Sem V CIVIL Dec-16

15/12/16.

QP Code:577102

(3Hours) Max Marks=80

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

Q.1 Attempt any **four**

a. Classify the shear tests based on drainage conditions and how these are simulated to field conditions **05**

b. Write a short note on Atterberg limits and show their variation with respect volume of soil **05**

c. Briefly explain different design features for sampler to obtain undisturbed soil sample **05**

d. A sample of inorganic soil has following grain size characteristics the liquid limit is 55% and plastic limit is 31% classify the soil as per IS classification system **05**

Size(mm)	%passing
2.0	95
0.075	78

e. Mention the scope of Geotechnical engineering in construction of various civil engineering works **05**

Q.2 a. Derive the expression for dry density and percentage air voids of soil by using the three phase diagram **05**

b. 50 grams of oven dried soil sample is taken for sedimentation analysis. The hydrometer reading in a 100ml soil suspension, 30minutes after the commencement of test is 24.5. The effective depth for hydrometer reading 25 found from calibration curve is 10.7cm. The composite correction is -2.5 take G=2.75 viscosity of water is 0.008poise. calculate the particle size that would have settled during this 30minutes and also % finer **05**

c. For the construction of embankment, the soil is transported from the borrow area using a truck which can carry 6m^3 of soil at a time. With the following details determine the number of truck loads required to obtain 100m^3 compacted earth fill and volume of soil to be excavated from borrow pit **10**

Property	Borrow area(insitu)	Truck(loose)	Field(compacted)
Bulk unit weight	16.6kN/m^3	11.5kN/m^3	18.2kN/m^3
Water content	8%	6%	14%

Q.3 a. Define Relative Density and Activity of soil along with the applications in the field **05**

b. A saturated soil sample has a volume of 23cm^3 at liquid limit. The shrinkage limit and liquid limit are 18% and 45% respectively. The specific gravity of solids is 2.73 find the minimum volume which can be attained by the soil **05**

c. A layer of sand 8m thick lies over the layer of clay. The water table is at a depth of 1m below ground surface. above the water table, the sand is saturated with capillary moisture .the saturated unit weight of sand is 20kN/m^3 and its dry unit weight is 17kN/m^3 plot the total stress neutral stress and effective stress at a depth of 8m below ground level **10**

[Turn Over

Q.4 a. Describe in detail the design criteria for geotextile filter 05

b. An aquifer of 20m thickness is overlain by an impermeable layer of 30m thickness. The test well of 0.5m diameter and two observation wells at a distance of 10m and 60m from the test well are drilled through the aquifer .after pumping at a rate of $0.1m^3/s$ for a long time, the following draw downs are stabilized in these wells, first observation well 4m, second observation well 3m. show the arrangement in diagram and find the coefficient of permeability and drawdown in the test well 08

c. Write a short notes on utilization of flow nets in seepage analysis 07

Q.5 a. Define(i) relative compaction(ii) placement water content also enlist the factors effecting compaction 06

b. Define preconsolidation of soil and explain graphical method for finding preconsolidation pressure 04

c. A CU triaxial tests were performed on two identical samples of saturated remolded clay the observations are find the total and effective shear parameters if in another CU test on identical sample is consolidates to the cell pressure of $400kN/m^2$,what would be the deviator stress at failure 10

Test No.	Cell pressure(kN/m^2)	Deviator stress(kN/m^2)	Pore pressure(kN/m^2)
1	250	179	101
2	350	242	145

Q.6 a. A layer of clay 2m thick is subjected to a loading of $0.5Kg/cm^2$ one year after loading, the average consolidation is 50% the layer has double drainage 10

(i) What is the coefficient of consolidation

(ii) If the coefficient of permeability is 3mm/year, what is the settlement after one year and

(iii) How much time will the layer take to reach 90% consolidation

b. Write a short notes on bore hole log 05

c. Explain Mohr-Coulomb's criteria for shear strength of soils 05

Sem V CBGS, CIVIL, MAY-17

Q. P. Code: 18506

N. B.: (1) Question No. 1 is compulsory.
(2) Attempt any three from remaining five questions.
(3) Figures to the right indicate the full marks.
(4) Assume suitable data if not given and justify the same.

Q.1 (A) Write characteristics of flow net. 05

(B) What do you mean by borehole logs? Write at least five number of information which it reflects. 05

(C) Write the use of particle size distribution curve. 05

(D) Explain the factors affecting the permeability of soil. 05

Q.2 (A) Explain how to determine the preconsolidation pressure by Casagrande Method. 05

(B) A moist soil has weight of 1260 gms and volume of 605 cc at a moisture content of 11%. If the specific gravity of soil grains is 2.66, determine the void ratio, degree of saturation, and percentage air voids. 10

(C) Establish the relationship between σ_1, σ_3, c, and ϕ. 05

Q.3 (A) In a liquid limit test, specimen of a certain sample of clay at water contents of 31.93, 27.62, 25.51 and 23.30 % required 5, 16, 23, and 42 blows respectively to close the standard groove. The plastic limit of clay is 13%. Natural water content is 18%. Determine the liquid limit, plasticity index, liquidity index, consistency index, flow index, and toughness index. 10

(B) Explain the primary consolidation by spring analogy system. 05

(C) For two soils the data is given as below. Classify the soil as per IS: 1498. 05

Soil	LL	PI	%-75 μ	% Gravel	% Sand
A	60	30	90	0	10
B	-	NP	100	0	0

Q.4 (A) In a falling head permeability test on a soil sample of length l_1 the head of water in the stand pipe takes 5 seconds to fall from 900 mm to 135 mm above the tail water level. When another soil of length 60 mm is placed on top of first soil, the time taken for the head to fall between the same limits is 150 seconds. The permeameter has a cross sectional area of 4560 mm^2, and a stand pipe area of 130 mm^2. Calculate the permeability of second soil. 10

(B) Write a note on methods of boring. 05

(C) Explain the quick sand condition and derive an expression for same. 05

[TURN OVER

Q. P. Code: 18506

Q.5 (A) Define reinforcing earth material. Classify the Geosynthetics and Geotextile. 05

(B) Write a brief note on factors affecting the compaction. 05

(C) Given the following data from a consolidated undrained test with pore water pressure measurement, determine the total and effective stress parameters. 10

σ_3	100 kN/m^2	200 kN/m^2
$(\sigma_1 - \sigma_3)_f$	156 kN/m^2	198 kN/m^2
u_f	58 kN/m^2	138 kN/m^2

Q.6 (A) In a normally consolidated clay of LL = 65.65% and 5 m thickness, the overburden pressure is increased from 250 kN/m^2 by 120 kN/m^2. Estimate the settlement that takes place; assume the saturated water content and specific gravity of solid are 45% and 2.7 respectively. 05

(B) Explain the effect of surcharge and capillary rise on effective pressure. 05

(C) Write scope of Geotechnical Engineering in design of deep foundation. Write five points. 05

(D) Explain the applicability of Plasticity chart [as per ISCS] in classifying the fine grained soil and how it differs from USCS. 05

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Sem V Civil (CBGS) May-17
SA-II

Q.P.Code: 016639

(3 Hours) [Total Marks: 80]

N. B.: 1. Question number 1 is compulsory.
2. Attempt any three from remaining questions.
3. Figures to the right indicate full marks.

1. (a) To find degree of static and kinematic indeterminacy of structures as shown in figure 1. [8]

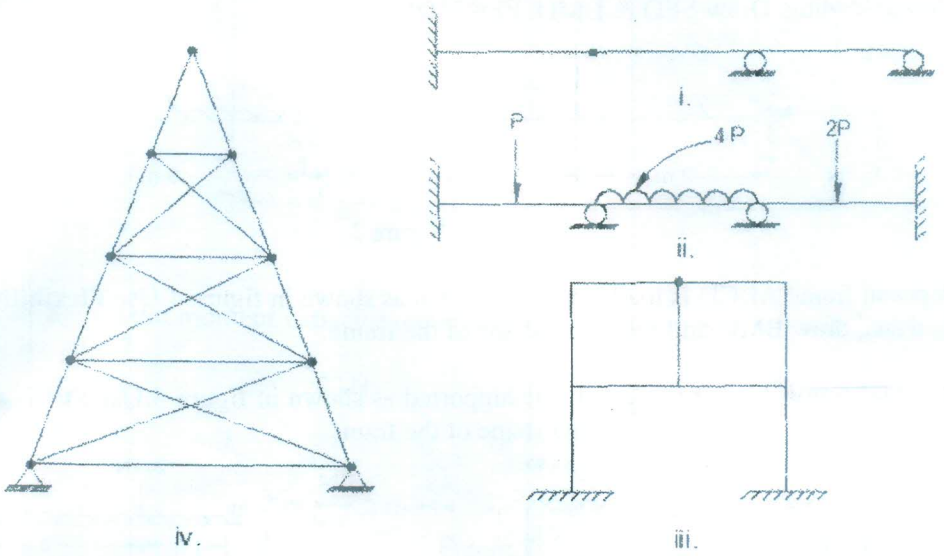


Figure 1

(b) The members of a steel bent frame are subjected to temperature variation as shown in figure 2. Find the vertical deflection at free end 'C' considering axial deformation in members. Take depth of each member as 500 mm & $\alpha = 12 \times 10^{-6}/^{o}C$. [7]

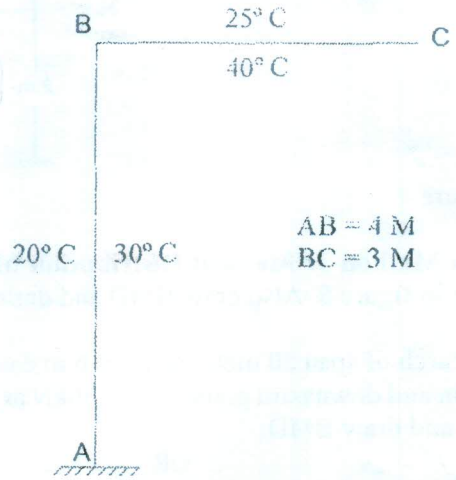


Figure 2

(c) Differentiate between Force method and Displacement method. [5]

TURN OVER

2. (a) Define Plastic hinge and mechanism. [2]
   (b) Define Carry over factor and relative stiffness. [2]
   (c) Define shape factor and load factor. [2]
   (d) Analyse the continuous beam loaded and supported as shown in figure 3. Using **Clapeyron's theorem of three moments or Moment Distribution method**. The support B settles by 8mm during loading. Draw SFD & BMD. EI = 1600 kN-m^2 [14]

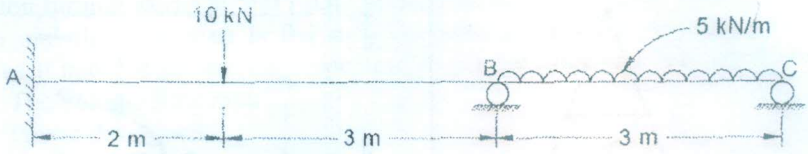


Figure 3

3. A portal frame ABCD is loaded and supported as shown in figure 4.Use **Flexibility method** for analysis, draw BMD and deflected shape of the frame. [20]

4. A portal frame ABCD is loaded and supported as shown in figure 4.Use **Stiffness method** for analysis, draw BMD and deflected shape of the frame. [20]

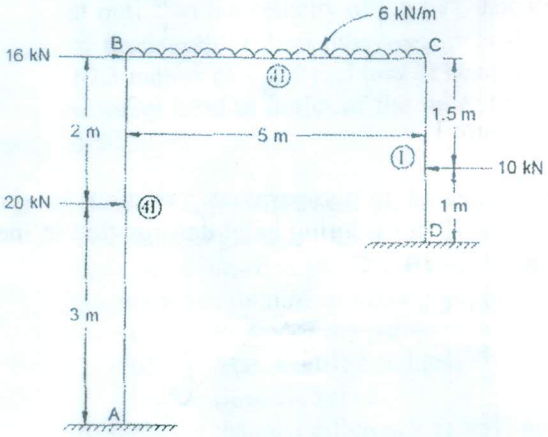


Figure 4

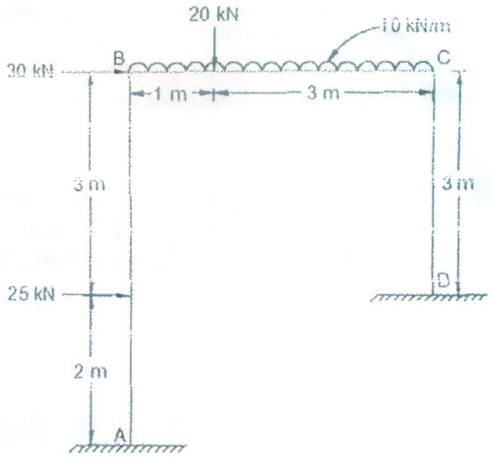


Figure 5

5. Using **Slope Deflection Method or Moment Distribution Method**, analyse the frame loaded and supported as shown in figure 5. Also draw BMD and deflected shape of the frame. [20]

6. (a) A two hinged parabolic arch of span 30 meter and rise 6 m carries uniformly distributed load of 20 kN/m on left half span and downward point load of 10kN at 5m from right hand support. Find the reaction at supports and draw BMD. [12]

OR

   (a) Using Force method or least work method, Analyse the pin jointed frame loaded & supported as shown in figure 6. Also find forces in all members. Take AE constant for all members. [12]

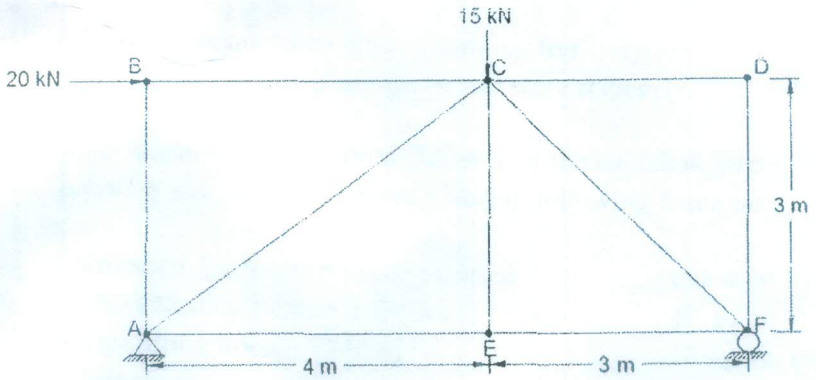


Figure 6

(b) Calculate the plastic moment capacity required for the continuous beam with working load as shown in figure 7. [8]

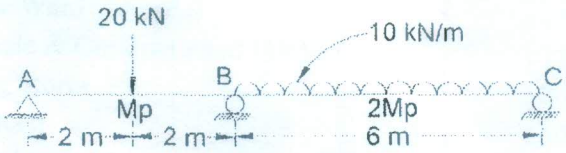


Figure 7

T.E. Sem V CBGS, Nov-16 Civil 22/11/16

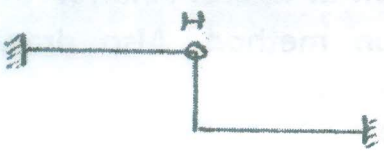
SA - II

Q.P. Code : 576802

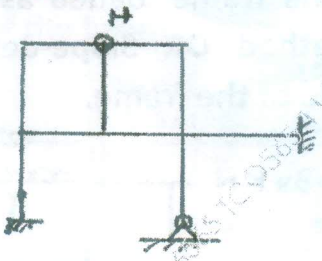
(3 Hours) **[Total Marks : 80**

N.B. (1) Question No. 1 is **compulsory.**
Attempt any **three** out of remaining **five** questions.
(2) Assume suitable data if necessary but justify the same.
(3) Figures to the right indicate full marks.

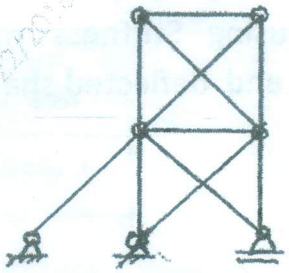
1 (a) For the structures shown, determine –
(i) Static Indeterminacy (indicating clearly external & internal) (3)
(ii) Kinematic Indeterminacy (neglecting axial deformation in flexural members) Show clearly the joint displacements. (3)



(i)
H - Internal Hinge

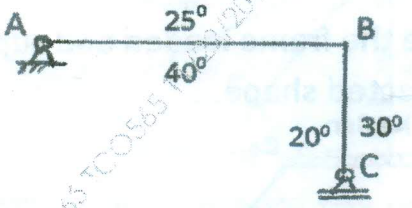


(ii)



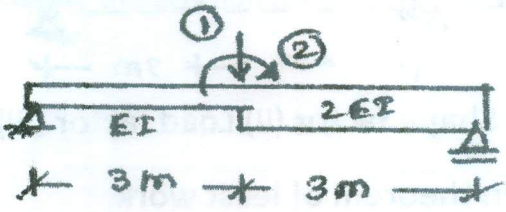
(iii)

(b) Compute the slope at support 'A' of the rigid jointed frame shown in figure due to temperature variation as indicated. Take $\alpha = 12 \times 10^{-6}$ /°c and depth of each member = 600 mm. Consider the effect of axial deformation. (6)



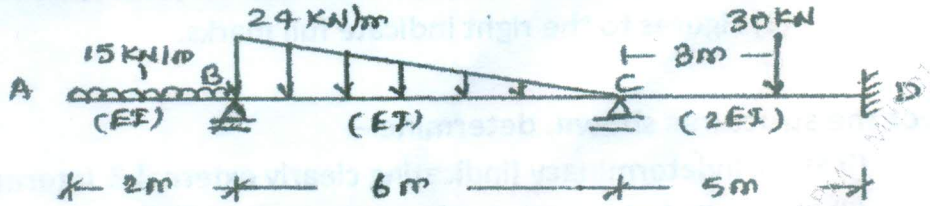
Lengths
AB = 6m
BC = 4m

(c) Develop the flexibility matrix **OR** stiffness matrix for the non - prismatic beam w.r.t. coordinate 1 and 2 as indicated. (4)

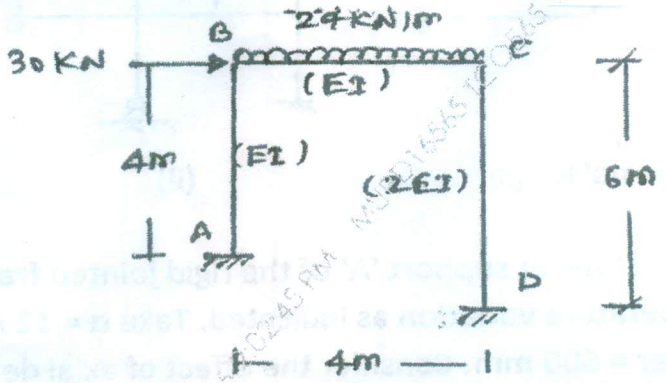


TURN OVER

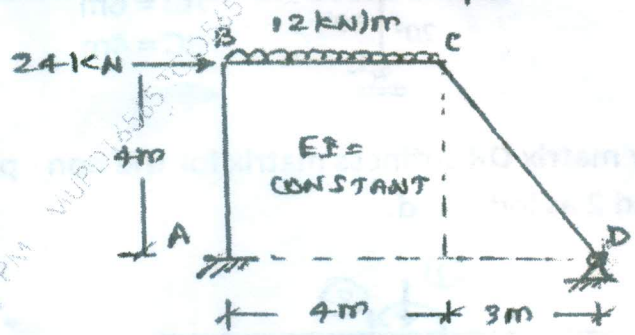
2 Analyse the continuous beam loaded as shown using Moment Distribution Method **OR** Clapeyron's Theorem of three moments. Also draw SFD, BMD and deflected shape of the beam. (16)



3 A rigid jointed plane frame loaded as shown in figure. Analyse this frame using Stiffness method **OR** Slope-deflection method. Also draw BMD and deflected shape of the frame. (16)



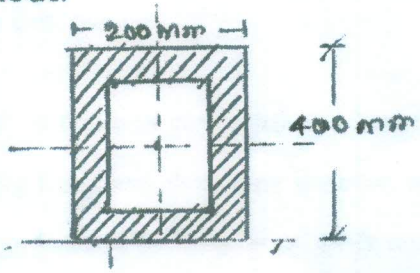
4 Using flexibility method, analyse the frame loaded and supported as shown in figure. Also draw BMD and deflected shape. (16)



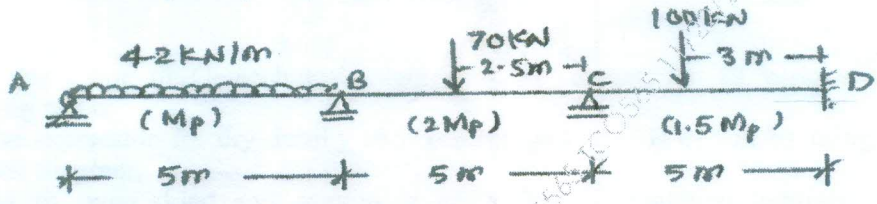
5 (a) Define the terms- (i) Shape factor (ii) Load factor (iii) Plastic hinge (4)

OR (a) State & explain theorem of least work. (4)

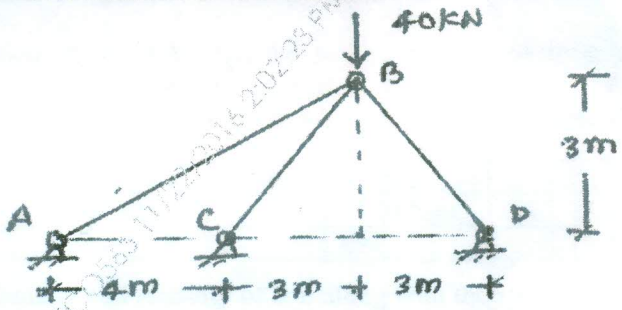
(b) Find the shape factor for the beam of box section as shown. Assume wall thickness = 50 mm throughout. (4)



5 (c) A continuous beam subjected to loading at collapse as shown. Determine the plastic moment capacity 'M_p' of the beam. (8)



6 (a) Using Force Method, analyse the pin jointed plane frame loaded as shown in figure. Take AE = Constant for all members. (8)



(b) A three hinged symmetrical parabolic arch of span 30 m and central rise 5 m is subjected to udl of 30 KN/m over right half portion of the arch. It also carries a point load of 40 KN at the crown position. Find support reactions and draw BMD for the arch, indicating clearly the position & magnitude of maximum + ve and -ve bending moment. (8)

160

03/12/16

Sem V CIVIL, Dec-16

TE - I

Q.P. Code : 577000

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

Note : 1. **Q.1** is **compulsory.** Attempt any 3 out of the remaining questions.
2. **All** questions carry **equal (20) marks**
3. Figures to the right indicate marks
4. Attempt sub questions in order

1. Answer briefly. **Each** question carries **04 marks.** **20**
   a) List five major ports and five international airports in India.
   b) Define breakwater. Enlist its types.
   c) Point out the difference between: i) Junction and terminus
   ii) Point and crossing
   d) Explain VASI & PAPI.
   e) What special care has to be taken while constructing railway in marshy areas?

2. a) A 9° branch curve diverges out from a8° main curve in an opposite direction in a MG yardlayout. If the speed on main line is restricted to 25 kmph, what would be the speed limit on branch line provided permissible deficiency is 5.1 cm. **8**
   b) Write a detailed note on Taxiway marking and lighting. **8**
   c) Which organizations may employ you after gaining the knowledge of this subject? **4**

3. a) Calculate all the elements of a turnout on B.G track if N=8.5, d=13.3cm &angle of switch is 1° 8' 0". **10**
   b) Write a note on (Any one) i) JNPT ii) Kandla port. **6**
   c) What are the advantages of constructing railway on embankment? **4**

4. a) If the basic runway length for an airport situated at an elevation of 180 metre is 800 metres, Find the actual runway length required if mean of average daily temperature and mean of maximum daily temperature is obtained as 36°C and 42°C respectively. Assume the effective gradient of 2% on the runway. **10**
   b) Explain zoning laws for an airport. **6**
   c) List the various projects going on and planned to make rail commute in Mumbai easier. **4**

5. a) Design an Exit Taxiway which joins a Runway and main parallel Taxiway with following data: Total angle of turning = 40°, Turning speed =75 kmph, Coefficient of friction =0.12, Radius of curvature= 750 metres. **8**
   b) Write notes on: i) Turning radius of an aircraft. **12**
   ii) Three controls of aircraft.
   iii) Facilities to be provided at an airport terminal.

[TURN OVER]

6. a) Define Interlocking and explain the principle of interlocking. Describe the various mechanical devices used for Interlocking **10**

b) State: i) Location of only diamond crossing in India. **10**
ii) Name of any 4 cities in India where local train service is provided.
iii) Facilities provided at a harbour.
iv) Length of runway of airport in Mumbai
v) Train in India having longest running distance.

Sem V CIVIL / (Rev.) MAY-17 Q.P.Code: 018126

(3 Hours) [Total marks: 80]

Note
1. Question No **1 is compulsory**.
2. Attempt Any **3** out of remaining
3. Assume any suitable data wherever required.

Q.1

	a.	State the role of Transportation in economic development of the nation.	**5**
	b.	Using sleeper density of M+6, Estimate the quantity of track material required for constructing a B.G railway track that is 6km long?	**5**
	c.	Define creep? How it is measured	**5**
	d.	Draw and explain the wind rose diagram	**5**
	e.	What are Docks? What are different types of docks?	**5**
Q 2	**a.**	a) A 4° curve branches off from an 2° main curve in opposite direction in a B.G. yard. If the speed on the main line is restricted to 35 kmph. Determine the speed restriction on the branch line.	**10**
	b.	Draw neat sketch of Left hand turnout & Right hand turnout	**10**
Q.3	**a.**	A taxiway is to be designed for an operating Boeing 707-320 having following characteristics; Wheel base =17.6m Tread of main gear= 6.6m Turning speed = 40Kmph Co- efficient of friction between tyre and pavement= 0.15	**10**
	b.	Explain in brief the factors to be considered while selecting the site for airport	**10**
Q.4	**a**	Draw the neat sketch of layout of artificial Harbour	**10**
	b.	State reasons for Transit curves are provided on both sides of a circular curve on a railwaytrack	**10**

TURN OVER

Q.5	a.	Briefly describe the significance of Airport drainage	10
	b.	Explain in brief the factors to be considered while selecting the site for Harbour.	10

Q.6 Write short notes on **(Answer any four out of six)** 20

i. Airport drainage
ii. Cross wind component
iii. Airport marking and lighting
iv. Longitudinal gradient of runway
v. Classification of airport as per ICAO
vi) Light house and Light ship

Sem V CBGS, May-16 MECH
TOM-II

QP Code: **31037**

(3 Hours) [Total Marks; 80]

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

2) Answer any **Three** questions from remaining **Five**

3) Assume suitable data wherever required, justify the same

4) Answer to questions showed be grouped and written together.

Qu. 1 Solve any Four (20)

a) What is a dynamometer? How does it differ from the brake?

b) Explain the necessity of the gearbox in automobile?

c) Differentiate between governor and flywheel.

d) Explain the following terms with reference to a governor-

(i)Sensitiveness (ii) stability (iii) isochronism (iv) Coefficient of insensitiveness

e) What do you understand by dry clutch and wet clutch?

Qu. 2 a) A single plate clutch, effective on both sides, is required to transmit 25 kW at 3000 rpm. Determine the outer and inner radii of frictional surface if the coefficient of friction is 0.255, the ratio of radii is 1.25 and maximum pressure is not to exceed 0.1×10^6 N/m^2. Also determine the axial thrust to be provided by springs. Assume uniform wear. (10)

b)The upper arm of porter governor are pivoted on the axis of rotation and the lower arms are attached to the sleeve at a distance of 3.75 cm from the axis. The length of the arm and suspension links are 30 cm. the weight of 60 N and the load on the sleeve is 480 N. if the extreme radii of rotation of governor balls are 20 cm and 25 cm, find the corresponding equilibrium speeds. (10)

Qu. 3 a) A band and block brake, having 14 blocks each of which subtends an angle 15^0 at the Centre, is applied to a drum of 1m effective diameter. The drum and the flywheel mounted on the same shaft has a mass of 2000 kg and a combined radius of gyration of 500 mm. The two ends of the band are attached to the pins on opposite sides of the brake lever at distances of 30 mm and 120 mm from the fulcrum. If a force of 200 N is applied at a distances of 750 mm from the fulcrum, find: a) Maximum braking torque. b) Angular retardation of the drum, and c) Time taken by the system to come to rest from the rated of 360 rpm. (12)

b) A governor of Hartnell type has equal balls of mass 3kg, set initially at a radius of 200 mm. the arms of bell crank lever are 110 mm vertically and 150 mm horizontally. Find a) The initial compressive force on the spring, if the speed for an initial ball radius of 200 mm is 240 rpm; and b) the stiffness of the spring required to permit a sleeve movement of 4 mm on a fluctuation of 7.5% in engine speed. (08)

Qu. 4 a)The crank and connecting rod of vertical single cylinder gas engine running at 1800 rpm are 60 mm and 240 mm respectively. The distance of the piston is 80 mm, and, mass of reciprocating part is 1.2 kg. At a point during power stroke when piston has moved 20 mm from top dead center position, the pressure on the piston is 800 kN/m^2. Determine I) Net force on the piston II)

Net load on gudgeon pin III) the thrust on cylinder walls IV) the speed at which the gudgeon pin load is reverse in direction. (10)

b) A punching press is required to punch 30 mm diameter holes in a plate of 20 mm thickness at the rate of 20 holes/min. It requires 6 Nm of energy/ mm^2 of sheared area. If the punching takes place in 1/10 of sec and rpm of the flywheel varies from 160 to 140, determine the weight of the flywheel having radius of gyration is 1 m. (10)

Qu. 5 a) An epicyclic gear train consists of three wheels A, B and C as shown in Fig. 1. Wheel A has 72 internal teeth, C has 32 external teeth. The wheel B gears with A and C and is carried on an arm which rotates about the Centre of A at 18 rpm. If the wheel A is fixed, determine the speed of wheels B and C. (10)

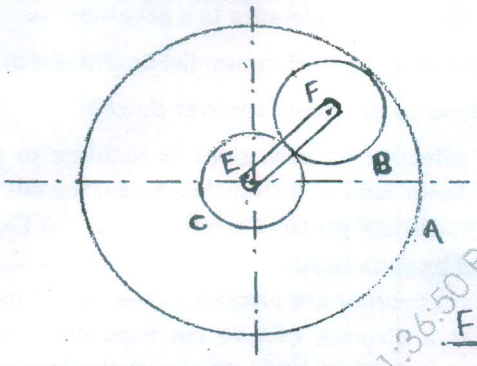


Fig. 1

b) Total mass of four wheeled trolley car is 1800 kg. The car runs on rails of 1.6 m gauge and rounds a curve of 24 m radius at 36 kmph. The track is banked at 10°. The external diameter of wheel is 600 mm and each pair with the axel has a mass of 180 kg, with radius of gyration of 240 mm. The height of the center of the mass of the car above the wheel base is 950 mm. Determine the pressure on each rail allowing for centrifugal force and gyroscopic couple action. (10)

Qu. 6 a) Turbine rotor of a ship has a mass of 2.2 tonnes and rotate at 1800 rpm clockwise, when viewed from aft. The radius of gyration of rotor is 320 mm. Determine the gyroscopic couple and its effects, when a) the ship turns right at radius of 250 m, with speed of 25 km/h. b) The ship pitches with the bow rising at an angular velocity of 0.8 rad/sec. c) Ship rolls at an angular velocity of 0.1 rad/sec. (10)

b) The following data relate to the connecting rod of reciprocating engine:
Mass = 50 kg, Distance between bearing centers = 900 mm, Diameter of big end bearing = 100mm, Diameter of small end bearing = 80 mm, Time of oscillation when a connecting rod is suspended from big end = 1.7 sec and small end = 1.85 sec, Determine I) the radius of gyration "k" of the rod about an axis through center of mass perpendicular to plane of oscillation. ii) The moment of inertia of the rod about same axis, and iii) The dynamically equivalent system of the connecting rod comprising two masses, one at the small end bearing center. (10)

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(17)

2315/17.

T.E. Sem V CBSGS, CIVIL
MAY-17

Q.P.Code: 013330

(3 hours) **Max.Marks: 80**

Note: (1) Question no.1 is compulsory
(2) Solve any 3 questions out of remaining
(3) Assume data wherever necessary and clearly mention the assumptions made.
(4) Draw neat figures as required.

Q1 **Solve any Four** 20

a Define Moment of Momentum Equation.

b Obtain an expression for the force exerted by a jet of water on a flat vertical plate moving in the direction of flow.

c Describe briefly the functions of main components of Pelton wheel turbine with neat sketches.

d Obtain an expression for unit speed, unit discharge and unit power for a turbine.

e What do you mean by manometric efficiency, mechanical efficiency and overall efficiency of a centrifugal pump?

f Write a short note on Hydraulic Accumulator.

Q2 a The angle of reducing bend is 60^0(that is the deviation from initial direction to final direction). Its initial diameter is 300 mm and final diameter is 150 mm and is filled in a pipeline carrying a discharge of 360 litres/sec. The pressure at the commencement of the bend is 2.943 bar. The friction loss in the pipe bend may be assumed as 10 percent of kinetic energy at the exit of the bend. Determine the force exerted by the reducing bend. 10

b A water sprinkler has 10 mm diameter nozzle at either end of a rotating arm, each of which is discharging water in opposite direction at right angle to the rotating arm, at a velocity of 8 m/s. If the axis of rotation is at a distance of 0.15 m from one end and 0.2 m from the other, determine the torque required to hold the arm stationary. If friction is neglected, determine the constant angular speed of the arm 10

Q3 a Find the form of equation for discharge Q through a sharp edged triangular notch assuming Q depends on the central angle α of the notch, head H, gravitational acceleration g , density ρ, viscosity μ, and surface tension σ of the fluid. 10

b (a) With Froude's number as the criterion of dynamic similarity for a certain flow situation, work out the scale factors for velocity, time, discharge, acceleration, force, work done and power in terms of the scale factor for length. 10
(b) A geometrically similar model of spillway is to be laid to a scale of 1 in 50, calculate the velocity ratio, discharge ratio and acceleration ratio.

TURN OVER

Q 4 a A pelton wheel is to be designed for a head of 60 m when running at 200 r.p.m. the pelton wheel develops 95.6475 KW shaft power. The velocity of the buckets = 0.45 times the velocity of the jet, overall efficiency = 0.85 and coefficient of velocity is equal to 0.98. 10

b A reaction turbine works at 500 r.p.m. under a head of 120 m. Its diameter at inlet is 120 cm and the flow area is 0.4 m^2. The angles made by absolute and relative velocities at inlet are 20^0 and 60^0 respectively with the tangential velocity. Determine: 10

(a) The volume flow rate.
(b) Power developed.
(c) Hydraulic efficiency.

Q 5 a A Kaplan turbine runner is to be designed to develop 7358 kW shaft power. The net available head is 5m. Assume that the speed ratio is 2.09 and flow ratio is 0.68, and the overall efficiency is 60%. The diameter of the boss is 1/3 rd of the diameter of the runner. Find the diameter of the runner, its speed and its specific speed. 10

b A conical draft tube having inlet and outlet diameters 1 m and 1.5 m discharges water at outlet with a velocity of 2.5 m/s. The total length of the draft tube is 6 m and 1.3 m of the length of draft tube is immersed in water. If the atmospheric pressure head is 10.3 meters of water and loss of head due to friction in the draft tube is equal to 0.2 x velocity head at outlet of the tube, find Pressure head at inlet and efficiency of the draft tube. 10

Q 6 a A three stage centrifugal pump has impeller 400 mm in diameter and 20 mm wide. The vane angle at outlet is 45^0 and the area occupied by the thickness of the vanes may be assumed 8 % of the total area. If the pump delivers 3.6 m^3 of water per minute when running at 920 r.p.m. determine: 10

(i) Power of the pump,
(ii) Manometric head,and
(iii) Specific speed.

Assume mechanical efficiency as 88% and manometric efficiency as 77%.

b Write a short note on 1. Hydraulic ram 2. Hydraulic lift. 10

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T.E. Sem.V (CBGS) NOV 2016 28/11/2016

AH-I (CIVIL) **QP Code : 576900**

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

N.B. : (1) Question **No. 1** is Compulsory.
(2) Answer **any three** out of remaining five questions.
(3) Assume suitable data wherever required and clearly state the same.
(4) Draw neat sketches wherever necessary.

1. Solve **any four** ofthe following . **20**
   (a) State and derive moment of momentum equation.
   (b) State the methods of selecting repeating variables.
   (c) What is jet propulsion of ship? Explain with neat sketch
   (d) Derive the equation of specific speed of turbine.
   (e) What is cavitation? State the causes and effects of cavitation in centrifugal pump.
   (f) Write short note on hydraulic ram.

2. (a) A 45° reducing bend connected in pipe line, the diameter at inlet & outlet of the bend being 400mm and 200 mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet of the bend is 215.8kN/m^2. The rate of flow of water is 0.5 m^3 /s. **10**

   (b) A twin jet unequal arm lawn sprinkler delivers a total discharge of 1.8 lps. Taking jet diameter as 1 cm and distance from axis of rotation to jet 20cm and 35cm and neglecting friction, find speed of sprinkler and torque to keep the sprinkler stationary if both jets are in opposite direction. **10**

3. (a) Using Buckingham's π theorem, show that the velocity through a circular orifice is given by $V = \sqrt{2gH}\phi\left[\frac{D}{H}, \frac{\mu}{\rho VH}\right]$ where H-head causing flow, D-diameter of the orifice, μ -coefficient ofviscosity, ρ -mass density, g-acceleration due to gravity. **10**

   (b) (i) Water is flowing through a pipe of diameter 30cm at a velocity of 4 m/s. find the velocity of oil flowing in another pipe of diameter 1 0 cm, if the condition of dynamic similarity is satisfied between the two pipes. The viscosity of water and oil is given as 0.001 Ns/m^2 & 0.0025 Ns/m^2. The specific gravity of oil is 0.8. **10**

[TURN OVER]

(ii) A jet of water of diameter 50 mm moving with a velocity of 20 m/s strikes a fixed plate in such a way that the angle between the jet and the plate is 60°. Find the force exerted by the jet on the plate in the direction normal to the plate.

4 (a) A jet of water having a velocity of 30 m/s strikes a curved vane, which is moving with a velocity of 15 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at an angle of 120° to the direction of motion of vane at outlet. Calculate (i) vane angles, so that the water enters & leaves the vane without shock. (ii) Work done per second per unit weight of water striking the vane per second. **10**

(b) A 137mm diameter jet of water issuing from a nozzle impinges on the buckets of a Pelton Wheel and the jet is deflected through an angle of 165° by the buckets. The head available at the nozzle is 400 m. Assuming coefficient of velocity as 0.97, : speed ratio as 0.46 and reduction in relative velocity while passing through buckets as 15% find **10**

(i) The force exerted by the jet on the buckets in tangential direction.

(ii) The power developed.

5 (a) A Kaplan turbine working under a head of 20m develops 11000 kW shaft power. The outer diameter of the runner is 3 m and hub diameter 1.5 m. The guide blade angle at the extreme edge of the runner is: 35^0 . The hydraulic and overall efficiences of the turbine are 86% and 82% respectively. If the velocity of whirl is zero at outlet, determine i) Runner vane angles at inlet and outlet at the extreme edge of the runner and (ii) Speed of the turbine. **10**

(b) (i) A conical drafttube having diameter at the top as 2m and pressure head of 7 m ofwater (vacuum) discharges water at the outlet with a velocity of 1.2 m/s at the rate of 25 m^3/s. if atmospheric pressure head is 10.3m of water and losses between the inlet & outlet of the draft tube are negligible, find the length of draft tube immersed in water. Total length of tube is 5m. **10**

(ii) Draw layout of hydropower plant.

6 (a) A centrifugal pump is running at 1000 rpm. The outlet Vane angle of the impeller is 30^0 and velocity of flow at outlet is 3 m/s. the pump is working against a total head, of 30m and the discharge through the pump is $0.3m^3/s$. If the manometric efficiencey of the pump is 75% determine **10**

(i) The diameter of the impeller and

(ii) The width of the impeller at the outlet.

(b) (i) Write short note on multistage centrifugal pump. **10**

(ii) Explain the hydraulic acumulator with neat sketch.

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(11)

T2625 / T9475 BUILDING DESIGN & DRAWING II (CIVIL) 09/06/2017

T.E. Sem. V (CBSGS) May 2017

Q. P. Code : 16477

(4 Hours) **(Max. Marks:80)**

N. B. :

1. Question **No. 1** is **compulsory**.
2. Attempt **any three** questions from remaining **five** questions.
3. Assume any **data** suitably if **not given** and **state it clearly**.

1. It is proposed to construct a Hospital Building in the suburban area of Thane District. The building is G+1 R.C.C. framed structure, having following requirement. The plot area is 32 m x 30 m.

(a)	Entrance Lobby with inquiry counter	: min 4 mt wide
(b)	Chief Medical Officer's Office	: 40 sq mt
(c)	Consulting Rooms [4 Nos]	: 10 sq. mt. each
(d)	Pathology Lab.	: 50 sq mt
(e)	Radiology Lab	: 50 sq mt
(f)	Operation Theatre	: 50 sq.mt.
(g)	ICU	: 50 sq mt
(h)	Male Ward [10 beds]	: 100 sq mt.
(i)	Female & Children ward [10 beds]	: 100 sq.mt.
(j)	Drug Stores	: 30 sq.mt.
(k)	Canteen	: 50 sq.mt
(l)	Emergency Ward	: 50 sq.mt

Provide spacious waiting area outside consulting rooms, passages, staircase, sanitary unit, parking area etc. as per byelaws. Assume any other requirement if required.

(a) Draw Ground floor plan. **[15]**

(b) Draw first floor line plan of the building given in Q.No.1 **[05]**

2. (a) Explain Importance of various principle of planning in hospital building **[10]**

(b) Draw the foundation plan of the building given in Q.No.1. **[10]**

3. (a) Draw the detailed sectional elevation passing through staircase and other important unit of building given in Q.No.1. **[15]**

(b) Draw the front elevation the building given in Q.No.1. **[05]**

4. Draw the two point perspective of the building which you have plan for Q.No.1. **[20]**

5. (a) Draw the site plan showing proposed built-up area, internal road, parking area, open space etc of the building given in Q.No.1. **[10]**

(b) Draw the roof terrace plan of the building in Q.No.1. **[10]**

6. Write short notes on **any four** :- **[20]**

(a) Architectural Compositions

(b) Built Environment-An integrated approach

(c) Master Plan and Green Belt

(d) Town planning

(e) Green Building.

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May - 17

30/05/17

Q.P.Code: 017075

REVISED COURSE

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

N.B. 1. Question No. **1** is **compulsory**
2. Attempt any **three** questions out of remaining **five** questions.
3. Draw neat **labelled diagrams** wherever necessary.
4. All the parts of a question should be **grouped together**.
5. Figures to the **right** indicate marks

Q.1a	Write the identifying properties and economic use of the following minerals-	5
(i)	Calcite	
(ii)	Graphite	
(iii)	Biotite	
(iv)	Orthoclase	
(v)	Corundum	
Q.1b	Define the following terms-	5
(i)	Engineering Geology	
(ii)	Exfoliation	
(iii)	Seismograph	
(iv)	Delta	
(v)	Cone of Depression	
Q.1c	Draw a neat sketch of the following -	5
(i)	Pedestal/mushroom rock	
(ii)	Columnar joint	
(iii)	Dyke	
(iv)	Box fold	
(v)	Alluvial Fan	
Q.1d	Name the following -	5
(i)	Boundary between crust and mantle	
(ii)	A texture of rock where all the constituent grains are of equal size	
(iii)	Water present in the pore spaces of rock beneath the earth surface	
(iv)	The type of metamorphism where pressure plays the dominant role	
(v)	The depression at the mouth of volcano	
Q.2(a)	Describe various landforms created by glaciers.	10
(b)	What is chemical weathering?	5
(c)	Briefly describe internal structure of Earth	5
Q.3(a)	Describe various textures of Igneous rocks.	10
(b)	How sedimentary rocks are formed, describe any two structures of these rocks.	5
(c)	Describe various agents of metamorphism	5
Q.4(a)	What are Faults? Give a brief account of various types of Faults in the rocks.	10
(b)	What is order of superposition?	5
(c)	What are the various causes of landslide?	5

TURN OVER

Q.5(a)	Describe the seismic method of geophysical investigation	5
(b)	Describe the favourable and unfavourable geological structures while choosing the alignment of tunnel .	10
(c)	Describe the zones of groundwater	5

Q.6 Differentiate between any 5 of the following- 5X4=20

(i) Confined and unconfined aquifer
(ii) Overturned and recumbent fold
(iii) Angular unconformity and Nonconformity
(iv) Central eruption and Fissure eruption
(v) Thermal and Dynamic Metamorphism
(vi) Strike and streak
(vii) Fracture and cleavage