portland Cement.
- d. Explain the procedure of Vee-Bee consistometer test.
- e. Write the mechanics of setting and hardening of concrete.
- f. What do you mean by special concretes? Also explain uses and applications of the same.
- g. Write the test procedure of rebound hammer. Also mention advantages and disadvantages.

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. What does strength in concrete mean? List the different types of concrete strength. **(7.5)**
 - b. Describe the dry process of manufacturing of ordinary Portland cement stepwise with the help of flow chart. **(7.5)**
- Q. 4.**
 - a. What are the factors affecting the strength and durability of concrete. **(7.5)**
 - b. What are the objectives of nondestructive test in concrete structures? **(7.5)**
- Q. 5.**
 - a. Write about any five types of curing methods. **(10)**
 - b. What do you mean by workability of fresh concrete? Explain how grading and surface texture will affect the workability. **(5)**
- Q. 6.**
 - a. Calculate the quantities of sand and aggregate in 1m³ of concrete. **(10)**
 - b. Describe rheology of fresh concrete with the help of flow chart. **(5)**
- Q. 7.**
 - a. Explain the following special concretes. **(10)**
 - i. Precast concrete
 - ii. Vacuum concrete
 - b. Write the phenomenon of the expansion of hardened concrete. **(5)**

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END SEMESTER EXAMINATIONS, JULY-2018**PROGRAM : B.TECH.(CE)****THIRD SEMESTER****COURSE CODE : CCE206****COURSE TITLE : STRENGTH OF MATERIALS****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- a. Define thermal stress.
- b. Define: Resilience, proof resilience and modulus of resilience.
- c. State the different types of supports.
- d. Distinguish between closed coil helical spring and open coil helical spring.
- e. Write down the Eulers formula for columns.
- f. Define principal planes and principal stresses.
- g. Define strain energy.
- h. What are springs? Name the two important types.
- i. What do you mean by the point of contraflexure?
- j. Define volumetric strain, tensile stress and compressive stress.

SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- a. A rod of 250 cm long and diameter 3.0cm is subjected to an axial pull of 30 KN. If the modulus of elasticity of the material of the rod is 2×10^5 N/mm² Determine:
 - i. Stress
 - ii. Strain
 - iii. Elongation of the rod
- b. The stiffness of close coiled helical spring is 1.5 N/mm of compression under a maximum load of 60 N. The maximum shear stress in the wire of the spring is 125 N/mm². The solid length of the spring (when the coils are touching) is 50 mm. Find the diameter of coil, diameter of wire and number of coils. $C = 4.5$.
- c. A cantilever PQRS carries loads of 2 kN and 3 kN at 2 m and 5 m respectively from fixed end and a U.D.L of 10 kN over its entire length. Draw Shear Force diagram and Bending Moment Diagram.
- d. Find the slope and deflection of the simply supported beam carrying a point load at mid-point of the rod with help of Moment Area Method
- e. Find the value of crippling load for the column whose both ends are hinged.
- f. A hollow shaft is subjected to a torque of 40 kNm and a bending moment of the 30 kNm. The internal diameter of the shaft is one half the external diameter. If the maximum shear stress does not exceed 80 MN/m², find the diameter of the shaft.
- g. Calculate the deflection at free end of a steel cantilever 7 m long when it carries uniformly distributed load of 50 kN/m & $E = 2 \times 10^8$ kN/m² and $I = 0.0009$ m⁴

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3. a. A rectangular block of material is subjected to a tensile stress of 210 N/mm² on one plane and a tensile stress of 28 N/mm² on the plane at right angle to the former plane and a tensile stress of 28 N/mm² on the plane at right angle to the former. Each of the above stress is accompanied by a shear stress of 53 N/mm². Find:
 - i. The direction and magnitude of each of the principal stress
 - ii. Magnitude of greatest shear stress

(7.5)

- b. A closed cylindrical vessel made of steel plates 5 mm thick with plane ends, carries fluid under pressure of 6 N/mm². The diameter of the cylinder is 35 cm and length is 85 cm. Calculate the longitudinal and hoop stresses in the cylinder wall and determine the change in diameter, length and Volume of the cylinder. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$ and $1/m = 0.286$. (7.5)

Q. 4. Show that:

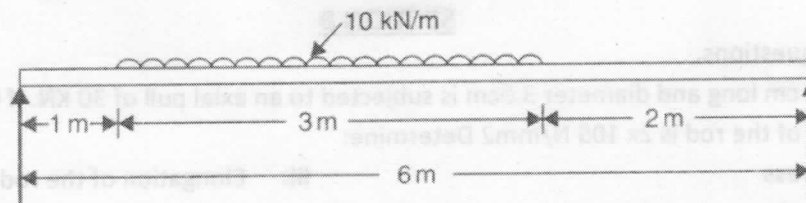
a. $E = 2C \left[1 + \frac{1}{m} \right]$

b. $E = \frac{9KC}{3K + C}$

Q. 5. a. What are the different assumptions made while deriving the bending equation? (5)

b. Prove the Relation $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$? (10)

Q. 6. a. A beam of length of 6 m is simply supported at its ends. It carries a uniformly distributed load of 10 kN/m as shown in figure. Determine the deflection of the beam at its mid-point and also the position and the maximum deflection. Take $EI = 4.5 \times 10^8 \text{ N/mm}^2$ (8)



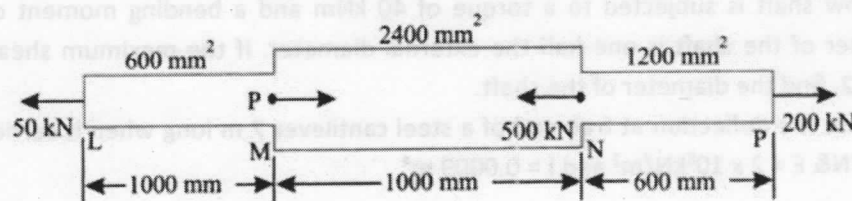
b. A simply supported beam of 16 m effective span carries the concentrated loads of 4 kN, 5 kN and 3 kN at distance 3, 7 and 11 m respectively. In addition UDL of 1 kN/m run between P and Q and 2 kN/m run between R and S. Draw S.F.D. and B.M.D. (7)

Q. 7. a. A member LMNP is subjected to point load as shown in figure. Calculate: (8)

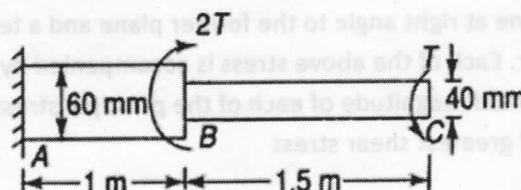
i. Force P necessary for equilibrium.

ii. Total elongation of the bar.

Take $E = 210 \text{ GN/m}^2$



b. The stepped steel shaft shown in figure 1 is subjected to a torque T at the free end and a torque of 2T in the opposite direction at the junction of two sizes. What is the total angle of twist, if the maximum shear stress in the shaft is limited to 70 MN/m²? Take $C = 84 \text{ GN/m}^2$. (7)



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END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : B.TECH.(CE) THIRD SEMESTER

COURSE CODE : CCE203**COURSE TITLE : FLUID MECHANICS****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)****a.** Explain briefly the following types of equilibrium of floating bodies:

i. Stable equilibrium

ii. Unstable equilibrium.

b. Differentiate between uniform and non-uniform flow.**c.** Explain various coefficient related to orifice?**d.** Explain the following:

i. Notch

ii. Orifices

iii. Mouthpieces

e. What is laminar and turbulent flow?**f.** What do you mean by equivalent pipe?**g.** What is loss of head at exit of pipe?**h.** What is free vortex flow?**i.** Define Pascal's law**j.** What is Reynolds equation?**SECTION B****Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)****a.** With the help of neat sketch explain Newtonian fluid, non-Newtonian fluids, Bingham plastic fluid, and ideal solid, ideal liquid.**b.** Derive Meta center height relation for a floating body.**c.** A manometer is used to measure the pressure of oil (specific gravity 0.8) flowing in a pipe line its right limb is open to the atmosphere and left limb is connected to the pipe. The centre of a pipe is 9 m below the level of mercury in the right limb. If the difference of mercury level in two limb is 15 cm, determine the absolute pressure of oil in the in the in kg/cm².**d.** 200 mm x 100 mm Venturimeter is provided in a vertical pipe carrying water, flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives reading of 220 mm. Find the rate of flow. Assume $C_d = 0.98$?**e.** If the velocity distribution over a plate is given by $u = \frac{2}{3}y - y^2$ in which u is the velocity in meter per second at a distance y meter above the plate, determine the share stress at $y = 0$ and $y = 0.15$ m. Take dynamic viscosity of fluid as 8.63 poise**f.** A 30 cm diameter pipe, conveying water, branches into two pipes of diameter 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in the pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20cm diameter pipe is 2 m/s.**g.** The dynamics viscosity of an oil used for lubrication between a shaft and sleeve is 6 poise, the shaft is of 0.4 m diameter and rotates at 190 r.p.m. Calculate the power lost in the bearing for the sleeve length of 90mm. Thickness of oil film is 1.5 mm.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

Q. 3. a. Derive Euler's equation. Also explain Bernoulli's equation and its assumptions. (10)

b. Define the terms: (5)

- i. cohesion
- ii. adhesion
- iii. surface tension
- iv. compressibility
- v. dynamic viscosity

Q. 4. Prove that the velocity distribution for viscous flow between parallel plates when the both plates are fixed across a section is parabolic in nature. Also prove the $U_{\max} = \frac{3}{2} \bar{u}$ & drop of pressure head for a given length is given by

$$h_f = \frac{12\mu\bar{u}L}{\rho g t^2}. \quad \text{Where } \bar{u} = \text{average velocity.} \quad (15)$$

Q. 5. a. An oil of viscosity 0.98 poise and relative density 0.91 is flowing through a horizontal circular pipe of diameter 100 mm and of length 10 m. Calculate the difference of pressure at the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. (8)

b. Derive an expression for discharge over a rectangular notch. (7)

Q. 6. a. The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left is connected to a pipe in which a fluid of sp. gravity 0.9 is flowing. The center of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe, if the difference of mercury level in the two limbs is 20 cm. (9)

b. Derive the relation for constant velocity potential and constant stream functions. (6)

Q. 7. The discharge Q of a centrifugal pump depends upon the mass density of fluid (ρ), the speed of the pump (N), the diameter of the impeller (D), the Manometric head (H_m) and the viscosity of fluid (μ). Show that:

$$Q = ND^3 \phi \left(\frac{gH}{N^2 D^2} \frac{\mu}{\rho N D^2} \right) \quad (15)$$

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END SEMESTER EXAMINATIONS, JUNE-2018**PROGRAM: B.TECH.(CE) FOURTH SEMESTER****COURSE CODE : CCE211****COURSE TITLE : HYDRAULIC MACHINES AND SYSTEMS****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q.1. Attempt all parts of this section:-****(10x2=20)**

- Write the expression for critical depth and critical specific energy in triangular channel section.
- Draw the GVF profiles in case of critical slope and horizontal slope.
- What do you understand by control sections?
- What do you understand by hydraulically efficient channel section?
- What are the different types of jump based on the Froude number?
- Explain most economical channel section.
- Explain steady flow and non-uniform flow.
- Explain prismatic channel and rigid boundary channel
- Explain alternate depth.
- Draw Velocity Distribution Curve in open channel.

SECTION B**Q.2. Attempt any five questions in this section: -****(7x5=35)**

- A triangular channel with an apex angle of 75° carries a flow of $1.2 \text{ m}^3/\text{s}$ at a depth of 0.8 m . If the bed slope is 0.009 , find the roughness coefficient 'n' of the channel. What is the corresponding value of Chezy's coefficient 'C'?
- Derive dynamic equation of gradually varied flow for a wide rectangular channel according to Chezy's formula.
- Derive the expression for critical depth and critical specific energy in triangular channel section in terms of Froude number.
- Show that a trapezoidal channel with given area and side slope is most efficient when hydraulic radius is half of the depth of flow ($R = d/2$). Also prove that best side slope is 600 .
- Explain with a suitable sketch, different types of bed forms which can be observed at different levels of deformation in an alluvial stream.
- A rectangular channel with a bottom width of 4 m and a bottom slope of 0.008 has a discharge of $1.50 \text{ m}^3/\text{sec}$. In GVF in this channel the depth at certain location is found to be 0.30 m . Assuming $\eta = 0.016$, determine the type of GVF profile.
- Explain various parts of Pelton wheel turbine with neat sketch.

SECTION C**Attempt any three questions in this section: -****(15x3=45)**

- A hydraulic jump takes place in a horizontal triangular channel having side slopes of $1.5H: 1V$. The depth before and after the jump are 0.3 m and 1.2 m respectively. Estimate:
 - flow rate
 - Froude no. at the beginning and at the end of the jump
 - energy loss in the jump.
- A rectangular channel having width 2 m and discharge $5 \text{ m}^3/\text{s}$. Calculate flow depth and Froude number.

(7.5)**(7.5)**

Q.4. a. Sketch the possible GVF profiles in the following serial arrangements of channels assuming the flow is from left to right: (7.5)

- iv. Horizontal to Steep
- v. Mild to Steep
- vi. Adverse to Mild
- vii. Steeper to Steep

b. Derive the expression of sequent depth ratio for a hydraulic jump in a horizontal frictionless rectangular channel. (7.5)

Q.5. a. A rectangular channel of width 4m has a bed slope of 1 in 1500. Find the maximum discharge through the channel. Take $C = 50$. (7.5)

b. A reaction turbine works at 450rpm under a head of 120m. Its diameter at inlet is 120 cm and the flow area is 0.4m^2 . The angle made by absolute and relative velocities at inlet is 20° and 60° respectively with the tangential velocity. Determine the volume flow rate, power developed and hydraulic efficiency. Assume flow is radial at outlet. (7.5)

Q.6. a. Explain various definitions of head and efficiencies of a centrifugal pump. (7.5)

b. A centrifugal pump is to discharge $0.118\text{m}^3/\text{s}$ at a speed of 1450 rpm against a head of 25m. Impeller diameter is 250mm, its width at outlet is 50mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of impeller. (7.5)

Q.7. a. Explain general layout of a hydroelectric power plant in detail. What are the various efficiencies of turbine? (7.5)

b. Find the discharge through a circular pipe of diameter 3m and bottom slope 1:1000, and $C=55$.
If :- (7.5)

- i. Depth is 1m
- ii. Depth of flow 2.5m

SECTION C

Enrol. No. S R H U

Regn. No. D D

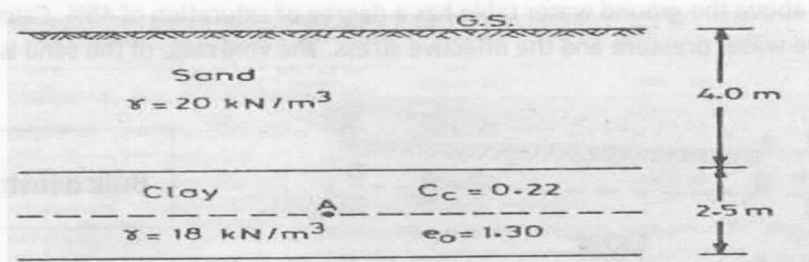
END SEMESTER EXAMINATIONS, JUNE - 2018
PROGRAM: B.TECH.(CE) FOURTH SEMESTER

COURSE CODE : CCE212**COURSE TITLE : SOIL MECHANICS****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- a. Write about any two types of agents by which soil can be transported.
- b. Describe in short these types of soils
 - i. Black cotton soil
 - ii. Loam
- c. What are the engineering properties of soil?
- d. What do you mean by Particle size Analysis and how you classify the solids of soil?
- e. What do you mean by
 - i. Initial Consolidation
 - ii. Secondary Consolidation
- f. Write the concept of compaction of soil.
- g. Derive the equation for the characteristics of Flow net.
- h. The falling-head permeability test was conducted on a soil sample of 4cm diameter and 18cm length. The head fell from 1.0m to 0.40m in 20 min. If the cross sectional area of the stand pipe was 1 cm^2 , determine the coefficient of permeability.
- i. What are the factors affecting consolidation?
- j. What do you mean by stress path? Write their classifications.

SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- a. A soil profile consists of a surface layer of clay 4m thick ($\gamma = 19.5 \text{ kN/m}^3$) and a sand layer 2m thick ($\gamma = 18.5 \text{ kN/m}^3$) overlying an impermeable rock. The water table is at the ground surface. If the water level in a standpipe driven into the sand layer rises 2m above the ground surface then calculate the total stress, pore water pressure and the effective stress. Take $\gamma_w = 10 \text{ kN/m}^3$.
- b. Calculate the final settlement of the clay layer shown in figure due to an increase of pressure of 30 kN/m^2 at mid-height of the layer. Take $\gamma_w = 10 \text{ kN/m}^3$. Also calculate the settlement when the water table rises to the ground surface.



- c. Derive the stresses in a soil under hydrostatic condition when
 - i. Water table above the soil surface
 - ii. Water table at the soil surface
 - iii. Water table in soil.
- d. What do you mean by initial, primary and secondary consolidation?
- e. Derive the expression for vertical pressure under a uniformly loaded circular area.
- f. What are the important characteristics of Mohr's circle?
- g. A capillarity- permeability test was conducted in two stages under a head of 50cm and 200cm at the end of entry of water. In the first stage, the wetted surface advanced from its initial position of 2cm to 8cm in 6 min. In the second stage it advanced from 8cm to 20cm in 20 min. If the degree of saturation at the end of the test

was found to be 90% and the porosity was 30%, determine the capillarity head and the coefficient of permeability?

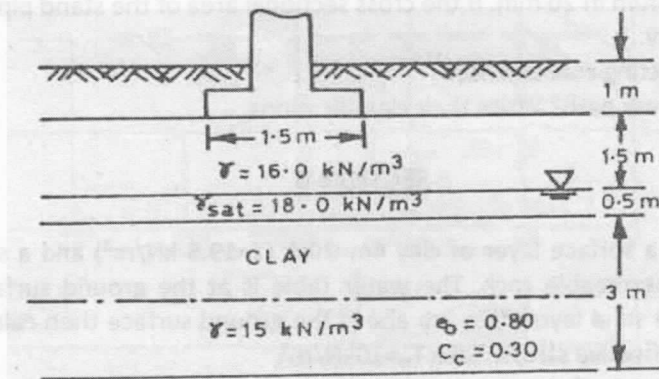
SECTION C

Attempt any 3 questions.

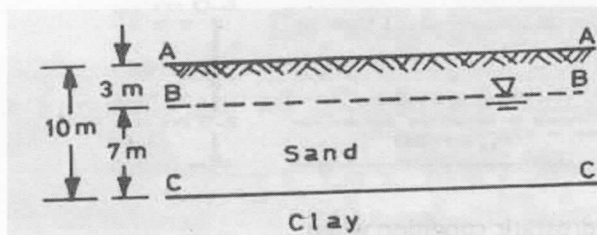
(15 x 3 = 45)

- Q. 3.** a. Derive the expression for the three phase diagram in terms of void ratio. (5)
 b. Define these properties of soil with expressions (2*5=10)
- Submerged unit weight
 - Percentage Air voids
 - Bulk Mass density
 - Bulk unit weight
 - Saturated mass density

- Q. 4.** a. Write the effects of compaction on properties of soil. (5)
 b. A footing has a size of 3m by 1.5m and it causes a pressure increment of 200 kN/m² at its base (figure). Determine the consolidation settlement at the middle of the clay layer. Assume 2:1 pressure distribution and consider the variation of pressure across the depth of the clay layer. $\gamma_w = 10 \text{ kN/m}^3$. (10)



- Q. 5.** a. Write any five factors which are affecting permeability of a soil. (5)
 b. A sand deposit is 10m thick and overlies a bed of soft clay. The ground water table is 3m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%. Calculate the variation of the total stress, pore water pressure and the effective stress. The void ratio of the sand is 0.70. Take $G = 2.65$ (10)



$$\text{Bulk density } \rho = \left(\frac{G + Se}{1 + e} \right) \rho_w$$

- Q. 6.** a. Write the definitions with their mathematical expressions of Coefficient of compressibility, Coefficient of Volume change and Compression Index. (9)
 b. Derive the expression for vertical pressure under a uniformly loaded rectangular area. (6)
- Q. 7.** Name the different types of tests are applied on the soil to calculate its strength characteristics based on drainage conditions. Write any two types of tests by showing their essential parts in the apparatus. (15)

Enrol. No.

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Regn. No.

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END SEMESTER EXAMINATIONS, JUNE-2018
PROGRAM : B.TECH.(CE) FOURTH SEMESTER

COURSE CODE : CCE205**COURSE TITLE : ENGINEERING GEOLOGY****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections and Questions.

SECTION A

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. What do you understand by engineering geology?
- b. Define Toposheet and their uses.
- c. What is meant by the intensity of earthquake?
- d. What is meant by Petrology?
- e. Define foot wall and hanging wall.
- f. Define Anticline and Syncline Folds.
- g. What is continental shelf?
- h. Write the main features of continental margins.
- i. What is strike-dip fault?
- j. What is geological map?

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Explain the stress and strain curve for the study of rock strength.
- b. Explain the importance of remote sensing data for Civil Engineering projects.
- c. What is epicenter and focus of earth quake?
- d. Explain the hazard 'landslide and mass movements'.
- e. Describe the site investigation techniques for Civil Engineering projects.
- f. Discuss the shelf and shelf break features of continental margins.
- g. Describe different types of volcanos.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. Discuss the various physical properties of rock.
 - b. What is meant by weathering of rocks? Explain the physical weathering of rocks.
- Q. 4.**
 - a. What are sedimentary rocks and how are they formed?
 - b. What are folds and how are they formed? Explain different classification of folds.
- Q. 5.**
 - a. Discuss the different forms of minerals? Give two examples of each.
 - b. Discuss various classification of joints.
- Q. 6.**
 - a. What is meant by principle of stratigraphy? State its importance.
 - b. Discuss primary, secondary and surface waves.
- Q. 7.**
 - a. Discuss the situations of Indian seismic zones.
 - b. Discuss the geological field investigation for tunneling and underground excavation.

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Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATION, JUNE - 2018
PROGRAM : B.TECH.(CE) FOURTH SEMESTER

COURSE CODE : CCE209**COURSE TITLE : BUILDING CONSTRUCTION****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. What is Cavity Wall? Why do we provide this type of wall in building construction?
- b. Explain the terms:
 - i. Quoin Closer
 - ii. Bat
- c. Write the name and proportions of different compound found in brick?
- d. Draw and explain Flemish Bond in brick masonry?
- e. What do you understand by site investigation? Write the name of different methods of sub-soil exploration?
- f. Explain post-termite anti termite treatment method.
- g. Draw a sketch of battens, ledged and framed door.
- h. Draw a neat sketch diagram of stairs showing the name of its components.
- i. Explain double or purlin roof.
- j. Draw and explain reinforced brick floor.

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Write the name of different types of brick molding.
- b. What do you understand by dressing of stones? Write various methods of stone dressing.
- c. What are the requirement of material for dampness in building and explain the causes of dampness.
- d. What are termites explain different types of termites?
- e. Explain in brief, but with sketch various basic forms of pitched roofs.
- f. Define the following terms:-
 - i. Plinth
 - ii. Frog
 - iii. Course
 - iv. Tothing
 - v. Lacing course
- g. Write a note on various types of hinged used for doors and windows.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.** What are the compositions in a good brick earth? Explain the process of manufacturing of brick.
- Q. 4.** What are termites? Explain anti-termite treatment.
- Q. 5.** What you understand by floor? Write the name of its components also write down different types of floor used in construction.
- Q. 6.** Differentiate between lintel and arches. Draw a neat sketch diagram of an arch with its components and explain the function of each component.
- Q. 7.** Define roof in detail. What are the requirements of roof? Write the name of different types of roof and explain trussed roof.

Enrol. No.

S R H U

Regn. No.

D D

END SEMESTER EXAMINATIONS, JUNE - 2018

PROGRAM : B.TECH.(CE)

FOURTH SEMESTER

COURSE CODE : CCE207

COURSE TITLE : ADVANCED SURVEYING

[Time allotted: Three hours]

[Max. Marks : 100]

Note: Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

- a. What do you mean by relief displacement?
- b. What do you mean by flight planning?
- c. Define the following terms
 - i. Picture plane
 - ii. Camera plate
 - iii. Principal point
 - iv. Focal length
- d. Write the principle of stadia method.
- e. Name the temporary adjustments of theodolite.
- f. What do you mean by mistakes, systematic error and accidental error in surveying?
- g. What is azimuth?
- h. Name the various types of signals.
- i. What do you mean by strength of figure?
- j. Why towers are adopted in triangulation survey?

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- a. A flag post of height 3 m was erected on top of a building. Find the R.L. of top of flag post, if the vertical angle to bottom and top of it were measured as 15° and 25° respectively from a point. Staff reading on a bench mark from the same point at $0^\circ 0' 0''$ was 3.445 m. R.L. of bench mark is 200.00 m
- b. A tachometer was set up at station A and the readings on a vertically held staff at B were 2.115, 3.239 and 3.935. The line of sight has an inclination of $17^\circ 25'$. Find horizontal distance between A and B, also the elevation from horizontal line of sight to inclined line of sight.
- c. A line AB, 3000 m long, lying at an elevation of 600 m measures 9.65 cm on a vertical photograph for which focal length is 20 cm. Determine the scale of the photograph in an area the average elevation of which is about 900 m
- d. Explain how to set a simple circular curve by any of the angular methods.
- e. Define the following:
 - i. Reverse curve
 - ii. Compound curve
 - iii. Vertical curve
 - iv. Transition curve
- f. Explain how to measure a horizontal angle by reiteration method?
- g. Explain the various stages of triangulation survey.

SECTION C

Attempt any 3 questions. Each question carry equal marks.

(15 x 3 = 45)

- Q. 3. a. In order to determine the elevation of top of a signal on hill observations were made from 2 points P and R. All three points are in the same vertical plane. Angle of elevation to Q from P and R are $35^\circ 25'$ and $25^\circ 5'$ respectively.
Staff reading at B.M. from P and R are 3.765 m and 4.855 m respectively. R.L. of bench mark is 106.42 m. Distance PR=140 m, height of signal=5 m. Find out R.L. of foot of signal.
- b. What do you mean by vertical and tilted photograph? Explain instrumental error in theodolite work.

- Q. 4.** a. A leveling staff is held vertical at a distance of 120 m and 350 m from the axis of a tachometer and staff intercept for horizontal sight are 0.99 m and 4 m respectively. Find the constants of the instruments. Instrument set up at a station A and the staff is held vertical at point B. With the telescope inclined at an angle of depression of 15° to the horizontal, the readings on the staff are 3.670, 2.835 and 1.0 m. Calculate the R.L. of B and its horizontal distance from A. H.I.=1.62 m and R.L.= 450.5 m.

- b. What do you mean by weight of an observation? Explain any four laws of weights with example.

- Q. 5.** a. Derive an expression for distance equation in the tachometric surveying.

- b. If staff readings taken on B and C are :

	Distance	Stadia readings		
B	140 m	1.43	1.91	2.45
C	220 m	0.96	1.94	2.96

Then calculate multiplying and additive constant in tachometric surveying

- Q. 6.** a. What is point of curve, point of tangency and point of intersection in simple circular curve? Write the principle of stadia method?

- b. Explain different types of vertical curves used in curve surveying.

- Q. 7.** a. Two points A and B having elevations of 500 m and 300 m respectively above datum appear on the vertical photograph having focal length of 20 cm and flying altitude of 2500 m above datum. Their corrected photographic co-ordinates are as follows :

Point	Photographic co-ordinates	
	x (cm)	Y(cm)
a	+2.65	+1.36
b	-1.92	-3.65

Determine the length of ground line AB

- b. What is satellite station? Explain various possible cases of satellite station.

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Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JANUARY-2018**PROGRAM : B.TECH.(CE) FIFTH SEMESTER****COURSE CODE : CCE304****COURSE TITLE : WATER SUPPLY AND TREATMENT****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**Section (A)****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- What do you mean by commercial as well as compensate losses of water?
- State Kuichling's and Freeman formula used to design the arte of fire demand.
- Explain the Design period term related to water supply?
- What are the main objectives of treating water?
- What is canal intake?
- What is meant by a water hammer pressure?
- Name the two apparatus by which the turbidity can be measured.
- What are the main objectives of treating water
- What is screens and their classification?
- Explain the specific conductivity of water.

Section (B)**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- Given the following data, calculate the population at the end of next three decades by decreasing rate method.

Year	Population
1940	80,000
1950	1,20,000
1960	1,68,000
1970	2,28,580

- A pipe line 0.6 m diameter is 1.5 km long. To augment the discharge, another pipe line of the same diameter is introduced parallel to the first in the second half of it's length. Find the increase in discharge if $f = 0.04$ and head at the inlet is 30 m.
- With the help of the following data; estimate the population of locality in the year 2001 by using incremental method.

Year	Population
1911	3,50,000
1921	4,66,000
1931	9,94,000
1941	15,60,000
1951	16,23,000

- Write about all the aspects of distribution methods of water supply.
- Write a short note on the laying of the pipe line.
- Enumerate and discuss all the physical characteristics of water.
- Draw a water connection in case of plumbing system. Also write about the components which are showing in the figure of water connection.

Section (C)

(15 x 3 = 45)

Attempt **any 3** questions.

- Q. 3. a.** Write a short note on the Elevated reservoir with its neat sketch
b. Write all aspects of the collection of water samples for bacteriological testing.
- Q. 4. a.** Enumerate and define all types of joints which are applied on the pipes.
b. What do you mean by Pipe appurtenances? Write it's both the components and all aspects about the same.
- Q. 5. a.** Define any three types of layouts of a distribution system with their schematic diagram.
b. A town with a population of 1 million has a continuous water supply. Average supply is 270 lpcd, the water being supplied by direct pumping. The total supply of 270 lpcd is phased as follows:

Time	Lpc
5 A.M. – 11 A.M.	90
11 A.M. – 3 P.M.	54
3 P.M. – 9 P.M.	81
9 P.M. – 12 midnight	27
12 midnight – 5 A.M.	18

- Q. 6. a.** What does meant by quality standards for municipal or domestic supplies?
b. Discuss all types of pipes based on materials used in pipeline
- Q. 7. a.** Explain all the constituents of a coagulation sedimentation plant.
b. Explain water treatment plant with flow diagram.

Year	Population
1940	80,000
1950	1,20,000
1960	1,58,000
1970	2,28,250

Year	Population
1951	16,23,000
1961	12,50,000
1971	9,94,000
1981	4,66,000
1991	3,50,000

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATION, JANUARY-2018
PROGRAM: B.TECH.(CE) FIFTH SEMESTER

COURSE CODE : CCE302**COURSE TITLE : DESIGN OF CONCRETE STRUCTURES-I****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**IS 456-2000 is Allowed in Examination Room (Hard binding only)**

Section (A)

Q. 1. Attempt **all** questions.**(2 x 10 = 20)**

- a. Define limit state of collapse.
- b. Draw a design stress strain curve for concrete in LSM.
- c. Column is a compression member, steel resist tension then why steel is required in column.
- d. Write the condition when bubbly reinforced is used.
- e. Explain the shear resistance mechanism in beam.
- f. Why steel is used in Reinforced Concrete Structures.
- g. Draw a design stress strain curve for steel in LSM.
- h. Name the different types of shear failure and explain any one.
- i. Distinguish between WSM & LSM.
- j. Define over balance section.

Section (B)

Q. 2. Attempt **any 5** questions.**(7 x 5 = 35)**

- a. Write down the basic assumption of WSM. Define over reinforced section.
- b. A singly reinforced concrete beam 300 mm wide 500 mm deep to the centre of tensile reinforcement, is reinforced with 4 bars of 18mm dia. Find the moment of resistance of the section using WSM . Use M20 concrete and Fe415 steel.
- c. A reinforced concrete beam is 400 mm wide and 600 mm deep to the centre of tensile reinforcement. The compression reinforcement consists of 4 bars of 16 mm dia. and is placed with its centre at a depth of 40 mm from the top. The tensile reinforcement consists of 4 bars of 20 mm dia. The section is subjected to a B.M of 100 KN-m. Determine the stresses in concrete and steel. Take $m = 15$
- d. A singly reinforced beam subjected to a bending moment 45kNm. If beam is 250mm wide find the effective depth and reinforcement required by LSM. Use M20 concrete and Fe250 steel
- e. A doubly reinforced beam section is 250mm wide and 500mm deep to the centre of tensile reinforcement. Is reinforced with 2 bars of 18mm diameter in compression zone and 4 bars of 25mm diameter in tension. If the effective cover is 40mm, determine moment of resistance (LSM). Use M20 and Fe415steel.(by LSM)

e_{sc}	f_{sc}
0.00256	346.0
0.00308	354.7

- f. A reinforced concrete column of 2.75 m effective length carries an axial load of 1600 KN. Design the column using M20 concrete and Fe 415 steel.
- g. A continuous beam 25cm by 40cm carried 3 longitudinal bars of 16mm diameter beyond the point of inflexion in the sagging moment region if factored shear force at the point of inflexion is 150kN check if the beam is safe in bond.

Section (C)

Attempt **any 3** questions.

(15 x 3 = 45)

- Q. 3.** Find the reinforcement required for a rectangular beam section for the following data.
Size=300mm x 600mm; Factored moment= 115kNm; Factored Torsion 45kNm; Factored shear= 94kN; M20 concrete & Fe415 steel. (15)
- Q. 4.** A slab of span 4m x 6m simply supported at each ends subjected to a live load of 3.25kN/m².if the thickness of wall is 160mm, Design the slab using M20 concrete and Fe415 steel. Check for shear only. (Bending moment coefficient for long span 0.103 and for the short span 0.047) (15)
- Q. 5. a.** A simply supported reinforced beam is 250 mm wide and 500mm deep to the centre of tensile reinforcement and it is reinforced with 5 bars of 18mm diameter as tensile steel. If the beam is subjected to a factored shear force of 105kN at the support, Design the shear reinforcement consists of stirrups (**by LSM**). Use M20 concrete and Fe415 steel. (7.5)
- b.** Simply supported beam 250mm wide and 500mm deep to the centre of tensile reinforcement, is provided with 6 bars of 22mm diameter. The maximum shear force for the beam is 140kN. One main bar is bent up to resist part of shear. Design the shear reinforcement (**by WSM**). Use M20 concrete and Fe415 steel. (7.5)
- Q.6.** Design a reinforce concrete slab resting on masonry wall of 120 mm with clear span 3m , Live load = 4000 N/m², floor finish = 20 mm , clear cover 15mm, Use M 20 concrete and Fe 415 steel. Check for shear and development length. (15)
- Q.7.** Design an axial loaded circular column held in position and restrain against rotation at both ends to the following requirement. (Assuming as a short column)
Actual length of the column = 7.8 m , axial load = 750 KN, type of reinforcement is longitudinal steel and helical steel, Use M 20 concrete and Fe 415 steel. (15)

ϕ_{sc}	ϕ_{se}
0.80296	766.0
0.80305	754.7

Enrol. No.

S R H U

Regn. No.

D D

END SEMESTER EXAMINATION, JANUARY-2018

PROGRAM : B.TECH.(CE) FIFTH SEMESTER

COURSE CODE : CCE307

COURSE TITLE : GEOTECHNICAL ENGINEERING

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

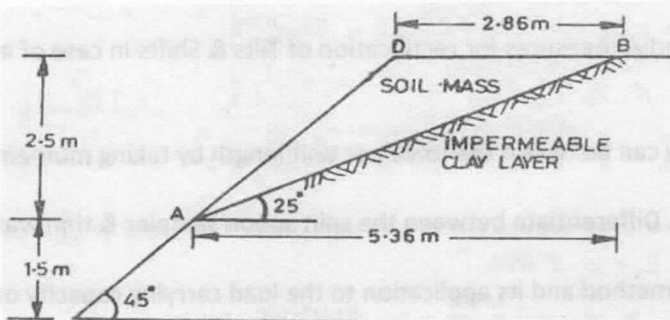
- What are the general aspects for the site investigation?
- What is S.P.T.?
- What do you mean by the Free Vibration and Forced Vibration?
- What is Strap or Cantilever footing?
- Classify the different type of lateral earth pressures.
- Define the term NSBC with their mathematical expression.
- Classify the piles on basis of it's material.
- In which conditions well foundation is used? Explain any four conditions.
- Define the Factor of safety of the slopes with respect to cohesion.
- Define these basic definitions which are given below
 - q_{nu}
 - q_{ns}

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Write down about all types of slope failures.
- Derive the Rankine's earth pressure theory for the Active earth pressure.
- A soil mass is resting on an inclined impermeable clay layer, as shown in figure. Determine the factor of safety against wedge failure along the interface. The soil has $c=6 \text{ kN/m}^2$, $\Phi=20^\circ$ and $\gamma=17 \text{ kN/m}^3$.



- What would be the effect of water table on bearing capacity if it is located. Explain with the help of figure
 - Above the base of footing
 - At a depth b below base
- What do you mean by Driven Pile? Write all the methods / techniques which are commonly used for installation of piles.
- Describe the Terzaghi's analysis for the Well Foundations. Also write the assumptions.
- Describe the phenomenon of Group action of piles.

Section (C)

Attempt any 3 questions.

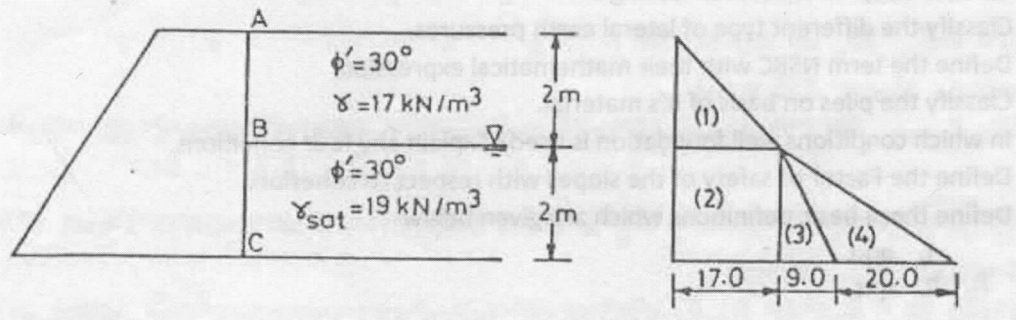
(15 x 3 = 45)

Q. 3. a. Derive the expression for the stability of an infinite slope of cohesion less soils for the case of dry soil. (8)

b. A vertical cut is made through a homogenous soil mass ($c=20 \text{ kN/m}^2$, $\phi=20^\circ$ and $\gamma = 16.5 \text{ kN/m}^3$). Using Culmann's method, determine the safe depth of the cut, taking a factor of safety of 2. Also determine the safe depth using stability number ($S_n=0.217$). (7)

Q. 4. a. Derive the Rankine's earth pressure when the surface is inclined in case of Active earth pressure. (8)

b. Determine the lateral earth pressure at rest per unit length of the wall shown in figure. Also determine the location of the resultant earth pressure. Take $K_0=1-\sin\phi$ and $\gamma_w=10 \text{ kN/m}^3$. (7)



Q. 5. a. Derive the expression for the Terzaghi's bearing capacity of soils under a strip footing. Also write the assumptions. (8)

b. Determine the depth at which the circular footing of 2 m diameter be founded to provide a factor of safety of 3. If it has to carry a safe load of 1600 kN. The foundation soil has $c=10 \text{ kN/m}^2$, $\phi=30^\circ$ and $\gamma=18 \text{ kN/m}^3$, $N_c=37.2$, $N_q=22.5$, $N_\gamma=19.7$. Use Terzaghi's analysis. (7)

Q. 6. a. Describe what are the remedial measures for rectification of Tilts & Shifts in case of an installation a of a Well foundation. (8)

b. In case of a heavy well how can be obtain the force per unit length by taking moment about base. (7)

Q. 7. a. Write the use of a sampler. Differentiate between the split spoon sampler & thin walled sampler. (8)

b. Derive the Wave Equation method and its application to the load carrying capacity on a pile. (7)

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATION, JANUARY-2018**PROGRAM : B.TECH.(CE) FIFTH SEMESTER****COURSE CODE : CCE309****COURSE TITLE : TRANSPORTATION ENGINEERING-I****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**Section (A)****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- a. Define passenger car unit (PCU).
- b. Define traffic volume and traffic density.
- c. What do you mean by 85th and 98th percentile speed?
- d. Write name only the historical development of road in sequence.
- e. What is cutback bitumen and write their types?
- f. Draw the plan of cloverleaf interchange.
- g. Write name only any 4 methods of origin and destination study.
- h. Draw all type of summit curve.
- i. Define effective specific gravity of blended aggregate.
- j. Define about CRV method of related to pavement.

Section (B)**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- a. The area of certain district is 14400 sq. km and there are 12 towns as per 1981 census. Determine the length of different categories of roads according to third road plan formulae to be provided in this district by the year 2001.
- b. Design the rate of super elevation for a horizontal highway curve of radius 500m and speed 100 kmph.
- c. Write the procedure of stability test in case of bituminous.
- d. Define bituminous emulsion with its classification.
- e. Explain in brief about combination stresses which are applied in case of rigid pavements.
- f. Describe the phenomenon of speed and delay study.
- g. What is traffic rotary? What are its advantages and design parameters?

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. Explain three road development plan in India. **(7.5)**
 - b. Explain various engineering surveys for highway location. **(7.5)**
- Q. 4.**
 - a. What do you mean by the Super elevation? Explain types of transition curve. **(7.5)**
 - b. The radius of a horizontal circular curve is 100 m. The design speed is 50 kmph and the design Coefficient of lateral friction is 0.15. **(7.5)**
 - i. Calculate super elevation by assuming full lateral friction.
 - ii. Calculate coefficient of friction at no any super elevation.
 - iii. Calculate equilibrium super elevation if pressure on inner and outer wheels be equal.
- Q. 5.**
 - a. A vehicle travelling at 40 kmph was stopped within 1.8 sec after the application of brakes. Determine the average skid resistance. **(6)**
 - b. Explain the following tests on bitumen: **(9)**
 - i. Ductility test
 - ii. Penetration test
 - iii. Viscosity test
- Q. 6.**
 - a. Explain the temperature stresses and joints in rigid pavement. **(7.5)**
 - b. What are the classification of road and road pattern? **(7.5)**
- Q. 7.**
 - a. Write the climatic variations which affect the pavement performance. **(5)**
 - b. Explain the Marshall method of bituminous mix design with graph details **(10)**

Enrol. No.

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END SEMESTER EXAMINATIONS, JANUARY-2018

PROGRAM : B.TECH.(CE) FIFTH SEMESTER

COURSE CODE : CCE308

COURSE TITLE : ANALYSIS OF STRUCTURES-II

[Time allotted: Three hours]

[Max. Marks: 100]

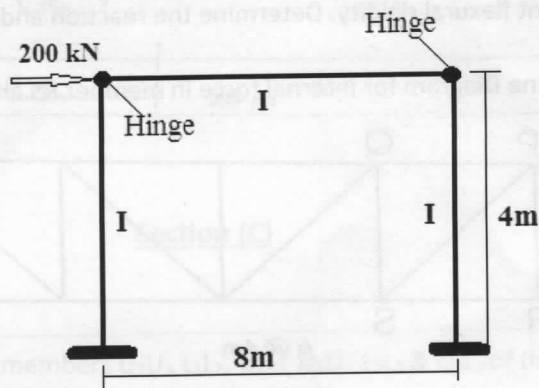
Note: Attempt all Sections & Questions.

Section (A)

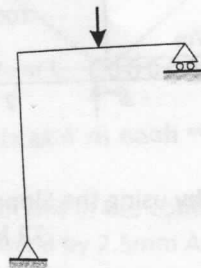
(2 x 10 = 20)

Q. 1. Attempt all questions.

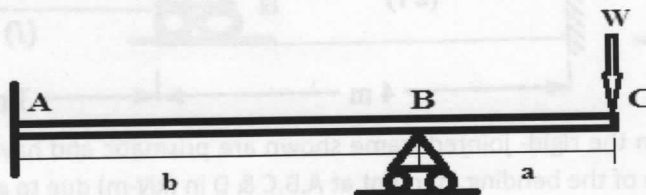
- Define Slope Deflection method.
- The moment at the ends P and Q of a beam PQ Where end P is fixed and Q is hinged, when the end Q sinks by an Amount δ , are Given as.
- A propped cantilever of span L, is loaded with UDL of intensity w/unit length, all through the span. Bending moment at the fixed end is.
- For the frame shown in figure, the maximum bending moment in the column is



- Write down any four displacement method.
- Define Moment Distribution Method.
- Draw the correct deflection diagram corresponding to the loading in the plane frame shown below



- Draw ILD for maximum shear at section 6 m from support left support for span of length 10 m.
- The magnitude of the bending moment at the fixed support of the beam is equal to



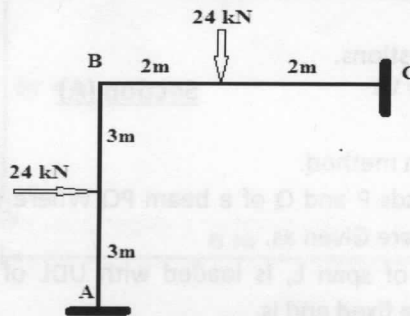
- Write down stiffness matrix for both end fixed beam

Section (B)

Q. 2. Attempt any 5 questions.

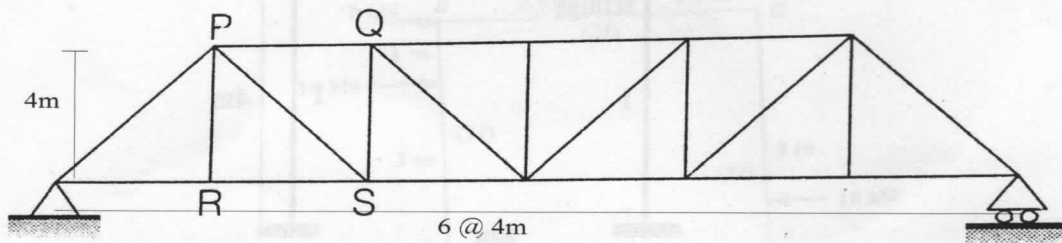
(7 x 5 = 35)

a. Assemble stiffness matrix for rigid frame as shown in fig. Take $E=200\text{GPa}$, $I = 1.33 \times 10^{-5} \text{ m}^4$ and $A = 0.04 \text{ m}^2$.

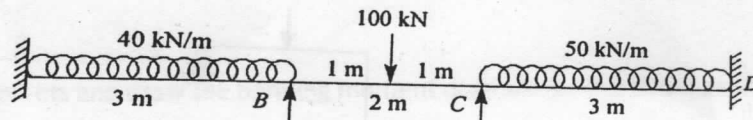


b. A two span continuous beam having equal spans each of length L is subjected to UDL $w/\text{unit length}$. The beam has constant flexural rigidity. Determine the reaction and moment at the middle support.

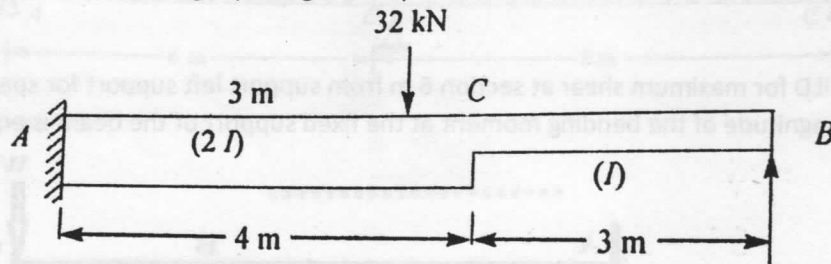
c. Draw Influence Line Diagram for internal force in member RS and PS.



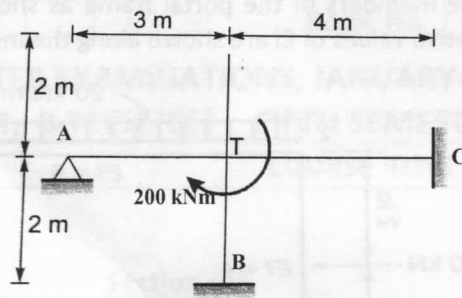
d. Let us consider the continuous beam as shown in fig. Under the loading support B sinks by 2.5mm. Determine the support moment using the moment distribution method. $E = 200 \text{ kN/mm}^2$ and $I = 3.50 \times 10^7 \text{ m}^4$.



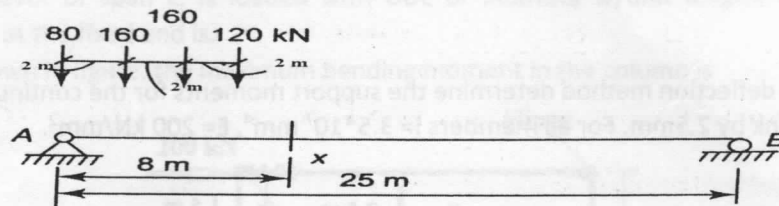
e. Analyse the beam as shown in fig. by using the Slope-deflection method.



f. All members in the rigid- jointed frame shown are prismatic and have the same flexural stiffness EI . Find the magnitude of the bending moment at A, B, C & D in (kN-m) due to given loading.



- g. The load system as shown in fig. Crosses a girder 25m span with the 120kN load leading. Determine the value of Maximum bending moment at a section 8m from the left end of the girder.

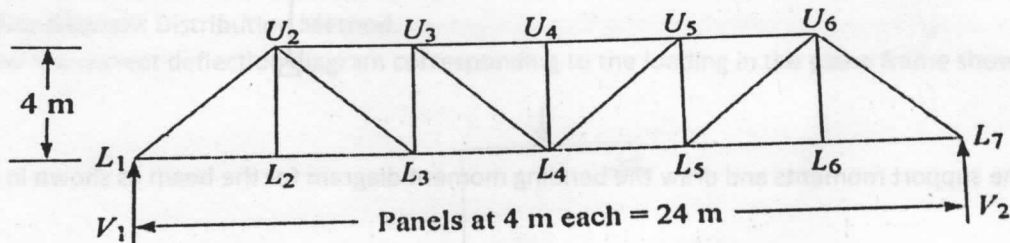


Section (C)

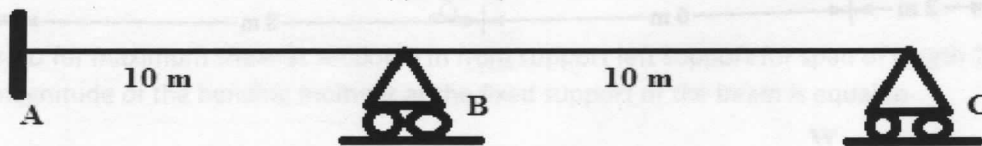
Attempt **any 3** questions.

(15 x 3 = 45)

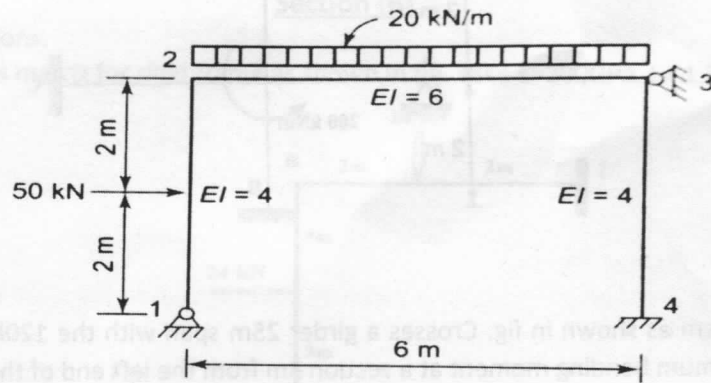
- Q. 3. Draw the ILD for the forces in the members U_2U_3 , L_1L_2 , U_2L_2 , U_3U_4 , L_2L_3 & U_3L_3 of the through type truss bridge as shown in fig.



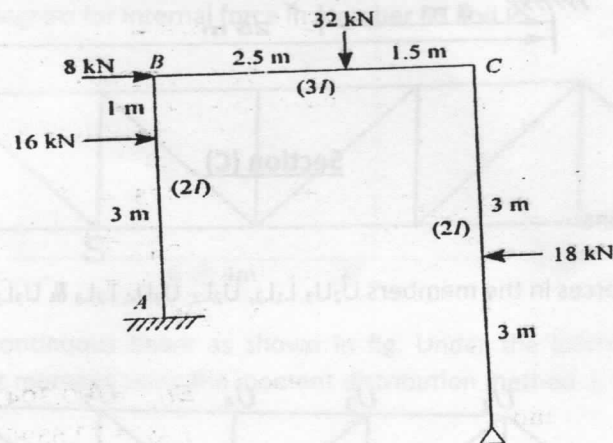
- Q. 4. By using Matrix method Calculate support reactions in the continuous beam having flexural rigidity EI , throughout due to vertical settlement of support B by 2.5mm Assume $E=200\text{GPa}$ and $I=4 \times 10^{-4}\text{m}^4$.



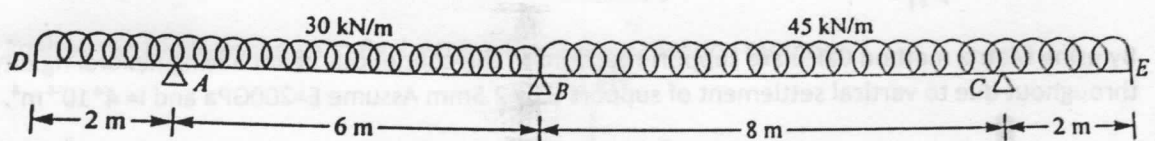
- Q. 5. The end moments of the members of the portal frame as shown in fig. are to be obtained using moment distribution method. The relative values of EI are shown along the members.



- Q. 6. Using slope deflection method determine the support moments for the continuous girder shown in fig. if the support B sink by 2.5 mm. For all members $I = 3.5 \times 10^7 \text{ mm}^4$, $E = 200 \text{ kN/mm}^2$.



- Q. 7. Find the support moments and draw the bending moment diagram for the beam as shown in fig.



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END SEMESTER EXAMINATIONS, JULY-2018

PROGRAM : B.TECH.

FIFTH SEMESTER

COURSE CODE : CCE308

COURSE TITLE : ANALYSIS OF STRUCTURES - II

[Time allotted: Three hours]

[Max. Marks: 100]

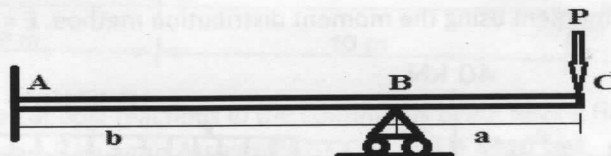
Note: Attempt all Sections & Questions.

SECTION A

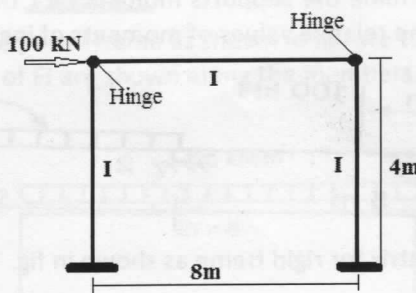
Q. 1. Attempt all questions.

(2 x 10 = 20)

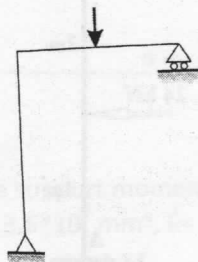
- The moment at the ends A and B of a beam AB Where end A is fixed and B is hinged, when the end B sinks by an Amount Δ , are Given as.
- The magnitude of the bending moment at the fixed support of the beam is equal to



- A propped cantilever of span L, is loaded with UDL of intensity w/unit length, all through the span. Bending moment at the fixed end is.
- For the frame shown in figure, the maximum bending moment in the column is



- Write down any four displacement method.
- Draw the correct deflection diagram corresponding to the loading in the plane frame shown below



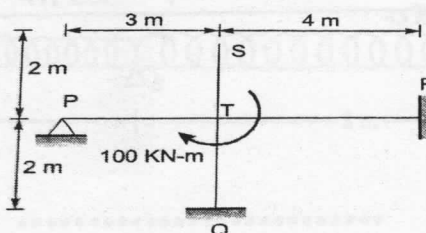
- Define NON-SWAY portal frame.
- Write the purpose of ILD.
- Define SWAY portal frame.
- Explain stable and unstable structure.

SECTION B

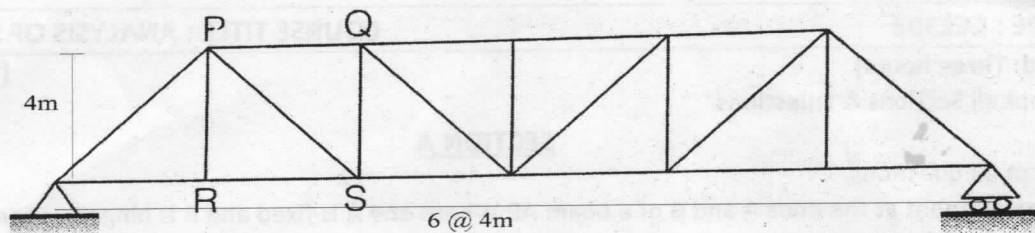
Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

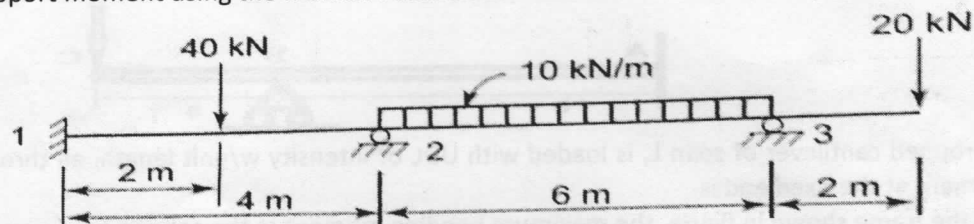
- All members in the rigid- jointed frame shown are prismatic and have the same flexural stiffness EI. Find the magnitude of the bending moment at P, Q, R & S in (kN-m) due to given loading.



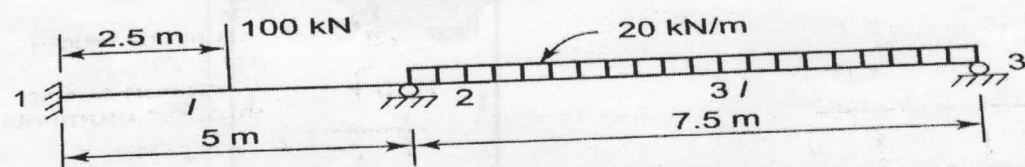
- b. A two span continuous beam having equal spans each of length L is subjected to UDL w /unit length. The beam has constant flexural rigidity. Determine the reaction and moment at the middle support.
- c. Draw Influence Line Diagram for internal force in member PQ and PS.



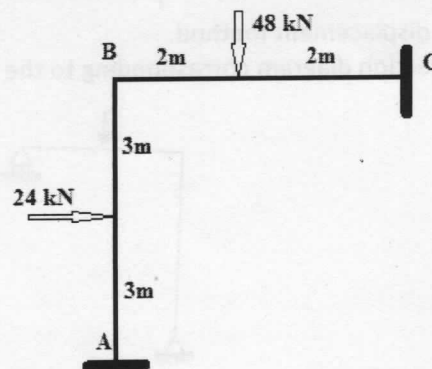
- d. Let us consider the continuous beam as shown in fig. Under the loading support 2 sinks by 10mm. Determine the support moment using the moment distribution method. $E = 200 \times 10^6 \text{ kN/m}^2$ and $I = 100 \times 10^6 \text{ m}^4$.



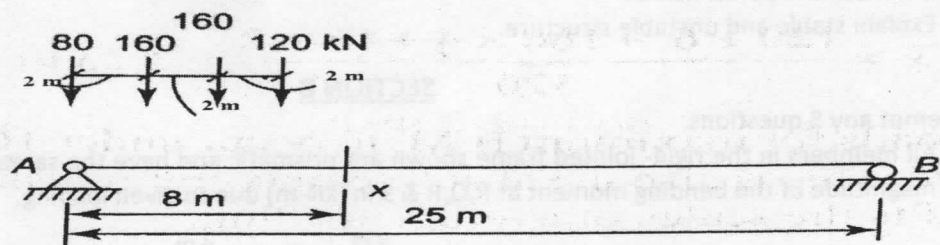
- e. It is required to determine the supports moments for the continuous beam as shown in fig. Use the Slope-deflection method. The relative values of moments of inertia are shown in fig, E is constant.



- f. Assemble stiffness matrix for rigid frame as shown in fig. Take $E = 200 \text{ GPa}$, $I = 1.33 \times 10^{-5} \text{ m}^4$ and $A = 0.01 \text{ m}^2$.



- g. The load system as shown in fig. Crosses a girder 25m span with the 120kN load leading. Determine the value of Maximum bending moment at a section 8m from the left end of the girder.

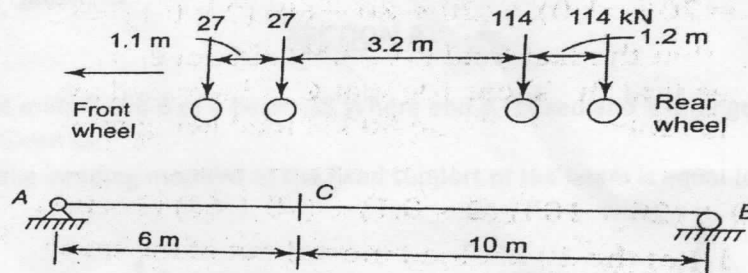


SECTION C

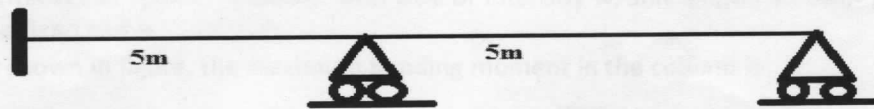
(15 x 3 = 45)

Attempt any 3 questions.

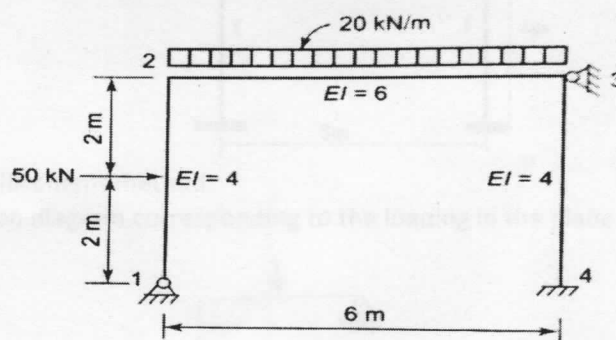
- Q. 3. The maximum moment and shear force at C for the beam as shown in fig. is to be computed. The loading is due to axle load of IRC Class A driving vehicle as shown on top of the beam. Assume that the vehicle can move in either direction.



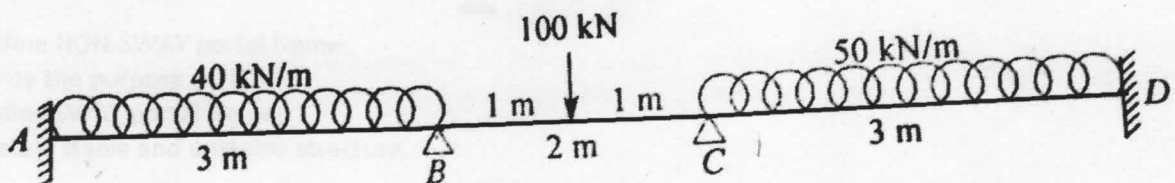
- Q. 4. By using Matrix method Calculate support reactions in the continuous beam having flexural rigidity EI , throughout due to vertical settlement of support B by 5mm Assume $E=200\text{GPa}$ and $I=4 \times 10^{-4}\text{m}^4$.



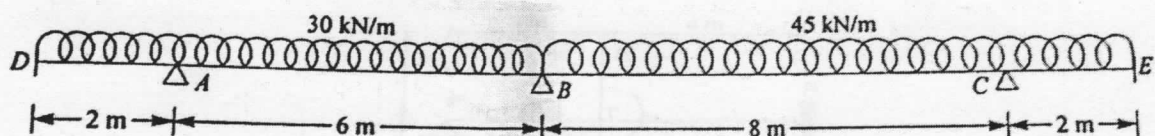
- Q. 5. The end moments of the members of the portal frame as shown in fig. are to be obtained using moment distribution method. The relative values of EI are shown along the members.



- Q. 6. Using slope deflection method determine the support moments for the continuous girder shown in fig. if the support B sink by 2.5mm. For all members $I=3.5 \times 10^7\text{mm}^4$, $E=200\text{ kN/mm}^2$.



- Q. 7. Find the support moments and draw the bending moment diagram for the beam as shown in fig.



Enrol. No.

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Regn. No.

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END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : B.TECH.(CE) FIFTH SEMESTER

COURSE CODE : CCE302**COURSE TITLE : DESIGN OF CONCRETE STRUCTURES - I****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions. Assume suitable data if required.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- a. Write down the assumptions of working stress method.
- b. What is limit state of collapse?
- c. Why is over-reinforced section not preferred?
- d. What should be the minimum reinforcement in slab having Fe 250 and Fe 415?
- e. Show that the limiting depth of neutral axis for a rectangular cross section reinforced with Fe250 grade steel is 0.53d.
- f. Define column and why they are necessary in structures.
- g. What are the assumptions for the limit state of collapse in compression?
- h. What are the various basic values of *span to effective depth ratio* for cantilever, simply supported and continuous slabs for spans up to 10 m?
- i. Define characteristic strength and target mean strength.
- j. What is the purpose of providing lateral ties in short RC columns?

SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- a. Derive the expression of moment of resistance for a balanced section in terms of :
 (i) steel strength, f_y and percentage of steel & (ii) concrete strength, f_{ck} .
- b. Distinguish between working stress method and limit state method.
- c. Derive the stress block parameters for a singly reinforced rectangular cross section in limit state design.
- d. Determine the moment of resistance for the section having 3-12 ϕ , width is 250 mm effective depth is 310 mm and the effective cover is 40 mm. (i) M 20 and Fe 415 (ii) M20 and Fe 500.
- e. Explain the terms 'balanced', 'over-reinforced' and 'under-reinforced' sections in bending.
- f. Design a beam of effective span of 6m to support a total load of 12kN/m inclusive of self-weight of the beam by LSM. Width of the beam is 250mm. Use M20 concrete and Fe415 steel.
- g. A beam of reinforced concrete is 300mm wide and 450mm deep to the center of tensile reinforcement. It is reinforced with 4 bars of 16 mm diameter as compression steel and 4 bars of 25mm diameter as tension steel. Determine the moment of resistance of the section by WSM. Covers at both ends are 50mm. Use M20 concrete and Fe415 steel.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. Draw stress-strain curve for various grades of steel.
 - b. Design a rectangular beam for 4 m effective span which is subjected to a dead load of 15 kN/m and a live load of 12 kN/m. Use M25 mix and Fe500 grade steel.
- Q. 4.** A RC beam has an effective depth of 500 mm and a breadth of 350 mm. It contains 4-25 mm bars. Calculate the shear reinforcement needed for a factored shear force of 350 kN.
 - i. M 20 and Fe250
 - ii. M25 and Fe 415

Q. 5. Design a two way slab for a room 5.5m x 4.0 m clear in size if the superimposed load is 5kN/m². Use M25 mix and Fe415 grade steel.

Q. 6. Design an axial loaded short circular column held in position and restrain against rotation at both ends to the following requirement.

Actual length of the column = 7.8 m, axial load = 750 kN, type of reinforcement is longitudinal steel and helical steel, Use M20 concrete and Fe 415 steel.

- Q. 7.**
- What is meant by slenderness ratio of a compression member?
 - Design a circular short column to carry an axial load (working) of 1200 kN. Assume e_{min} is less than .05D. Use **(i)** lateral ties, **(ii)** helical reinforcement.

*** **

SECTION B

Attempt any 2 questions.

- Derive the expression of moment of resistance for a balanced section in terms of (i) steel strength, f_y and percentage of steel, A_s (ii) concrete strength, f_{ck} .
- Distinguish between working stress method and limit state method.
- Derive the stress block parameters for a singly reinforced rectangular cross section in limit state design.
- Determine the moment of resistance for the section having $f_{yk} = 415$ N/mm², width is 300 mm effective depth is 310 mm and the effective cover is 40 mm. (i) M20 and Fe 415 (ii) M25 and Fe 500.
- Explain the terms 'balanced', 'over-reinforced' and 'under-reinforced' sections in bending.
- Design a beam of effective span of 6m to support a total load of 12 kN/m inclusive of self-weight of the beam by ISM. Width of the beam is 250mm. Use M20 concrete and Fe415 steel.
- A beam of reinforced concrete is 300mm wide and 450mm deep to the center of tensile reinforcement. It is reinforced with 4 bars of 16 mm diameter as compression steel and 4 bars of 25mm diameter as tension steel. Determine the moment of resistance of the section by ISM. Cover at both ends are 20mm. Use M20 concrete and Fe415 steel.

SECTION C

Attempt any 2 questions.

- Draw stress-strain curve for various grades of steel.
- Design a rectangular beam for 4 m effective span which is subjected to a dead load of 12 kN/m and a live load of 12 kN/m. Use M25 mix and Fe500 grade steel.
- A RC beam has an effective depth of 500 mm and a breadth of 350 mm. It contains 4-25 mm bars. Calculate the shear reinforcement needed for a factored shear force of 350 kN. (i) M20 and Fe250 (ii) M25 and Fe 415

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : B.TECH.(CE) FIFTH SEMESTER

COURSE CODE : CCE304**COURSE TITLE : WATER SUPPLY AND TREATMENT****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. What is per capita demand and design period?
- b. What are the reasons of leakage and wastage of water?
- c. Write permissible and rejection value of dissolved solid, hardness, temperature and turbidity.
- d. What are the factors affecting consumption of water supply.
- e. What is canal intake?
- f. Define stop cock and bib cock used in water supply plumbing system.
- g. Name the two apparatus by which the turbidity can be measured.
- h. Explain permanent hardness of water and how it can be remove from water.
- i. What is screens and their classification?
- j. If pH of water is 9.25. Determine concentration of OH ion?

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Given the following data, calculate the population at the end of next three decades by decreasing rate method.

Year	Population
1940	80,000
1950	1,20,000
1960	1,68,000
1970	2,28,580

- b. Discuss all types of pipes based on materials used in pipeline.
- c. A 0.5m diameter and 100m long pipeline carrying 0.5m³/sec discharge is fitted with a valve at downstream end. Calculate the rise of pressure caused within the pipes due to the valve closure in one second and instantaneously.
- d. Write about all the aspects of distribution methods of water supply.
- e. Write a short note on the Elevated reservoir with its neat sketch.
- f. Enumerate and discuss all the physical characteristics of water.
- g. Explain the process of sedimentation in detail.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. Discuss layout of distribution network with their neat sketches. **(7.5)**
 - b. Discuss various methods of distribution. **(7.5)**

- Q. 4.**
 - a. Enumerate and discuss laying of water supply pipelines. **(7.5)**
 - b. Discuss appurtenances and valves used in water supply pipeline. **(7.5)**

- Q. 5. a. Define softening of water and discuss method of softening also. (7.5)
 b. A town with a population of 1 million has a continuous water supply. Average supply is 270 lpcd, the water being supplied by direct pumping. The total supply of 270 lpcd is phased as follows: (7.5)

Time	Lpc
5 A.M. – 11 A.M.	90
11 A.M. – 3 P.M.	54
3 P.M. – 9 P.M.	81
9 P.M. – 12 midnight	27
12 midnight – 5 A.M.	18

- Q. 6. a. Discuss quality and quantity of various type of sub surface water. (7.5)
 b. Write all aspects of the collection of water samples for bacteriological testing. (7.5)
- Q. 7. Determine the distribution of flow in the pipe network shown in figure 1 below. The head loss may be assumed as KQ^n . The flow is turbulent and pipes are rough. The value of k for each pipe is indicated in the figure. Use Hardy Cross method. Derive also Hardy-Cross correction value. Also write following condition satisfied for analysis of complex pipe network. (15)

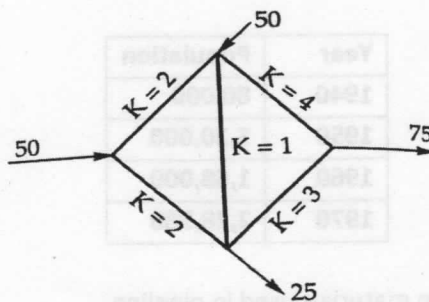


Figure 1

Enrol. No. S R H U

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END SEMESTER EXAMINATION, JUNE - 2018**PROGRAM : B.TECH. (CE)****SIXTH SEMESTER****COURSE CODE : CCE312****COURSE TITLE : ENGINEERING HYDROLOGY****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- What are isochrones?
- What do you mean by DAD relationship?
- Match the following:

Hydrological term	Relatable term
Rainfall intensity	Isohyets
Rainfall excess	Cumulative rainfall
Rainfall averaging	Hyetograph
Mass curve	Direct runoff hydrograph

- What do you mean by infiltration?
- Write differences between hydrograph and hyetograph.
- Write differences between evaporation, interception and transpiration.
- Write difference between travel time and time of concentration in a catchment.
- Write difference between pellicular water and hygroscopic water.
- Show fan shaped catchment and fern leaf catchment with diagrams.
- Find probability of a 20 year flood to occur at least once in the next 8 consecutive years

SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- Explain the various factors affecting infiltration capacity.
- Compute the ϕ -index from the following data:

Total volume of runoff = $89 \times 10^6 \text{ m}^3$, Area of basin = 369 km^2 , Contribution from groundwater in total runoff is $3.5 \times 10^6 \text{ m}^3$.

The rainfall distribution is as follows-

Time (hr)	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16
Rainfall cm/hr	3.9	6.8	7.5	6.4	4.9	3.8	1.50	1.50

- A 600 mm well completely penetrates an unconfined aquifer of saturated thickness of 4500 cm. Under a steady pumping rate for a long time, the drawdown at two observation wells 18 m and 32 m from the well are 4.5 m and 3.2 m respectively. Estimate the discharge and drawdown at the pumping well by assuming the coefficient of permeability of the aquifer 30 m/ day
- What are the advantages and disadvantages of ground water irrigation over canal irrigation?
- Define the following:
 - ϕ -index and W-index
 - Radius of influence
 - Draw down curve
 - Perched aquifer
 - S-curve hydrograph
 - Aquifuge and aquitard

- f. Rainfall over a basin in 3 consecutive hours is 8 cm, 6.5 cm and 4 cm respectively. Estimate the surface runoff from the basin assuming negligible surface retention and evaporation losses. The infiltration loss can be estimated using the Horton's equation:

$$F = 1.2 + 4.2 e^{-2.5t}, \text{ here } f = \text{infiltration in cm/hr and } t = \text{time in hr from start of rainfall}$$

- g. A well penetrates fully a 24 m thick aquifer which lies between aquiclude and aquifuge. The coefficient of permeability of the aquifer is 6.5 mm/sec. The well diameter is 200 mm and is to be worked under a drawdown of 4.5 m at the well face. Estimate the discharge from the well. What will be the influence on the discharge, if the diameter of the well is doubled? Take radius of circle of influence 280 m in each case.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3. a. There are 4 rain gauge stations existing in the catchment of a river. The average annual rainfall values at these stations are 800, 620, 400 and 540 mm respectively. Determine the optimum number of rain gauges in the catchment, if it is desired to limit the error in the mean value of rainfall in the catchment to 10%. (7.5)
b. Explain the factors affecting runoff. (7.5)

- Q. 4. a. Write difference between confined and unconfined aquifer. Derive an expression of Thiem's confined aquifer case for calculation of discharge (7.5)

- b. Find the value of ϕ -index for a storm having direct runoff volume as $1.2 \times 10^6 \text{ m}^3$. Catchment area of 42 km^2 has one recording rain-gauge and following values of total rainfall were observed:

Time (hrs)	0	2	4	6	8	10	12	14
Accumulated rain (mm)	0	7.5	19.5	63.5	70	81	87	97

(7.5)

- Q. 5. a. The storage in a stream reach has been studied; and x and K have been identified as 0.28 and 2.4 days. If the inflow hydrograph in the stream reach, as the flood starts coming in and passes, is given by the following table, compute the basin lag and reduction in the peak of outflow hydrograph: (8)

Time from start (hrs)	Inflow (l) in m^3/s
0	42
6	59
12	98
18	130
24	172
30	135

- b. Explain infiltrometer and ring infiltrometer with suitable diagram (7)

- Q. 6. a. A 6 hr rainfall with uniform intensity of 7.5 cm/hr produces a storm hydrograph of peak discharge $1200 \text{ m}^3/\text{s}$. The abstractions of rainfall are at the rate of 1 cm/hr and base flow is $65 \text{ m}^3/\text{s}$. Compute the peak discharge of 6 hr unit hydrograph. (8)

- b. Explain the following:

- | | |
|-------------------------|-----------------------------------|
| i. Permeability | v. Muskingum equation |
| ii. Transmissibility | vi. Instantaneous unit hydrograph |
| iii. S-curve hydrograph | vii. Consumptive use |
| iv. Infiltration index | |

(7)

- Q. 7. a. The ordinates of a 2 hr unit hydrograph are given below:

Time in hr	0	2	4	6	8	10	12
Discharge ($100 \text{ m}^3/\text{s}$)	0	0.54	1.75	1.27	0.58	0.25	0

Compute the 1 hr unit hydrograph for the catchment

(10)

- b. Write name only various methods with formula for calculation of peak discharge

(5)

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END SEMESTER EXAMINATIONS, JUNE-2018**PROGRAM : B.TECH.(CE) SIXTH SEMESTER****COURSE CODE : CCE311****COURSE TITLE : ENVIRONMENTAL ENGINEERING****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections and Questions.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- a. What is the importance of environmental engineering in the present day of civil life?
- b. Difference between ELR and ALR
- c. State Chezy's formula, Manning's formula and William-Hazen's formula for calculating flow velocities in sewers.
- d. Define B.O.D and C.O.D.
- e. Explain small bore sewer system.
- f. How does the temperature of atmosphere affect the height of stake? Write in brief.
- g. Define MSW and explain the necessity of its safe disposal.
- h. Write any five air quality standards and their permissible limits.
- i. Write only engineering device names which are used for controlling of particulate and gaseous pollutant in industries?
- j. What do you mean by noise level?

SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- a. Discuss briefly the necessity of replacing the conservancy system by the water carriage system of sanitation.
- b. Calculate 1 day 37°C BOD of sewage sample whose 5 day 20°C BOD.
- c. Explain various types of sewers based on material and shape.
- d. A factory uses 1.5 ML of fuel oil per month. The exhaust gases from the factory contain the following quantities of pollutant per ML per year: particulate matter = 4 t/year; SO₂ = 20 t/year; HC, CO and other = 3 t/year. Determine the safe height of the chimney required for safe dispersion of air pollutants.
- e. Calculate the diameter and discharge of a circular sewer laid at a slope of 1 in 400 when it is running half full, and with a velocity of 1.9m/sec.
- f. Enumerate various types of noise, their characteristics, their sources and effects.
- g. Enumerate the different major air pollutants, their sources and effects of air pollution.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)**Q. 3.** a. Explain different types of plume behaviour with their schematic diagrams.**(7.5)**

b. A town having a population of 30,000 persons is producing following sewages:

(7.5)

i. Domestic sewage @ 120 lpcd having 200 mg/l of BOD

ii. Industrial sewage @ 3000000 lpcd having 800 mg/l of BOD

Design high rate tricking filters for treating the above sewage assuming that the PST removes 35% BOD. Organic loading is 10000 kg/ha-m/day; recirculation ratio is 1 and the surface loading should not exceed 170M.l./ha/ day.

Q. 4. a. Write in details about various type of settling of discrete particles in waste water.**(7.5)**

b. Discuss various appurtenances used in sewer line with their schematic diagrams.

(7.5)

- Q. 5. a.** Write a brief note on the status of collection and transportation of MSW in India. Explain any three methods of disposal of municipal solid waste. (8)
- b.** A 225mm diameter sewer is to discharge 0.005 cumecs at a velocity as self-cleansing as a sewer flowing full at 0.80 m/sec. Find the depth, velocity generated and the required gradient. Use Manning's coefficient as 0.013. Assume that sewer is running half-full. Determine the values of proportioning elements of self-cleaning equivalent half-full. (7)

- Q. 6. a.** Discuss various types of engineering devices that are used to control emission of particulate matter and gaseous pollutant with their schematic diagram. (10)
- b.** Determine the effective height of a stack, with the following given data: physical stack is 180m tall with 0.95m inside diameter; wind velocity is 2.75m/sec; air temperature is 20°C; stack gas velocity is 11.2m/sec and stack gas temperature is 160°C. (5)

- Q. 7. a.** Design the activated sludge units for the following data: (5)
- Population served = 50,000
Average sewage flow = 180lpcd
BOD of raw sewage = 200mg/l
Raw sewage suspended solids = 300mg/l
BOD removal in primary treatment = 35%
Overall BOD reduction desired = 80%
- b.** Explain functions of different treatment unit in sewage treatment plant: (10)
- | | |
|---|--|
| <p>i. Screening</p> <p>ii. Grit chamber</p> <p>iii. Skimming tank</p> <p>iv. Oxidation pond</p> | <p>v. Oxidation ditch</p> <p>vi. Trickling filter</p> <p>vii. Activated sludge process</p> |
|---|--|

Enrol. No.

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END SEMESTER EXAMINATIONS, JUNE - 2018

COURSE CODE : CCE310

COURSE TITLE : TRANSPORTATION ENGINEERING-II

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt **all** questions.

(2 x 10 = 20)

- a. Define the phenomenon of Slipping and Skidding.
- b. Define Morgan key.
- c. What do you mean by Equilibrium Cant?
- d. What do you mean by Cant deficiency?
- e. What is the minimum horizontal distance between center line of track and structure in case of goods platform.
- f. Define TNC and ANC.
- g. What is meant by Special Class Stations?
- h. Define heel clearance as well as stretcher bars.
- i. What should be the standard size of ballast in case of Steel sleeper and wooden sleepers?
- j. Define hump yards.

SECTION B

Q. 2. Attempt **any 5** questions.

(7 x 5 = 35)

- What do you mean by Spikes? Discuss about any three types of spikes.
- Give the comparison between different types of rail sections also showing by their figures.
- Write the limits of super elevation as well as Cant deficiency with maximum permissible values.
- Describe in brief about a Cant. Also derive a relationship between e , G , V , and R .
- Describe all types of Crossings on the basis of shape of crossing with the help of schematic diagram.
- Classify and define all loops by showing graphical representation.
- Write about national airports authority and its major responsibilities and their objectives.

SECTION C

Attempt **any 3** questions.

(15 x 3 = 45)

Q. 3. a. What do you mean by Kinks in rails and there causes.

(5)

b. What do you mean by a Sleeper? Write any five functions of sleeper and any three requirements of sleeper. (10)

Q. 4. a. If the ruling gradient is 1 in 150 on a particular section of Broad gauge and at the same time a curve of 4 degree is situated on this ruling gradient. What should be the allowable ruling gradient? (5)

b. If 8 degree curve track diverges from a main curve of 5° in an opposite direction in the layout of Broad gauge yard, calculate the Super elevation and the speed on the branch line, if the maximum speed permitted on the mainline is 45 kmph. **(10)**

Q. 5. a. Discuss about Terminal station and draw a schematic diagram for the same.

(5)

b. What do you mean by a level crossing? Also briefly discuss about its 5 categories.

(10)

Q. 6. a. What do you mean by CTC? Write the Special features / advantages of this system.

(5)

b. Briefly describe about any five systems which work for the control of movement of trains.

(10)

Q.7. a. Discuss about the Cross wind component of wind coverage.

(5)

b. Write about the main factors for site selection in case of an Airport planning. Give the names of all surveys are applied for the same. Also specify the future air traffic needs. **(10)**

(10)

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END SEMESTER EXAMINATIONS, JUNE - 2018

PROGRAM: B.TECH.(CE)

SIXTH SEMESTER

COURSE CODE : CCE305

COURSE TITLE : DESIGN OF STEEL STRUCTURES

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

❖ Use IS 800-2007, IS 875, IS 1893-2002 and Steel Tables is permitted.

❖ **Use if required - A_{nb} for 18 mm dia. Bolt is 157 mm², 20 mm dia. bolt is 245 mm², 22 mm dia. bolt is 303 mm², 24 mm dia. bolt is 353 mm².****SECTION A****Q. 1.** Attempt all questions.

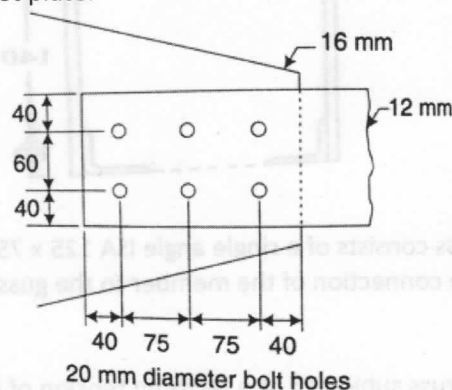
(2 x 10 = 20)

- Distinguish between steel and concrete structure.
- Write down advantage and disadvantages of steel structure.
- What will be effect on tensile strength and ductility of steel if carbon content increases?
- Write down chemical composition of steel and explain wrought iron, cast iron and carbon steel
- Write down mechanical properties of structural steel.
- What is meant by pitch of rivet?
- What are the various types of tension members?
- State mode of failure of a bolted joint
- Why fillet weld are preferred in comparison to butt welds?
- Write down Net Area for chain and staggered riveting or bolting.

SECTION B**Q. 2.** Attempt any 5 questions.

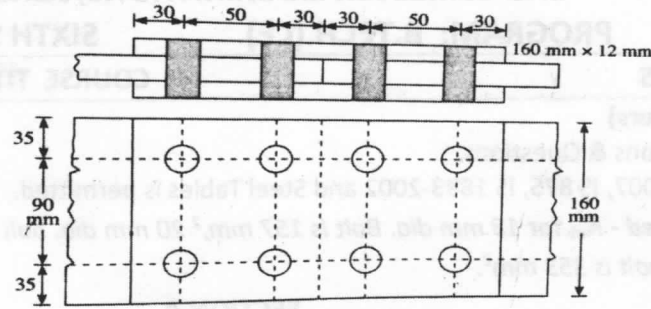
(7 x 5 = 35)

- Draw the stress - strain curve of mild steel and explain the salient features.
- Determine the service load for an interior column of the ground floor of an eight storey building for the following data.
 Height of each storey = 3.5m
 Spacing of column c/c in either directions = 3.8m
 Live load on each floor = 2500 N/m²
 Live load on roof = 1500 N/m²
 Dead load of floor/roof finish, slab and beam = 3000 N/m²
- A plate tension members is shown in fig. It is connected to a 12mm thick gusset plate. Determine the block shear strength of the gusset plate.

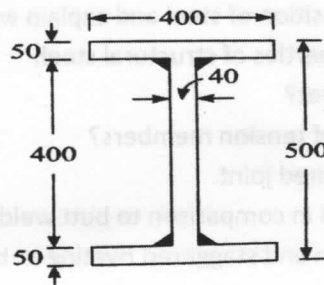


- Two plates 250 mm x 12 mm are to be connected in a double cover butt joint with 20 mm diameter bolts. The factored tensile strength of the plates is 500 kN. Design the connection. The cover plates are 8 mm thick. The bolts may be arranged in diamond pattern.

- e. Find the efficiency of the butt joint as shown in fig. bolts are 16mm diameter of grade 4.6. cover plates are 8mm thick.



- f. A 150mm x 10mm plate and a 180mm x 10mm plate are to be connected in a lap joint by shop weld. Design the connection for the full strength of the 150mm x 10mm plate.
- g. A fabricated column section shown in fig. is 6m long with both ends pinned. Investigate the adequacy of the section if the factored load on the column is 8000 kN. Take $f_y = 250 \text{ N/mm}^2$.

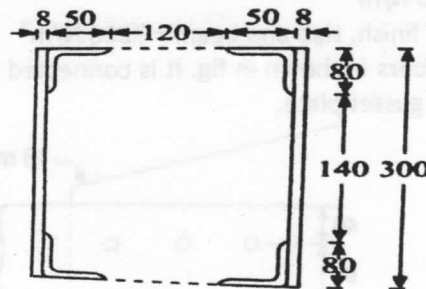


SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3. A Simply supported beam of span 6m supports a reinforced concrete slab. The compressive flange of the beam is restrained due to its connections with the slab. The beam is subjected to a dead load of 25kN/m. Design the beam. Assume the beam is sufficiently against bearing.
- Q. 4. As shown in fig. the section proposed for the top chord member of a bridge truss. The section consists of four angles 80 x 50 x 8 mm with cover plates 300 mm x 8 mm. the effective length of the member is 4.75 m and it has to carry a factored axial compressive force of 1600 kN. Investigate the safety of the design.



- Q. 5. A tension member of a truss consists of a single angle ISA 125 x 75 x 10 and is subjected to a factored tensile force of 350 kN. Design the connection of the member to the gusset plate using a lug angle. Use 20 mm bolts. Take $f_y = 250 \text{ N/mm}^2$.
- Q. 6. The tension member of a truss subjected to a factored tension of 850 kN consists of a channel ISMC 350 @ 413 N/m has to be connected to a 10 mm thick gusset plate. The overlap length of the member with the gusset plate is limited to 300 mm. Design a fillet welded connection. Assume field welding.
- Q. 7. Design double cover butt joint to connect two plates diamond pattern, each 12 mm thick and 300 mm wide. The service load to be transferred is 200 kN.

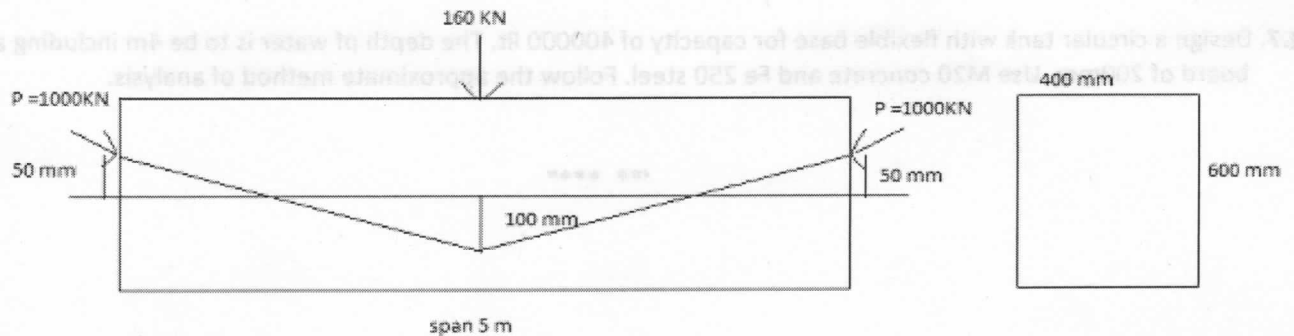
END SEMESTER EXAMINATIONS, JUNE - 2018
PROGRAM: B.TECH.(CE) SIXTH SEMESTER

COURSE CODE: CCE303**COURSE TITLE: DESIGN OF CONCRETE STRUCTURES-II****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q. 1. Attempt all questions.****(2 x 10 = 20)**

- Why is high strength steel necessary for prestressed work.
- Write short notes on Buttressed and Counterfort Retaining walls.
- Sketch plan & elevation of mat or raft footing.
- Write down Rankine's formula for minimum depth of foundation and should not be less than.
- Which one is more effective, circular water tank or rectangular water tank and why?
- Define Shallow and Deep foundation.
- Write down different types of retaining walls.
- Write down advantages of Flat slab.
- Sketch reinforcement for rectangular flat slab with suitable assumptions.
- Short notes on bending failure of retaining wall.

SECTION B**Q. 2. Attempt any 5 questions.****(7 x 5 = 35)**

- Design thickness of slab, bending moments for column strip and distribution of moments of an interior panel of a flat slab, 4 m * 4 m, for live load 6 kN/m². Use M20 concrete and Fe 415 Steel.
- The stem of a cantilever type retaining wall is 5 m tall. The wall retains soil level with its top. The soil weights 19000 N/m³ and has an angle of repose of 30°. The bearing capacity of the soil is 200 kN/m². Use M20 concrete and Fe 415 steel. Check stability calculation per meter run of the wall.
- Explain various types of foundations also sketch their Plan and Elevation.
- Show in fig. a prestressed concrete beam provided with bent tendon. The beam carries a point load of 160 kN at the center. Determine the stress distribution for the end section and mid-section of the beam. The dead load of the beam is 6 kN/m



- Define various loss of prestress.
- Brief explanation of various type of joints used in water tank.
- Design an open square tank 5 m * 5 m * 3 m deep rests on the ground. Use M20 concrete and mild steel reinforcement.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

Q.3. A square column 400mm side carries an axial load 1050 KN, the safe bearing capacity of soil at the site is 200KN/m². Use M20 concrete and Fe 415 steel. Design a square footing with sketch reinforcement.

Q.4. Design a cantilever type retaining wall for a road to the following requirement. Use M20 concrete and Fe 415 steel.

- i. Height of the from the bottom of the base slab to the top of the stem = 4.50 m
- ii. Superimposed load due to traffic = 10000 N/m²
- iii. Angle of repose of the soil = 30°
- iv. Weight of the soil 18000 N/m³
- v. Coefficient of friction between concrete and ground $\mu = 0.50$
- vi. Top surface of the backing is level
- vii. Safe bearing capacity of the soil = 200 KN/m²
- viii. A parapet wall one meter high shall also be provided.

Q.5. A pre-stressed concrete beam 250 mm wide and 360 mm deep has a span of 12 m. The beam is pre-stressed by steel wires of area 350 mm² provided at a uniform eccentricity of 60 mm with an initial pre-stress of 1250 N/mm². Determine the percentage loss of stress in the wires,

(a) If the beam is a pre-tensioned beam.

(b) If the beam is a post-tensioned beam.

Take $E_s = 210 \text{ KN/mm}^2$, $E_c = 35 \text{ KN/mm}^2$

Ultimate creep strain = $45 \times 10^{-6} \text{ mm/mm per N/mm}^2$ for pre-tensioned beam.

= $22 \times 10^{-6} \text{ mm/mm per N/mm}^2$ for post-tensioned beam.

Shrinkage of concrete = 300×10^{-6} for pre-tensioned beam.

= 215×10^{-6} for post-tensioned beam.

Relaxation of steel stress = 5% of initial stress

Anchorage slip = 1.25 mm

Friction coefficient for wave effect $K = 0.00015 / \text{m}$

Q.6. Design the interior panel of flat slab 6 m x 6 m in size, for a super-imposed load of 4000 N/m². The slab is provided with floor finishing weighing 1000 N/m². Drop shall be provided. Use M20 concrete and Fe 415 steel.

Q.7. Design a circular tank with flexible base for capacity of 400000 lit. The depth of water is to be 4m including a free board of 200mm. Use M20 concrete and Fe 250 steel. Follow the approximate method of analysis.



Enrol. No. S R H U

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END SEMESTER EXAMINATIONS, JANUARY-2018
PROGRAM: B.TECH.(CE) SEVENTH SEMESTER

COURSE CODE: CCE402**COURSE TITLE: WATER RESOURCE AND IRRIGATION ENGINEERING****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**Section (A)****Q. 1.** Attempt **all** questions.**(2 x 10 = 20)**

Explain in brief :

- a. Classification of soils
- b. Soil water characteristics
- c. Irrigation efficiency
- d. Silt factor
- e. Critical velocity
- f. Manning's formula for velocity in canals
- g. Canal structures for crossing a river
- h. Divide walls
- i. Cut offs in barrages
- j. Trap efficiency of a reservoir

Section (B)**Q. 2.** Attempt **any 5** questions.**(7 x 5 = 35)**

- a. Enumerate various river training works.
- b. Explain the procedure to determine the waterway of a barrage.
- c. What is the function of cistern in a barrage and how is its length determined?
- d. Explain the studies required for fixing the design capacity of a reservoir
- e. Explain steps taken for construction of concrete gravity dams.
- f. Explain modes of failures of embankment dams and how the seepage through the dam body is controlled.
- g. Discuss about the causes of failure of earthen dam on the basis of the followings components.
 - i. Hydraulic failure
 - ii. Structural failure

Section (C)Attempt **any 3** questions.**(15 x 3 = 45)**

- Q. 3.**
 - a. What are the main objectives and regulations of barrage operation? (7.5)
 - b. What is the data required For fixing the live storage capacity? How it is derived using a mass curve? (7.5)
- Q. 4.**
 - a. Explain various methods of estimation of Design Flood. (7.5)
 - b. Explain the method of finding stresses at dam foundation, and draw a dam section indicating various forces acting on it. (7.5)
- Q. 5.**
 - a. Explain the effect of seismic on slope stability of earthen dams. (7.5)
 - b. Draw flow net for a homogeneous earth dam and explain how the amount of seepage water is estimated. (7.5)
- Q. 6.**
 - a. What are The functions of spillways and energy dissipaters. (7.5)
 - b. What are the various types of spillway, explain basic characteristics of an ogee shaped spillway. (7.5)
- Q. 7.**
 - a. Enumerate different types of energy dissipaters. (7.5)
 - b. Explain objectives of grouting. How grouting is used to prevent subsurface seepage for dams. (7.5)

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Enrol. No. S R H U

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END SEMESTER EXAMINATION, JANUARY-2018

PROGRAM : B.TECH.(CE) SEVENTH SEMESTER

COURSE CODE : ECE404

COURSE TITLE : PRESTRESSED CONCRETE STRUCTURES

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

- Explain few examples where pre-stressed concrete beams are used.
- How do we make PSC beam in bulk?
- Which of beam of same strength have less cross section area, whether RCC beam or PSC beam? Write reason also.
- Make a diagram of bent tendon in a PSC Beam.
- What do you understand by cracking moment?
- Write assumption involve while analyzing PSC beam.
- Write difference between Pre-Tensioned Concrete and Post Tensioned concrete beam.
- Write steps of constructing post tensioned member.
- What are C-Force and P-Force?
- Write a note on loss during anchoring process.

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Write the detailed concept of P-Line and C-Line. How do we calculate shift between them.
- Explain Stress Concept Method and Load balancing method of analyzing PSC beam.
- Write a note on loss due to creep of concrete and steel.
- Write a note on loss due to elastic shortening of concrete.
- Write the basic concept of prestressed concrete. Write basic formula and how much loss of prestress would be there when reduction in elongation is Δl (delta L).
- Write the types of Prestressing Concrete Members. Also write advantage of PSC over RCC.
- If a rectangular beam is subjected to prestressing force 'P' at an eccentricity of 'e' from NA what would be final top and bottom fiber stress of beam cross section (and How). Assume that 'w' udl (including self weight) acting along the length 'l' of the beam.

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- A prestressed pre tensioned concrete beam of size 300X500 mm² is provided prestressing force pf 1200 kN at an eccentricity of 120 mm. If span of beam is 6 m. Calculate loss of stress in steel r/f due to all reason if area of steel used is 900 mm², grade of concrete is M45, $E_s = 2 \times 10^5$ (15)
- A PSC beam of cross-section 300X600 mm², 12 m long carries a line load of 12 kN/m (In addition to its self-weight) It is pre-stressed with a pre tensioned cable of area $A_s = 200 \text{ mm}^2$, $p_0 = 800 \text{ N/mm}^2$ located at 175 mm from soffit, determine the location of thrust line in the beam and plot its position at mid span. $E_s/E_c = 6.0$ (15)
- A concrete beam simply supported at both ends 300X600 mm² is prestressed by two post tensioned cables of area 500mm² each. Calculate deflection of beam (maximum when it carries an imposed load of 20 kN/m. allowing 20% loss of prestress) $E_s = 2 \times 10^5 \text{ MPa}$, $E_c = 30000 \text{ MPa}$; Eccentricity of prestressing forces is 100 mm down to NA and length of beam is 8 m. (15)
- Name different losses in PSC beam, explain and formulate in detail loss during tensioning process. (15)
- A strip footing of width 3 m is founded at a depth of 2 m below the ground surface in a (c - 0) soil having a cohesion $c = 30 \text{ kN/m}^2$ and angle of shearing resistance $\phi = 35^\circ$. The water table is at a depth of 5 m below ground level. The moist weight of soil above the water table is 17.25 kN/m³. Determine (a) the ultimate bearing capacity of the soil, (b) the net bearing capacity, and (c) the net allowable bearing pressure and the load/m for a factor of safety of 3. Use the general shear failure theory of Terzaghi. Value of C is 35 kN/m², $N_c = 25.2$, $N_q = 12.7$ & $N_\gamma = 9.7$ (15)

Enrol. No. S R H U

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END SEMESTER EXAMINATION, JANUARY-2018

PROGRAM : B.TECH.(CE) SEVENTH SEMESTER

COURSE CODE: CCE 401

COURSE TITLE: CONSTRUCTION PLANNING & MANAGEMENT

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all sections. Assume suitable data (if not given/required)

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

- Give the diagram of functional organization?
- Give the limitations of Bar chart?
- What are the advantages of arbitration?
- How an event can be shown? Give the different types of diagram of event.
- What is slack? What are the different types of slack? Define clearly
- Explain 'Latest allowable occurrence time'.
- What is difference between Independent float & Interfering float?
- Define cost slope?
- What is direct cost & indirect cost? Give one example of each.
- What are the different functions of inspection department?

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Choose events & activity from following:
 - Prepare budget
 - All parts assembled
 - A budget prepared
 - Assemble parts
 - Excavate trench
 - construction completed
 - paint wall
- Define the various float and Show how they are useful in a CPM network.
- Explain different types of errors in network.
- Define variance & standard deviation with definition?
- The time estimates received from three engineers for an activity of a project are under

	Optimistic time	Most likely time	Pessimistic time
Engineer A	4	6	8
Engineer B	3	5	8
Engineer C	4	6	10

State who is more certain about the time of completion of the job.

- A father notes that his son uses the telephone. He takes no less than 5 minutes for a call sometimes as much as an hour. 15 minutes calls are more frequent than calls of any other duration. If son's calls were an activity in PERT project.
 - What would be the phone calls expected duration?
 - What estimate would you give for its variance?
 In scheduling the project, how much time would you allocate for the phone call.
- Explain Fulkerson's rules for node numbering.

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Give the difference between CPM & PERT.
- Draw a pert network for the following project:
 - A is the first or start event & K the end event.
 - J is a successor event to F.
 - C and D are successor events to B.
 - D is a preceding event to G.
 - E and F occur after event C.
 - E precedes F.
 - C restrains the occurrence of G, & G precedes H
 - H precedes J
 - F restrains the occurrence of H

x. K succeeds event J

Q. 4. The three time estimates t_o , t_m , t_p of each activities of a project are given below.

(15)

Activity	t_o	t_m	t_p
1-2	2	5	14
1-3	3	12	21
2-4	5	14	17
3-4	2	5	8
4-5	1	4	7
3-5	6	15	30

- Draw the network diagram,
- Find the expected duration & variance of each activity.
- Calculate the early & late occurrence times for each event.
- Determine the expected duration.
- Calculate the total float for each activity.

Q. 5. The following information applies to a particular

(15)

- Event 0 is the initial event,
- Event 1 is preceded by event 0,
- Event 3 is preceded by event 1,
- Event 4 is preceded by event 1,
- Event 2 is preceded by event 1,
- Event 3 is preceded by event 2 & 1,
- Event 4 is preceded by event 3 & 1,
- Event 5 is preceded by event 4,

For the various activities in the project, the expected times are:

Activity	0-1	1-3	1-2	2-3	1-4	3-4	4-5
Duration	3	16	6	8	10	5	3

- Draw the arrow diagram for this project.
- If the scheduled completion date is equal to the earliest expected time (TE) for the end event, calculate the slack time for each event & identify the critical path.

Q. 6. The following table lists the activities, durations & their sequences of operations for a construction project. Prepare the network & compute in a table:

(15)

- EST, EFT, LST & LFT.
- Determine the critical path & find the total float & free float for all the activities.

Activity	Duration (days)	Activity	Duration (days)
1-2	8	4-7	0
1-3	10	5-6	4
1-4	5	5-7	3
2-7	6	5-8	6
3-4	3	6-8	5
4-5	7	7-8	5

Q. 7. a. Six activities to be undertaken in series for completion of a project have been assumed to have to following a, m & b time estimates in months. What is the probable range of the project duration? (Write in months & days)

(11)

Time/ Activity	1	2	3	4	5	6
a (o)	6	7	4	10	15	5
m (p)	8	7	9	12	19	8
b (m)	11	7	12	15	20	11

b. Define total & free float.

(4)

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END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : B.TECH.(CE) SEVENTH SEMESTER

COURSE CODE : ECE404**COURSE TITLE : PRESTRESSED CONCRETE STRUCTURES****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. Make a diagram of bent tendon in a PSC beam.
- b. What do you understand by cracking moment?
- c. Write assumption involve while analyzing PSC beam.
- d. Write difference between Pre-Tensioned Concrete and Post-Tensioned concrete beam.
- e. Give few examples where pre-stressed concrete beams are used.
- f. How do we make PSC beam in bulk?
- g. Which of beam of same strength have less cross section area, whether RCC beam or PSC beam? Write reason also.
- h. Write steps of constructing post tensioned member.
- i. What are C-Force and P-Force?
- j. Write a note on loss during anchoring process.

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Write the basic concept of prestressed concrete. Write basic formula and how much loss of prestress would be there when reduction in elongation is Δl (delta L).
- b. Write the types of prestressing concrete members. Also write advantage of PSC over RCC.
- c. If a rectangular beam is subjected to prestressing force 'P' at an eccentricity of 'e' from NA what would be final top and bottom fiber stress of beam cross section (and How). Assume that 'w' udl (including self weight) acting along the length 'l' of the beam.
- d. Write the detailed concept of P-Line and C-Line. How do we calculate shift between them?
- e. Explain Stress Concept method and Load Balancing method of analyzing PSC beam.
- f. Write a note on loss due to creep of concrete and steel.
- g. Write a note on loss due to elastic shortening of concrete.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.** A concrete beam simply supported at both ends 300X600 mm² is prestressed by two post tensioned cables of area 500mm² each. Calculate deflection of beam (maximum when it carries an imposed load of 20 kn/m. allowing 20% loss of prestress) $E_s = 2 \times 10^5$ MPa, $E_c = 30000$ MPa; Eccentricity of prestressing forces is 100 mm down to NA and length of beam is 8 m. **(15)**
- Q. 4.** Name different losses in PSC beam, explain and formulate in detail loss during tensioning process. **(15)**
- Q. 5.** A prestressed pre tensioned concrete beam of size 300X500 mm² is provided prestressing force pf 1200 kN at an eccentricity of 120 mm. If span of beam is 6 m. Calculate loss of stress in steel r/f due to all reason if area of steel used is 900 mm², grade of concrete is M45, $E_s = 2 \times 10^5$ **(15)**

Q. 6. A strip footing of width 3 m is founded at a depth of 2 m below the ground surface in a (c - 0) soil having a cohesion $c = 30 \text{ kN/m}^2$ and angle of shearing resistance $\phi = 35^\circ$. The water table is at a depth of 5 m below ground level. The moist weight of soil above the water table is 17.25 kN/m^3 . Determine :

- the ultimate bearing capacity of the soil
- the net bearing capacity
- the net allowable bearing pressure and the load/m for a factor of safety of 3

Use the general shear failure theory of Terzaghi. Value of C is 35 kN/m^2 , $N_c = 25.2$, $N_q = 12.7$ & $N_\gamma = 9.7$ (15)

Q. 7. A PSC beam of cross-section $300 \times 600 \text{ mm}^2$, 12 m long carries a line load of 12 kN/m (In addition to its self weight) It is pre-stressed with a pre tensioned cable of area $A_s = 200 \text{ mm}^2$, $p_0 = 800 \text{ N/mm}^2$ located at 175 mm from soffit, determine the location of thrust line in the beam and plot its position at mid span. (15)

$E_s/E_c = 6.0$

SECTION B

- Write the basic concept of prestressed concrete. Write basic formulae and how much loss of prestress would be there when reduction in elongation is Δl (4 marks).
- Write the types of prestressing concrete members. Also write advantages of PSC over RCC.
- If a rectangular beam is subjected to prestressing force 'P' at an eccentricity of 'e' from NA, what would be the top and bottom fiber stress of beam cross section (and then). Assume that 'w' will (including self weight) acting along the length 'L' of the beam.
- Write the detailed concept of P-line and C-line. How do we calculate shift between them?
- Explain stress concrete method and load balancing method of analyzing PSC beam.
- Write a note on loss due to creep of concrete and steel.
- Write a note on loss due to elastic shortening of concrete.

SECTION C

- Attempt any 3 questions.
A concrete beam simply supported at both ends $300 \times 600 \text{ mm}^2$ is prestressed by two post tensioned cables of area 200 mm^2 each. Calculate deflection of beam (maximum) when it carries an imposed load of 20 kN/m , allowing 10% loss of prestress. $E_s = 2 \times 10^5 \text{ MPa}$, $E_c = 30000 \text{ MPa}$; Eccentricity of prestressing forces is 100 mm down to NA and length of beam is 8 m . (12)
- Attempt any 3 questions.
Name different losses in PSC beam, explain and formulate in detail loss during tensioning process. (12)
- Attempt any 3 questions.
A prestressed pre tensioned concrete beam of size $300 \times 600 \text{ mm}^2$ is provided prestressing force of 1200 kN at an eccentricity of 175 mm . If span of beam is 8 m . Calculate loss of stress in steel (%) due to all reason if area of steel used is 300 mm^2 ; grade of concrete is M40, $E_s = 2 \times 10^5$. (12)

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END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : B.TECH.(CE) SEVENTH SEMESTER

COURSE CODE : CCE402**COURSE TITLE : WATER RESOURCES AND IRRIGATION ENGINEERING****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt **all** questions.

Explain in brief the following:

(2 x 10 = 20)

- a. Alluvial soils capillary water
- b. Field capacity
- c. Field irrigation requirement
- d. Silt factor
- e. Critical velocity

- f. Mean velocity by Manning's formula
- g. Aqueduct and super passage
- h. Guide bunds
- i. Free board
- j. Trap efficiency

SECTION B

Q. 2. Attempt **any 5** questions.**(7 x 5 = 35)**

- a. What are the objective of river training works?
- b. Explain the procedure to determine the waterway of a barrage.
- c. What are the protection works in a barrage?
- d. Explain the data and information required for fixing the various components of the design capacity of a reservoir
- e. Explain river diversion and preparation of foundation for concrete gravity dams
- f. Explain causes of failure of embankment dams and how the seepage through the dam body is controlled.
- g. Discuss about the causes of failure of earthen dam on the basis of the followings components.
 - i. Hydraulic failure
 - ii. Structural failure

SECTION C

Attempt **any 3** questions.**(15 x 3 = 45)**

- Q. 3.**
 - a. What are the main objectives and regulations of barrage operation? **(7.5)**
 - b. What is the data required for fixing the live storage capacity? How it is derived using a mass curve? **(7.5)**
- Q. 4.**
 - a. Explain rational method of derivation of design flood **(7.5)**
 - b. Explain the design criteria for a concrete gravity dam. Explain with the help of a diagram various forces acting on a gravity dam. **(7.5)**
- Q. 5.**
 - a. Explain the conditions for which slope stability of earthen dams need to be checked. **(7.5)**
 - b. What is phreatic line and how is the amount of seepage water estimated through the dam body? **(7.5)**
- Q. 6.**
 - a. What are the functions of spillways and energy dissipators? **(7.5)**
 - b. What are the various types of spillway? Explain basic characteristics of an ogee shaped spillway. **(7.5)**
- Q. 7.**
 - a. Enumerate different types of energy dissipators. **(7.5)**
 - b. Explain how protection works down stream of a dam spillway. **(7.5)**

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END SEMESTER EXAMINATIONS, JUNE - 2018

PROGRAM : B.TECH.(CE)

EIGHTH SEMESTER

COURSE CODE : ECE417

COURSE TITLE : GROUND WATER ENGINEERING

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

- What do you mean by positive boundary in image well theory?
- Write the advantages of artificial recharge of underground storage.
- Write down Dupuits discharge formula for confined aquifer.
- What do you mean by confined aquifer?
- Write down Slichter's formula of velocity of flow.
- What do you mean by specific capacity of a well?
- What is Darcy's law?
- Define specific yield and specific retention.
- Define hydrogeology.
- Write names only of types of tube wells according to their method of construction

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- A gravity well has a radius of 180 mm and the depth of water in the well is 36 m when pumping has not been started. If the radius of influence is twenty times the discharge and the coefficient of permeability is 0.003125 m/min, compute the specific capacity of the well.
- Explain any three well system used.
- Explain the following:
 - Aquifer
 - Aquiclude
 - Aquitard
 - Aquifuge
 - Effective size
 - Cavity formation in open well
- A uniform horizontal confined aquifer is 60 m thick. The porosity and compressibility of four samples of the soil of aquifer are given below :

Sample	Porosity (%)	Compressibility (cm ² /kg)
A	35	31x10 ⁻⁶
B	38	30x10 ⁻⁶
C	32	26x10 ⁻⁶
D	35	27x10 ⁻⁶

Compressibility of water of aquifer is 47x10⁻⁶ cm²/kg

Determine the representative value of the storage coefficient

- Explain well completion process.
- A well penetrates into an unconfined aquifer having a saturated depth of 150 m. The discharge is 200 litres per minute at 12 m drawdown. Assuming equilibrium flow conditions and a homogeneous aquifer, estimate the discharge at 22 m drawdown. The distance from the well where the drawdown influences are not appreciable may be taken to be equal for both the cases
- Explain the municipal, industrial and agricultural causes of ground water pollution

SECTION C

Attempt **any 3** questions.

(15 x 3 = 45)

- Q. 3.** a. What do you mean by image well? Explain the image well theory and its use in ground water analysis. (7.5)
 b. Explain any two surface investigation method (7.5)
- Q. 4.** a. Write difference between confined and unconfined aquifer. Derive an expression of Theim's unconfined aquifer for calculation of discharge (7.5)
 b. Explain the following: (7.5)
 i. Storage coefficient ii. Coefficient of transmissibility iii. Strainer tube well
- Q. 5.** a. A well penetrates into an unconfined aquifer having a saturated depth of 15 m. The discharge is 8000 litres/hour at 6 m drawdown. Assuming equilibrium flow conditions and a homogeneous aquifer, compute the discharge at 9 m drawdown. The radius of influence may be taken as equal in both cases. (7.5)
 b. What is artificial recharge? Explain the various methods of artificial recharge of underground storage with their advantages. (7.5)
- Q. 6.** a. Find out the velocity of the ground water flow with the following data, using Slichter's constant as 350. (7.5)
 Viscosity coefficient of water at temperature of 10°C = 1.5
 Effective size of the particles in the aquifer = 0.2mm,
 Head loss is .20 m per 16 m length. Total length of aquifer = 80 m
 b. Explain the slotted pipe gravel pack tube well system (7.5)
- Q. 7.** a. Water is pumped from a well tapping an unconfined aquifer at a rate of 3000m³/day. A no-drawdown boundary exists at a distance of 4.5 km from the well centre. Assume the well to be fully penetrating, compute the steady state drawdown at the well face. (7.5)
 Initial saturated thickness = 65 m
 Coefficient of permeability = 24 m/day, effective well radius = 1 m
 b. What do you mean by an aquifer? Explain the types of aquifer with suitable diagram. (7.5)

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JUNE - 2018
PROGRAM : B.TECH.(CE) EIGHTH SEMESTER

COURSE CODE : ECE423**COURSE TITLE : ARCHITECTURE & TOWN PLANNING****[Time allotted: Three hours]****[Max. Marks : 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q.1. Attempt all part of this section:-**(10x2=20)**

- a. What are the aims and objectives of Town Planning?
- b. What is Doric order of Greek? Explain in detail.
- c. Write the name of different stages in the growth of Town.
- d. What you mean by Zoning Power.
- e. Write a short note on Dolmen and Cromlechs.
- f. What are the causes of expansion of towns?
- g. Write the name of Architecture civilization with composite construction of Arches, Vaults and Doms.
- h. What you mean by 'Proportion' and 'scale' and Scale in the Architecture of a building?
- i. What are the objectives of building Bye-Laws?
- j. Give the five symbols of materials used in building industry.

SECTION B

Q.2. Attempt any five questions in this section: -**(5x7=50)**

- a. Why the proper coordination between a designer engineer and architect must be required. (7)
- b. (i) Briefly explain the 'Gothic' and 'Renaissance' architecture. (3.5)
(ii) Write a detailed note on evolution of architecture forms. (3.5)
- c. (i) What are the Rules of Dimensioning? (3.5)
(ii) Write some common size of component of building. (3.5)
- d. Explain the planning consideration of Neighborhood with special reference to Indian cities. (7)
- e. Explain use of GIS data collection, analysis and planning of a town. (7)
- f. (i) Briefly mention the building Bye-law for residential area of a typical town planning. (3.5)
(ii) Define Built up area and floor space index. How it is calculated? (3.5)
- g. (i) What is 'Aesthetics'? Write a note on 'Aesthetics qualities'. (3.5)
(ii) Define concept of Habitat. (3.5)

SECTION C

Attempt any three questions in this section: -**(3x15=45)**

- Q.3. What are the 'Methods of external growth' of a Town, Explain in detail? (15)
- Q.4. a. Discuss in detail about the design of residential building. (7.5)
b. Write a short note on 'Satellite Town Concept'. (7.5)
- Q.5. What is land use patterns and land use zoning, what is its classification? Explain in detail. (15)
- Q.6. a. What are the various aspects of population survey? How it is conducted? (7.5)
b. How the transportation planning does affect the social sector of country? (7.5)
- Q.7. a. What are the factors influencing the Trabeated architecture in India. (7.5)
b. What do you mean by concept of "Garden city"? Also discuss the contribution in early planning effort. (7.5)
