BharatiyaVidyaBhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058

Re Exam January 2020

Program: Civil Engineering

Course Code: BT 301/PCBTC501

Course Name: Geotechnical Engineering I

Duration: 3hr

Maximum Points: 100

Semester: V

Instructions:

1. Attempt any 5 questions out of 7 questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly

Q. No.		Questions	Points	CO	BL	PI
1	a	Discuss Constant head permeability test and also derive expression for the same.	5	CO2	BL2	1.3.1
	b	Distinguish between standard Proctor Test & Modified Proctor Test.	5	CO1	BL3	1.2.1
	c	Define Zero air Voids line. How will you plot the Zero air voids line on Dry Density-Moisture Content Curve.	5	CO2	BL3	1.3.1
	d	Write down the advantages of Triaxial shear test.	5	CO2	BL3	1.3.1
2	a	A sample of clay has a liquid limit of 80% and its plastic limit is 35%. How do you classify the soil as per the IS Classification	6	CO1	BL2	1.2.1
	b	Define the following term with mathematical expression Void ratio, porosity, degree of saturation, water content, Density index, Mass density, Unit weight and Specific gravity.	8	CO1	BL2	1.2.1
	c	Discuss importance of grain size analysis and State the methods for carrying it out.	6	CO1	BL2	2.2.3
3	a	In an earthen embankment under construction the bulk unit weight is 16.5 kN/m² at water content of 11%, If the water content is to be raised to 15%, compute the quantity of water required to be added per cubic meter of soil? Assume no change in the void ratio.	7	CO1	BL3	1.3.1
	b	Discuss in detail Mohor's Coulomb Theory.	8	CO4	BL5	2.1.3
	c	Derive expression for the torque at failure in case of vane shear test when both portion of vane take part in shearing process.	5	CO1	BL5	1.3.1

	a	In a consolidation test the following results have been obtained. When the load was changed from 150 kN/m^2 to 300 kN/m^2, the void ratio changed from 0.70 to 0.65. Determine the coefficient of volume decrease, modulus of volume change and compression index.	7	CO3	BL6	2.1.3
4	b	Fine the ratio of average permeability in horizontal to vertical direction for a soil deposit consisting of three horizontal layer, if the thickness and permeability of the second layer are twice of those of the first and those of the third layer twice those of the second.	7	CO2	BL6	2.1.3
	c	The hydraulic gradient for an upward flow of a water through a sand mass is 0.9. If the specific gravity of the soil particles is 2.65and e= 0.5. will the quick sand condition develop.	6	CO1-	BL1	1.3.1
	a	Discuss different drainage condition for estimation of shear strength.	8	CO3	BL6	4.2.1
5	b	A layer of soft clay is 6m thick and lies under a newly constructed building. The weight of sand overlying the clayey layer produces a pressure of 260kN/m2 and new construction increases the pressure by 100kN/m2. If the compression index is 0.5, compute the settlement. Water content is 40% and specific gravity of grains is 2.65.	6	CO3	BL3	2.1.3
	c	Discuss the properties and utility of flow net.	6	CO2	BL1	2.2.4
	a	The mass specific gravity of a fully saturated specimen of clay having a water content of 30:5% is 1.96. On oven drying, the mass specific gravity drops to 1.6. Calculate specific gravity of clay.	7	CO3	BL6	4.1.1
6	b	A cylindrical specimen of a saturated soil fails under an axial stress $150kN/m^2$ in an unconfined compression test. The failure plane makes an angle of 52 degrees with the horizontal. Calculate the cohesion and angle of internal friction of the soil. Also verify your answer by graphical method.	8	CO4	BL6	4.3.1
	c	Discuss the factors affecting permeability of the soil.	5	CO4	BL5	2.1.3
	a	The soil in borrow pit has a void ratio of 0.90. A fill in place volume of 20000m3 is to be constructed with an in place dry density of 18.84 kN/m^3. If the owner of borrow area is to be compensated at Rs. 1.50 per cubic meter of excavation, determine cost of compensation.	6	CO3	BL3	2.1.3
7	b	Discuss the mechanistic model for consolidation	8	CO3	BL6	2.1.3
	c	Explain Plasticity Index, Shrinkage Index, and Liquidity Index.	3	CO4-	BL1	1.2.1
	d	Differentiate finite and infinite slope.	3	CO4	BL1	1.2.1

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SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Re- EXAMINATION – Jan.2020

Program: Civil Engineering

Course Code: PC-BTC 504

Course Name: Highway Engineering

Duration: 3 hour

Maximum Points: 100

Semester: V

Notes: assume suitable data if required

Q.No.	Questions	points	CO	BL	PI
Q.1.	Solve any four (each sub question carries 5 marks)				
	(a) Jaikar Committee (b) Vision – 2021 (c) Golden Quadrilateral (d) Lane Distribution Factor (e) Vehicle Damage Factor	20	1	1,2	
Q.2.					
a	Explain with sketch the various factors controlling alignment of roads.	10	1	2	
b	The area of the certain district in India is 35, 400 km², the number of towns as per 2011 census is 27. For a road density of 82 km per 100 km² area, calculate the length of various categories of Road as per third 20 year's road development plan.	10	1	3	
Q.3.					
a	How will you carried out in Profile Leveling field. Discuss with sketch preparation of longitudinal section drawing for highway projects.	10	1	2	
b	Discuss the points to be consider while preparation of detailed road project report	10	3	1,2	
Q.4.					
a	Discuss the importance of geometric design of highway. List the geometric elements to be considered in highway design.	10	1	2	
b	Explain camber. What are the objectives of camber? The recommended value of camber for different pavement surface in different rainfall area.	10	1	1,2	
Q.5.					
a.	What is gradient. Enlist its objectives. Discuss the recommended values of gradient as per IRC guideline.	10	1	2	

b.	A vertical summit curve is formed when an ascending gradient of 1 in 25 meet with another ascending gradient of 1 in 100. Find length of the summit curve to provide the required stopping sight distance for a design speed of 80 kmph.	10	3	4	
Q.6.					
a.	Explain Rutting and fatigue Failure Criteria as per IRC 37-2001.	10	2	2	
	Design the single lane undivided carriageway type flexible pavements passing through plain area. The traffic is allowed to move in both direction and design life of 15 years. Total numbers of heavy vehicles in both directions for undivided lane carriageway are 600 cvpd, if rate of growth of traffic is 6 %, the CBR value of subgrade soil is 6 % and time required for construction of road after last count is 3 years. (Use IRC 37- 1984 Guideline Table 1.)	10	2	4	
Q.7.	**Solve any four (each sub question carries 5 marks)**				
	(a) Triaxial Method for Flexible pavement design (b) Burmister 2 and 3 layers theory (c) Construction of cement concrete roads (d) Joints in rigid pavements (e) Transition Curve and its Importance	20	1,2,3	2,3	

Table 1. Composition of pavement as per IRC – 37 – 1984

Design traffic in msa	Minimum thickness of layers in mm		
	Surface	Base	Subbase
0.50	20 mm PC or 2 coats of SD	150 mm	T – 50, minimum thickness of 100 mm on subgrade of CBR less than 20 %
0.5 – 2	20 mm PC or MS	225 mm	T – 225, minimum thickness of 150 mm on subgrade of CBR less than 20 %
2 – 5	20 mm PC/MS/SDC over 50 mm/75 mm BM	250 mm	T – 300/325, minimum thickness of 750 mm on subgrade of CBR less than 30 %
5 – 10	20 mm BC/SDC over 60 – 80 DBM	250 mm	T – 335 to 355, minimum thickness of 750 mm on subgrade of CBR less than 30 %
10 – 15	40 mm BC over 65 – 80 DBM	250 mm	T – 335 to 370, minimum thickness of 750 mm on subgrade of CBR less than 30 %
15 – 20	40 mm BC over 80 – 100 DBM	250 mm	T – 370 to 390, minimum thickness of 750 mm on subgrade of CBR less than 30 %
20 – 30	40 mm BC over 100 – 115 DBM	250 mm	T – 390 to 405, minimum thickness of 750 mm on subgrade of CBR less than 30 %

Note: SD – Surface Dressing, PC – Pre mix Carpet, MS – Mix Seal, SDC – Semi Dense Carpet, BC – Bituminous Concrete, BM – Bituminous Macadam, DBM – Dense Bituminous Macadam.

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SARDAR PATEL COLLEGE OF ENGINEERING
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Re-Examinations: January 2020

Program: B.Tech. in Civil Engineering

Course Code: PC-BTC 501

Course Name: Structural Engineering

Duration: 3 Hours

Maximum Points: 100

Semester: V

1.	Attempt any FIVE questions out of SEVEN questions.
2.	Answers to all sub questions should be grouped together.
3.	Figures to the right indicate full marks.
4.	Assume suitable data if necessary and state the same clearly.

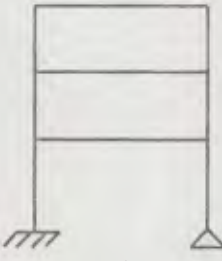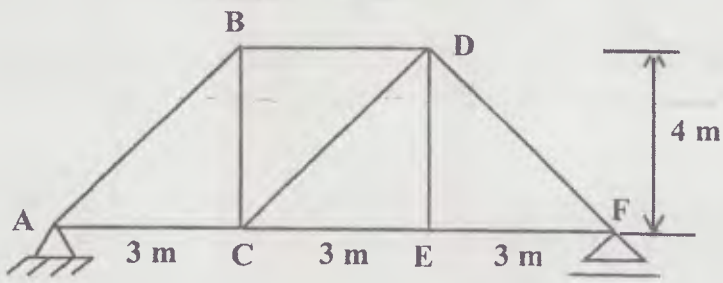| Q.No.	Questions	Points	CO	BL	PI
Q.1(a)	A symmetrical three hinged parabolic arch of span 40 m and central rise of 6 m is subjected to two concentrated loads of 180 kN and 140 kN act on the arch at 8 m and 30 m respectively from the left support. Determine (a) the support reactions (b) radial shear force, normal thrust and BM just to the right of 180 kN load (c) radial shear force, normal thrust and BM just to the right of 140 kN load (c) draw BMD	15	1	4	1.1.1 1.3.1 2.4.1
Q.1(b)	What are the advantages and disadvantages of an arch over a beam of same span?	05	1	2	1.3.1
Q.2	A suspension cable of span 50 m and a central dip of 8 m is supporting a three hinged stiffening girder. The dead load of the girder is 10 KN/m. A point load of 200 KN acts on the girder at a distance of 20 m from the left support and another point load of 120 KN acts on the girder at a distance of 10 m from the right support. (a) Determine the maximum and minimum tension in the cable (b) Draw SFD and BMD for the girder If the suspension cable passes over a smooth pulley on the top of a pier of height 16m and the anchor cable is at 40° to the horizontal, find the forces transmitted to the base of the pier.	20	1	3,4	1.3.1 2.1.3
Q.3(a)	For a simply supported beam of span 30 m draw influence diagram for a) reaction at left support A b) shear force at a section C, 12 m from left support A c) bending moment at a section C, 12 m from left support A.	10	2	3,4	1.3.1 2.1.3

Q.3(b)	For the pin jointed frame shown in figure below draw influence diagram for axial force in members CE, CD and DF.	10	2	3,4	1.3.1 2.1.3
Q.4(a)	For the frame shown in figure calculate the vertical deflection of C due to change in temperature as indicated in figure. Take $\alpha = 12 \times 10^{-6}/°C$ and depth of all members as 400 mm.	10	3	3,4	1.3.1 2.1.3
Q.4(b)	Determine the static and kinematic indeterminacy of the structures shown in figures below.	10	3	3,4	1.3.1 2.1.3
	(i)				
	(ii)				
	(iii)				

	 (iii)				
	 (v)				
Q.5(a)	Calculate the flexibility coefficients for the beam shown in figure w.r. to the coordinates indicated in figure.	08	4	3,4	1.1.1 1.3.1 2.4.1
Q.5(b)	Analyse the beam shown in figure by slope deflection method and find the end moments. $E = 200 \times 10^6$ kN/m^2, $I = 80 \times 10^6$ mm^4.	12	4	3,4	1.1.1 1.3.1 2.4.1
Q.6(a)	Find the reactions at B and C in the continuous beam loaded as shown in figure using the force method.	12	4	3,4	1.1.1 1.3.1 2.4.1
Q.6(b)	What are the internal forces developed in the following (i) A rigid jointed frame (ii) A pin jointed frame (iii) An arch (iv) A cable	04	1	2	1.3.1

Q.6(c)	For the structures shown in figures below determine (a) the degree of static external and internal indeterminacy and (b) kinematic indeterminacy considering and neglecting axial deformations.	04	3	3,4	1.3.1 2.1.3
	  (ii)				
Q.7(a)	The members of the truss shown in figure are subjected to temperature increase of 40^0 C. Calculate the vertical deflection of C due to the increase in temperature. Take $\alpha = 12 \times 10^{-6}/°C$.	12	4	3,4	1.1.1 1.3.1 2.4.1
Q.7(b)	How is the information about the degree of static and kinematic indeterminacy useful in analyzing an indeterminate structure?	03	4	2	1.3.1
Q.7(c)	What are the methods of analysis of indeterminate structures? What are the conditions to be satisfied in the analysis of elastic structures?	05	4	2	1.3.1

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Program: Civil Engineering

Course Code: BT 301/PCBTC501

Course Name: Geotechnical Engineering I

Duration: 3hr

Maximum Points: 100

Semester: V

Instructions:

1. Attempt any 5 questions out of 7 questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly

Q. No.		Questions	Points	CO	BL	PI
1	a	Discuss Constant head permeability test and also derive expression for the same.	5	CO2	BL2	1.3.1
	b	Distinguish between standard Proctor Test & Modified Proctor Test.	5	CO1	BL3	1.2.1
	c	Define Zero air Voids line. How will you plot the Zero air voids line on Dry Density-Moisture Content Curve.	5	CO2	BL3	1.3.1
	d	Write down the advantages of Triaxial shear test.	5	CO2	BL3	1.3.1
2	a	A sample of clay has a liquid limit of 80% and its plastic limit is 35%. How do you classify the soil as per the IS Classification	6	CO1	BL2	1.2.1
	b	Define the following term with mathematical expression Void ratio, porosity, degree of saturation, water content, Density index, Mass density, Unit weight and Specific gravity.	8	CO1	BL2	1.2.1
	c	Discuss importance of grain size analysis and State the methods for carrying it out.	6	CO1	BL2	2.2.3
3	a	In an earthen embankment under construction the bulk unit weight is 16.5 kN/m^2 at water content of 11%, If the water content is to be raised to 15%, compute the quantity of water required to be added per cubic meter of soil? Assume no change in the void ratio.	7	CO1	BL3	1.3.1
	b	Discuss in detail Mohor's Coulomb Theory.	8	CO4	BL5	2.1.3
	c	Derive expression for the torque at failure in case of vane shear test when both portion of vane take part in shearing process.	5	CO1	BL5	1.3.1

	a	In a consolidation test the following results have been obtained. When the load was changed from 150 kN/m² to 300 kN/m², the void ratio changed from 0.70 to 0.65. Determine the coefficient of volume decrease, modulus of volume change and compression index.	7	CO3	BL6	2.1.3
4	b	Fine the ratio of average permeability in horizontal to vertical direction for a soil deposit consisting of three horizontal layer, if the thickness and permeability of the second layer are twice of those of the first and those of the third layer twice those of the second.	7	CO2	BL6	2.1.3
	c	The hydraulic gradient for an upward flow of a water through a sand mass is 0.9. If the specific gravity of the soil particles is 2.65and e= 0.5. will the quick sand condition develop.	6	CO1–	BL1	1.3.1
	a	Discuss different drainage condition for estimation of shear strength.	8	CO3	BL6	4.2.1
5	b	A layer of soft clay is 6m thick and lies under a newly constructed building. The weight of sand overlying the clayey layer produces a pressure of 260kN/m2 and new construction increases the pressure by 100kN/m2. If the compression index is 0.5, compute the settlement. Water content is 40% and specific gravity of grains is 2.65.	6	CO3	BL3	2.1.3
	c	Discuss the properties and utility of flow net.	6	CO2	BL1	2.2.4
	a	The mass specific gravity of a fully saturated specimen of clay having a water content of 30:5% is 1.96. On oven drying, the mass specific gravity drops to 1.6. Calculate specific gravity of clay.	7	CO3	BL6	4.1.1
6	b	A cylindrical specimen of a saturated soil fails under an axial stress 150kN/m² in an unconfined compression test. The failure plane makes an angle of 52 degrees with the horizontal. Calculate the cohesion and angle of internal friction of the soil. Also verify your answer by graphical method.	8	CO4	BL6	4.3.1
	c	Discuss the factors affecting permeability of the soil.	5	CO4	BL5	2.1.3
	a	The soil in borrow pit has a void ratio of 0.90. A fill in place volume of 20000m3 is to be constructed with an in place dry density of 18.84 kN/m³. If the owner of borrow area is to be compensated at Rs. 1.50 per cubic meter of excavation, determine cost of compensation.	6	CO3	BL3	2.1.3
7	b	Discuss the mechanistic model for consolidation	8	CO3	BL6	2.1.3
	c	Explain Plasticity Index, Shrinkage Index, and Liquidity Index.	3	CO4–	BL1	1.2.1
	d	Differentiate finite and infinite slope.	3	CO4	BL1	1.2.1

Odd semester Re-Examinations Civil Engineering
January 2020

Max. Points: 100

Class: *T.Y. (Civil), Semester: V*

Name of the Course: *Hydraulic Engineering-I*

Duration: Three Hours

Program: U.G. (B. Tech. Civil)

Course Code : PC-BTC304/504

Instructions:

1. Attempt *Any Five* questions
2. All questions carry equal marks
3. Answer to each question to be started on the fresh page
4. Assume suitable data if necessary and mention it clearly.
5. Draw neat diagrams.

Q. No.	Questions	Points	CO	BL	PI
1	(a) What is siphon? Where is it used? Explain its working with neat sketch.	10	1	1	1.3.1
	(b) A 30 cm wrought iron pipeline 600 meter long discharges water 110 meter below the surface of a reservoir. Determine the diameter of the nozzle which will deliver the maximum power. Assume f = 0.023 and coefficient of velocity of the nozzle is 0.96.	10	1	5	1.3.1
2	(a) A pipe bend placed in a horizontal plane tapers from 300 mm diameter at inlet to 150 mm diameter at outlet. Water enters the reducing bend horizontally and gets turned through 45-degree in the clockwise direction. Observations indicate that when water flows at the rate of 180 liters/sec, the pressure of 42 kN/m² at the inlet section drops to 24 kN/m² at outlet section due to frictional effects. Find magnitude and direction of resultant force on the bend.	10	2	3	2.1.2
	(b) Water is admitted at the axis of rotation of a two arm lawn sprinkler. The nozzles facing opposite each other's has a diameter of 12 mm each and sprinkler arm have a length of 300 mm, for the flow rate of 1.5 liters/sec. Find (i) Speed of rotation of sprinkler (ii) Torque to keep the sprinkler stationary.	10	2	4	1.3.1
3	(a)Show that the efficiency of a free jet striking normally on a series of flat plates mounted on the periphery of a wheel can never exceeds 50%.	10	3	5	2.2.2
	(b) A jet of water 3 cm in diameter moving with a velocity of 15 meter/sec strikes a hinged square plate of weight 250 N at the center of the plate. The plate is of uniform thickness. Find the angle through which the plate will swing.	10	3	4	1.3.1

4	(a)Explain working of turbine. Define hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine.	10	4	2	6.1.1
	(b) A hydroelectric power plant having gross head of 160 meters delivers 0.95 cumecs of water to a Pelton wheel through a 1800 meter long pipeline at maximum efficiency of transmission. The bucket speed is 15 meter/sec. Design a Pelton Wheel type turbine for the outlet vane angle of 150 and determine diameter of pipeline required.	10	4	5	3.2.1
5	(a)Explain Draft Tube theory and lists out types of Draft tubes with sketches.	10	4	2	1.3.1
	(b) A Kaplan turbine develops 14000 kilowatts of power at a head of 28 meter. The boss diameter to runner diameter ratio is 0.34, speed ratio is 2.10, flow ratio is 0.66 and overall efficiency is 0.92. Find; (i) runner diameter (ii) boss diameter (iii) runner rpm and (iv) specific speed of the turbine.	10	4	3	3.1.6
6	(a) Explain work done, head and efficiencies of a centrifugal pump.	10	3	1	6.1.1
	(b) A centrifugal pump impeller has an outer diameter of 30 cm. and inner diameter of 15 cm. The pump runs at 1050 rpm. The impeller vanes are set at a blade angle of 300 at the outlet. If the velocity of flow is constant at 2.10 meter/sec, calculate: (i) The velocity and direction of water at outlet (ii) the head developed, by assuming a manometric efficiency of 0.85 and (iii) The blade angle at inlet.	10	4	5	2.2.3
7	(a)Explain working of: (i) Hydraulic press; and (ii) Hydraulic crane.	10	3	1	2.2.2
	(b) Derive Hagen-Poiseuille equation for laminar flow through circular pipe.	10	2	4	1.3.1

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ODD SEMESTER RE-EXAMINATION

JANUARY 2020

Program: T.Y. B.Tech (Civil Engineering) Duration: 3 hours

Course Code: BT303 / ES BTC303 Maximum Points: 100

Course Name: Development Engineering Semester: V

Instructions:

1. Question 1 is COMPULSORY
2. Attempt ANY FOR out of remaining six questions
3. Start each question on a new page.
4. Assume suitable data, if required, and state it clearly.
5. Figures to the right indicate full marks assigned to the question.

Q.No.		Points	CO	BL	PI
1	Define: (04 marks each) a. Smart city b. Global positioning system c. Population density d. Rural and Urban e. Sustainable development	20	CO1, CO2	L1	6.3 1
2a	Define 'Rural Development' and discuss the techniques planned and adopted to urbanize the rural areas.	10	CO1	L1, 2	6.3 1
2b	Discuss how academics can be linked to development of rural areas through Unnat Bharat Abhiyaan (UBA). Give examples.	10	CO1	L1, 2	6.4 1
3a	State the importance of Area based development (ABD) in the planning of Smart City. Explain concept of ABD implemented or proposed by any one of the 100 cities of India approved for smart city project.	10	CO2	L1, 2	6.3 1
3b	Discuss the use of geospatial technologies like GPS, GIS and remote sensing for providing solution to drinking water problem in rural areas. Give an example of an implemented project in this sector.	10	CO2	L1	6.3 1
4a	Enlist and discuss various schemes implemented by Ministry of Housing and Urban Affairs for Urban transport in Urban areas. Explain any one scheme in detail.	10	CO2	L1, 2	6.3 1
4b	Explain the town planning concept of Chandigarh city.	10	CO2	L1	6.3 1

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ODD SEMESTER RE-EXAMINATION

JANUARY 2020

5a	Explain the need of sustainable development approach to be adopted in today's scenario by the construction industry. Give practical examples of implementation of sustainable development in construction practices for civil projects in India.	10	CO2	L1, 2	6.3 1
5b	Explain the process or approached adopted by rural areas for the implementation of schemes proposed by the government.	10	CO1	L1, 2	6.3 1
6a	As a civil engineer, explain the methodology you would adopt for analysis of the sewage disposal or waste management problem in rural areas.	10	CO1	L1, 2	6.3 1
6b	Give a smart solution for effective utilization of public transport in a metro city like Mumbai. Provide Justification.	10	CO1	L1	6.3 1
7a	Write short notes on: (05 marks each) 1. Slum clearance and Slum Rehabilitation 2. Zoning and Green Belt 3. Modern town planners and their work 4. Development plan and master plan	20	CO1	L2, 3	6.4 1

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Munshi Nagar, Andheri (West), Mumbai – 400058

Re- Examination January 2020

Program: Civil Engineering

Course Code: PCBTC505

Course Name: Foundation Engineering

Duration: 3hr

Maximum Points: 100

Semester: V

Instructions:

1. Attempt any 5 questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI
1	a	A gravity retaining wall retains 12 m backfill,	8	CO2	BL3	2.1.3.
		γ= 17.7 kN/m3, ϕ= 25°, with a uniform horizontal surface. Assume the wall interface to be vertical, determine the magnitude and point of application of the total active pressure. Water table is a height of 6m.				
	b	Differentiate rigid and flexible retaining wall.	4	CO1	BL2	1.2.1
	c	Discuss the stability criteria of gravity type of retaining wall.	8	CO1	BL2	1.3.1
2	a	Draw pressure distribution diagram for partially submerged cohesion less backfill for Rankine's Active earth pressure.	7	CO2	BL4	1.3.1
	b	Determine the ultimate bearing capacity of a circular footing of 1m diameter resting on the surface of saturated clay of unconfined compression strength of 100kN/m2. Also calculate safe value if factor of safety is 3. Diameter=1, Df=0 ϕ= 0°, N_q=1 and N_γ=0, N_c=5.7	5	CO1	BL1	1.2.1
	c	Brief about the applications of underground Conduits along with their classification.	8	CO2	BL2	1.2.1
3	a	Discuss soil reinforcement failure mechanism.	6	CO1	BL3	1.3.1
	b	Discuss the effect of water table on bearing capacity of a soil.	8	CO1	BL2	1.2.1
	c	Determine whether failure is by group or individual action using following data:	6	CO2	BL4	1.3.1
		No. of piles in group=16, diameter of pile=50cm, spacing both ways=1.0m c/c, Cohesion=30kN/m², Length of pile=9m, Shear mobilization factor for each pile=0.6, Neglect bearing.				
4	a	Draw pressure distribution diagram for cantilever sheet pile in cohesive soil with granular backfill.	6	CO1	BL3	1.2.1
	b	Explain how load carrying capacity of pile is determined and Discuss the Pile load test.	10	CO1	BL2	1.4.1

	c	Discuss the procedure for the construction of Gabion wall	4	CO1	BL4	1.4.1
5	a	Discuss the modes of bearing capacity failure	6	CO1	BL3	1.3.1
	b	Discuss applications of geotextiles in earth dam and road construction.	6	CO2	BL5	1.3.1
	c	A vertical wall 6m high with a smooth back has sand behind it. The level of the sand is horizontal. What will be the active earth pressure distribution and total active force on the wall if there is water table behind the wall at 2m below the surface of the sand? C=0, $\varphi=30°$, $\gamma=18KN/m^3$, γ sat=$21KN/m^3$	8	CO1	BL2	1.3.1
6	a	A 3 m square footing is located in a dense sand at a depth of 2.0 m	8	CO2	BL3	1.4.1
		Determine the ultimate bearing capacity for the following water table position (i) At ground surface,(ii) At footing level (iii) At 1 m below the footing The moist unit weight of sand above the water table is $18kN/m^3$ and saturated weight is $20kN/m^3$. $\phi= 35°$; c=0; $N_q=33$ and $N_\gamma=34.0$				
	b	Discuss in detail pile driving.	6	CO2	BL2	1.●
	c	Explain negative skin friction in case of pile foundation.	6	CO1	BL2	1.3.1
7	a	A wooden pile of 10 m length is driven by a 1500kg drop hammer falling through 3m to final set equal to 1.25 cm per blow. Calculate the safe load on the pile using Engineering News Formula	5	CO2	BL4	4.1.1
	b	Discuss about earth pressure at rest, active and passive state condition.	6	CO1	BL2	1.2.1
	c	Discuss Feld's rule for the determination of efficiencies of 2, 3, 4, 5, & 9 piles in group.	5	CO4	BL2	1.2.1
	d	Brief the procedure for construction of diaphragm wall foundation.	4	CO1	BL3	1.3.1

Re-Examination January 2020

Q.6(a)	Analyse the frame shown in figure by stiffness method. Draw BMD.	(10)		
	10 kN/m 90 kN A ↓↓↓↓↓↓↓↓↓↓ B 3 m ↓ 3 m C △ 1 5 m △ 2 1			
Q.6(b)	Define stiffness coefficient K_{ij} and state the important properties of the stiffness matrix.	(04)		
Q.6(c)	How is the information about the degree of static and kinematic indeterminacy useful in analyzing an indeterminate structure?	(06)		
Q.7 (a)	Find the shape factor for the unsymmetrical I section with the following data. Top flange - width = 300 mm, thickness = 30 mm Bottom flange - width = 200 mm, thickness = 20 mm Depth of web = 250 mm, thickness of web = 25 mm.	(10)		
Q.7 (b)	A continuous beam is subjected to working loads as shown in figure below. If M_P = 60 kN-m, calculate the (true) load factor for the beam.	(10)		
	80 KN 40 KN 20 kN/m A 4 m ↓ 4 m B 4 m ↓ 2 m ↓↓↓↓↓↓↓↓↓ △ 2M_P △ M_P C 2M_P 6 m D			

| Q.3(a)	Find the reaction at C in the beam shown in figure using the theorem of least work. Use vertical reaction at C as the redundant force.	(10)	2	3,4	1.3.1
Q.3(b)	A two hinged parabolic arch of span 40 m and rise 6 m carries a concentrated load of 60 kN at a distance of 10 m from the left support. Determine the horizontal thrust in the arch. The moment of inertia (MI) of the section of the arch varies as $I = I_0 \sec\theta$, where I_0 = MI of the section at the crown.	(10)	2	3,1	1.1.1 1.3.1 2.4.1
Q.4(a)	Calculate the flexibility coefficients for the beam shown in figure w.r. to the coordinates indicated in figure.	(08)	2	3	1.3.1 2.1.2
Q.4(b)	Analyse the beam shown in figure by moment distribution method.	(12)	3	3,4	1.3.1 2.1.2
Q.5	Analyse the frame shown in figure by slope deflection method. Draw BMD.	(20)	3	3,4	1.3.1 2.1.2

3

Q.1(b)	The members of the truss shown in figure are subjected to temperature increase of 50^0 C. Calculate the horizontal deflection of E due to the increase in temperature. Take $\alpha = 12 \times 10^{...}$ C				13.
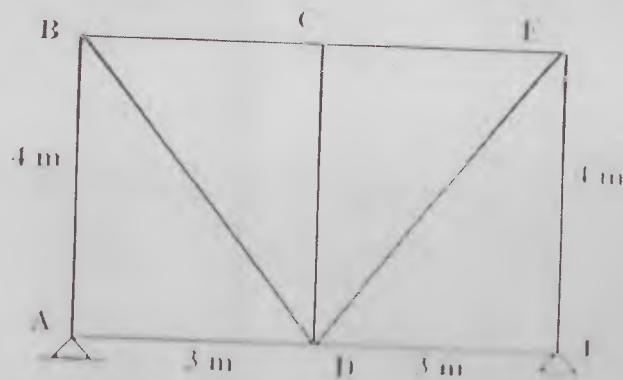
Q.2(a)	Find the force in the redundant member BD of the truss loaded as shown in figure below by flexibility (compatibility) method. (Take force in member BD as the redundant force.) Assume AE to be same for all the members.	(10)			
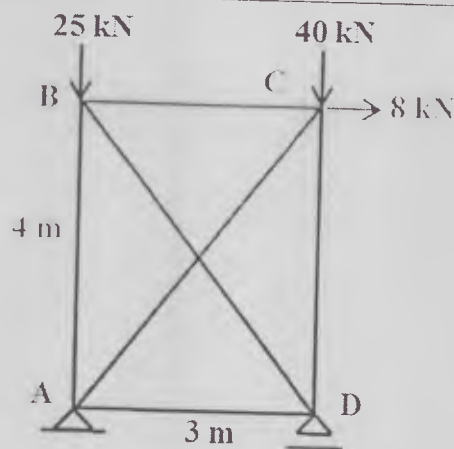
Q.2(b)	Analyse the continuous beam shown in figure using three moment theorem.	(10)	2	4	1.3.1 2.1.2
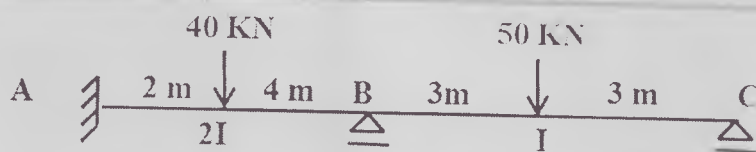
2

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Re-Examination January 2020

Program: B.Tech. in Civil Engineering   Duration: 3 Hours
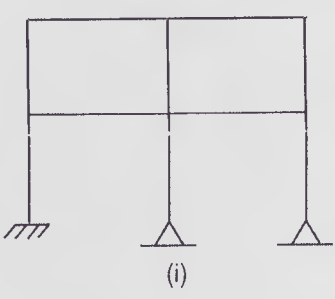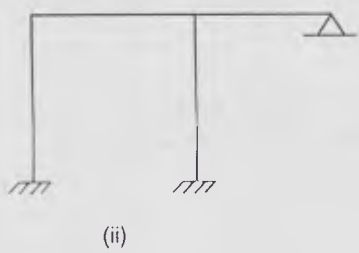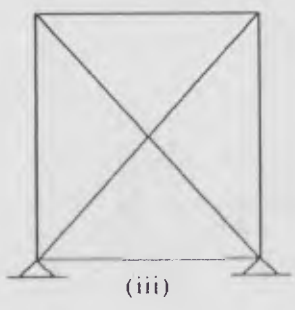
Course Code: PC-BTC 502   Maximum Points: 100

Course Name: Structural Analysis-II   Semester: V

Instructions:
- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.

Q.No.	Questions	Points	CO	BL	PI
Q.1(a)	**Determine the static and kinematic indeterminacy of the structures shown in figures below.**	(08)	1	3	1.4.1
	(i) (ii)				
	(iii)				

Program: Civil Engineering   **Duration:** 3 hour

Course Code: PC-BTC 504   **Maximum Points:** 100

Course Name: Highway Engineering   **Semester:** V

Notes: assume suitable data if required

Q.No.	Questions	points	CO	BL	PI
Q.1.	**Solve any four (each sub question carries 5 marks)**				
	(a) Jaikar Committee	20	1	1,2	
	(b) Vision – 2021				
	(c) Golden Quadrilateral				
	(d) Lane Distribution Factor				
	(e) Vehicle Damage Factor				
Q.2.					
a	Explain with sketch the various factors controlling alignment of roads.	10	1	2	
b	The area of the certain district in India is 35, 400 km^2, the number of towns as per 2011 census is 27. For a road density of 82 km per 100 km^2 area, calculate the length of various categories of Road as per third 20 year's road development plan.	10	1	3	
Q.3.					
a	How will you carried out in Profile Leveling field. Discuss with sketch preparation of longitudinal section drawing for highway projects.	10	1	2	
b	Discuss the points to be consider while preparation of detailed road project report	10	3	1,2	
Q.4.					
a	Discuss the importance of geometric design of highway. List the geometric elements to be considered in highway design.	10	1	2	
b	Explain camber. What are the objectives of camber? The recommended value of camber for different pavement surface in different rainfall area.	10	1	1,2	
Q.5.					
a.	What is gradient. Enlist its objectives. Discuss the recommended values of gradient as per IRC guideline.	10	1	2	

b.	A vertical summit curve is formed when an ascending gradient of 1 in 25 meet with another ascending gradient of 1 in100. Find length of the summit curve to provide the required stopping sight distance for a design speed of 80 kmph.	10	3	4
Q.6.				
a.	Explain Rutting and fatigue Failure Criteria as per IRC 37-2001.	10	2	2
	Design the single lane undivided carriageway type flexible pavements passing through plain area. The traffic is allowed to move in both direction and design life of 15 years. Total numbers of heavy vehicles in both directions for undivided lane carriageway are 600 cvpd, if rate of growth of traffic is 6 %, the CBR value of subgrade soil is 6 % and time required for construction of road after last count is 3 years. (Use IRC 37- 1984 Guideline Table 1.)	10	2	4
Q.7.	**Solve any four (each sub question carries 5 marks)**			
	(a) Triaxial Method for Flexible pavement design (b) Burmister 2 and 3 layers theory (c) Construction of cement concrete roads (d) Joints in rigid pavements (e) Transition Curve and its Importance	20	1,2,3	2,3

Table 1. Composition of pavement as per IRC – 37 – 1984

Design traffic in msa	Minimum thickness of layers in mm		
	Surface	Base	Subbase
0.50	20 mm PC or 2 coats of SD	150 mm	T – 50, minimum thickness of 100 mm on subgrade of CBR less than 20 %
0.5 – 2	20 mm PC or MS	225 mm	T – 225, minimum thickness of 150 mm on subgrade of CBR less than 20 %
2 – 5	20 mm PC/MS/SDC over 50 mm/75 mm BM	250 mm	T – 300/325, minimum thickness of 750 mm on subgrade of CBR less than 30 %
5 – 10	20 mm BC/SDC over 60 – 80 DBM	250 mm	T – 335 to 355, minimum thickness of 750 mm on subgrade of CBR less than 30 %
10 – 15	40 mm BC over 65 – 80 DBM	250 mm	T – 335 to 370, minimum thickness of 750 mm on subgrade of CBR less than 30 %
15 – 20	40 mm BC over 80 – 100 DBM	250 mm	T – 370 to 390, minimum thickness of 750 mm on subgrade of CBR less than 30 %
20 – 30	40 mm BC over 100 – 115 DBM	250 mm	T – 390 to 405, minimum thickness of 750 mm on subgrade of CBR less than 30 %

Note: SD – Surface Dressing, PC – Pre mix Carpet, MS – Mix Seal, SDC – Semi Dense Carpet, BC – Bituminous Concrete, BM – Bituminous Macadam, DBM – Dense Bituminous Macadam.

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
END SEMESTER RE-EXAMINATION

Program: T.Y.B.Tech (Civil)   Date:
Course code: BTC327/PC-BTC602   Duration: 3 hours
Course Name: Design and Drawing of Steel Structures   Max Marks: 100

Instructions:
Q1. is **compulsory**
Attempt any **FOUR** questions out of remaining six questions
Figures to the right indicate full marks.
Assume suitable data if necessary and state the same clearly
Use of **IS800-2007** and **steel tables** is permitted in the examination

Question No		Maximum Marks	Course Outcome Number	Module Number
1)	a. List some important advantages of Steel over RCC construction b. Explain with sketch shear lag effect c. List with sketches different types of welded joints d. List all the geometrical properties of steel sections & explain their signification (5 marks each)	20	1 & 2	1,2,5,6
2)	a. Design a single angle to carry a compression of 150 kN & having length 2.0 m. Yield & ultimate strengths are 250 & 410 MPA. (10) b. Design the BOLTED seat angle connection between the beam ISMB300 and column ISHB250 for a factored reaction from beam equal to 150 kN. Use M24 bolts of 4.6 grade and steel 410 with fy = 250 MPa (10)	20	1	3,6
3)	a. Design a single angle to carry a tension of 200 kN. Use M20 bolts for end connections having class 4.6. Yield & ultimate strengths are 250 & 410 MPA (10) b. Design the welded seat angle connection between the beam ISMB200 and column ISHB200 for a reaction from beam equal	20	1	2,6

		20	1	
	to 100 kN. Use M16 bolts of 4.6 grade and steel 410 with fy = 250 MPa (10)			
4)	Design laced column with channels back to back to working load of 1000 kN. Unsupported length is 11 m with one end fixed & one pinned. Assume welded connection FOR LACING.	20	1	3
5)	a. Design a suitable I beam for a simply supported span of 6 m. and carrying UDL of 25 KN/m. Take fy = 250 MPa. Assuming it is restrained laterally, having stiff bearing. (10) b. A beam ISMB400 transfers a working load of 300 kN to a column ISHB450. Using Fe410 grade steel design the stiffened seat connection with bolting (10)	20	1	5,6
6)	Design a welded Gusseted base for a column ISHB200 having working load of 1000kN, yield strength 250 MPA & use M25 grade of concrete	20	1	4
7)	a. Calculate moment carrying capacity of a laterally unsupported beam ISMB300 having length 7 m. (10) b. Design the BOLTED cleat angle connection between the beam ISMB200 and column ISHB200 for a factored reaction from beam equal to 75 kN. (10)	20	1	5,6

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SARDAR PATEL COLLEGE OF ENGINEERING

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Munshi Nagar, Andheri (W) Mumbai – 400058

Previous Semester Examination December 2019 Examinations

Program: Civil Engineering

Course Code: BTC 305

Course Name: Transportation Engineering- I

Duration: 3 Hour

Maximum Points: 100

Semester: V

Notes:

Attempt any Five Questions

Figures to the right indicate full marks.

Assume suitable data if necessary and state the same clearly

Q.No.		Questions	Points	CO	BL	PI
1	a	Discuss the role of transportation in development of a nation. **(5)**	20	2	II	1.2.1
	b	Using sleeper density (N+6), find out the number of sleepers for constructing a BG of 700m length. **(5)**		3	III	2.1.2
	c	What are the requirements of good ballast? Mention the different types of ballast used in permanent way. **(5)**		1	II	1.2.1
	d	Mention the various assumptions made in the basic runway length. **(5)**		2	III	2.1.2
	e	Distinguish between wet docks and dry docks. **(5)**		3	III	2.1.2
2	a	A 5° curve diverges from a 3° main curve in the reverse direction in the layout of a B.G. yard. If the speed on the branch line is restricted to 35 kmph, determine the restricted speed on the main line. **(8)**	20	2	II	1.2.1
	b	What are the objects of providing transition curve? Explain briefly the essential requirements of an ideal transition curves. **(6)**		3	II	1.2.1
	c	Define gauge and discuss different types of gauges. **(6)**		1	II	2.1.2
3	a	Calculate all the necessary elements required to set out a 1 in 12 turnout taking off from a straight B.G. track with its curve starting from the toe of the switch, i.e, tangential to the gauge face of the outer main rail and passing through TNC. Given heel divergence (d): 11.4cm. **(8)**	20	2	III	2.1.2
	b	Explain with sketch coning of wheels and tilting of rails. **(6)**		3	III	2.1.2
	c	Draw a neat sketch of a left hand turnout and show its various component parts. **(6)**		1	III	2.1.2
4	a	The length of the runway under standard conditions is 1700 m. The airport site is at an elevation of 260 m. its reference temperature is 32°C. If the runway is to be constructed with an effective gradient of 0.2%, determine the corrected runway length. **(8)**	20	3	II	2.1.2
	b	With a neat sketch explain various runway patterns. **(6)**		2	III	1.2.1
	c	Classify the airport according to ICAO. **(6)**		3	III	2.1.2

5	a	Design an exit taxiway joining a runway and a parallel main taxiway. The total angle of turn is 30^0 and the turn off speed is 80 kmph. Draw a neat sketch showing all the design elements. [Assume R_1 = 731m for 80 kmph speed] **(10)**	20	1	III	1.2.1
	b	Explain the factors that influence the site selection of an airport. **(10)**		2	III	1.2.1
6	a	Write a short note on creep and its various theories. Also discuss the possible causes and effects of creep? **(10)**	20	3	II	1.2.1
	b	What are the various air traffic control aids? Explain their role in safety in aircraft movements. **(10)**		2	II	1.2.1
7	a	List the factors to be considered while selecting the site for harbour and briefly discuss various types of Harbour. **(10)**	20	1	II	1.2.1
	b	Explain the breakwater structure briefly and explain the different types of breakwater. **(10)**		2	II	1.2.1

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SARDAR PATEL COLLEGE OF ENGINEERING

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Munshi Nagar, Andheri (W) Mumbai – 400058

Previous Semester Examination December 2019 Examinations

Program: Civil Engineering   Duration: 3 Hour

Course Code: BTC 305   Maximum Points: 100

Course Name: Transportation Engineering- I   Semester: V

Notes:

Attempt any Five Questions

Figures to the right indicate full marks.

Assume suitable data if necessary and state the same clearly

Q.No.		Questions	Points	CO	BL	PI
1	a	Discuss the role of transportation in development of a nation. **(5)**	20	2	II	1.2.1
	b	Using sleeper density (N+6), find out the number of sleepers for constructing a BG of 700m length. **(5)**		3	III	2.1.2
	c	What are the requirements of good ballast? Mention the different types of ballast used in permanent way. **(5)**		1	II	1.2.1
	d	Mention the various assumptions made in the basic runway length. **(5)**		2	III	2.1.2
	e	Distinguish between wet docks and dry docks. **(5)**		3	III	2.1.2
2	a	A 5° curve diverges from a 3° main curve in the reverse direction in the layout of a B.G. yard. If the speed on the branch line is restricted to 35 kmph, determine the restricted speed on the main line. **(8)**	20	2	II	1.2.1
	b	What are the objects of providing transition curve? Explain briefly the essential requirements of an ideal transition curves. **(6)**		3	II	1.2.1
	c	Define gauge and discuss different types of gauges. **(6)**		1	II	2.1.2
3	a	Calculate all the necessary elements required to set out a 1 in 12 turnout taking off from a straight B.G. track with its curve starting from the toe of the switch, i.e, tangential to the gauge face of the outer main rail and passing through TNC. Given heel divergence (d): 11.4cm. **(8)**	20	2	III	2.1.2
	b	Explain with sketch coning of wheels and tilting of rails. **(6)**		3	III	2.1.2
	c	Draw a neat sketch of a left hand turnout and show its various component parts. **(6)**		1	III	2.1.2
4	a	The length of the runway under standard conditions is 1700 m. The airport site is at an elevation of 260 m. its reference temperature is 32^0C. If the runway is to be constructed with an effective gradient of 0.2%, determine the corrected runway length. **(8)**	20	3	II	2.1.2
	b	With a neat sketch explain various runway patterns. **(6)**		2	III	1.2.1
	c	Classify the airport according to ICAO. **(6)**		3	III	2.1.2

5	a	Design an exit taxiway joining a runway and a parallel main taxiway. The total angle of turn is 30^0 and the turn off speed is 80 kmph. Draw a neat sketch showing all the design elements. [Assume $R_1 = 731$m for 80 kmph speed] **(10)**	20	1	III	1.2.1
	b	Explain the factors that influence the site selection of an airport. **(10)**		2	III	1.2.1
6	a	Write a short note on creep and its various theories. Also discuss the possible causes and effects of creep? **(10)**	20	3	II	1.2.1
	b	What are the various air traffic control aids? Explain their role in safety in aircraft movements. **(10)**		2	II	1.2.1
7	a	List the factors to be considered while selecting the site for harbour and briefly discuss various types of Harbour. **(10)**	20	1	II	1.2.1
	b	Explain the breakwater structure briefly and explain the different types of breakwater. **(10)**		2	II	1.2.1

Odd semester Re-Examinations Civil Engineering
January 2020

Max. Points: 100   Duration: Three Hours
Class: *T.Y. (Civil), Semester: V*   Program: U.G. (B. Tech. Civil)
Name of the Course: *Hydraulic Engineering-I*   Course Code : PC-BTC304/504
Instructions:

1. Attempt *Any Five* questions
2. All questions carry equal marks
3. Answer to each question to be started on the fresh page
4. Assume suitable data if necessary and mention it clearly.
5. Draw neat diagrams.

Q. No.	Questions	Points	CO	BL	PI
1	(a) What is siphon? Where is it used? Explain its working with neat sketch.	10	1	1	1.3.1
	(b) A 30 cm wrought iron pipeline 600 meter long discharges water 110 meter below the surface of a reservoir. Determine the diameter of the nozzle which will deliver the maximum power. Assume f = 0.023 and coefficient of velocity of the nozzle is 0.96.	10	1	5	1.3.1
2	(a) A pipe bend placed in a horizontal plane tapers from 300 mm diameter at inlet to 150 mm diameter at outlet. Water enters the reducing bend horizontally and gets turned through 45-degree in the clockwise direction. Observations indicate that when water flows at the rate of 180 liters/sec, the pressure of 42 kN/m² at the inlet section drops to 24 kN/m² at outlet section due to frictional effects. Find magnitude and direction of resultant force on the bend.	10	2	3	2.1.2
	(b) Water is admitted at the axis of rotation of a two arm lawn sprinkler. The nozzles facing opposite each other's has a diameter of 12 mm each and sprinkler arm have a length of 300 mm, for the flow rate of 1.5 liters/sec. Find (i) Speed of rotation of sprinkler (ii) Torque to keep the sprinkler stationary.	10	2	4	1.3.1
3	(a)Show that the efficiency of a free jet striking normally on a series of flat plates mounted on the periphery of a wheel can never exceeds 50%.	10	3	5	2.2.2
	(b) A jet of water 3 cm in diameter moving with a velocity of 15 meter/sec strikes a hinged square plate of weight 250 N at the center of the plate. The plate is of uniform thickness. Find the angle through which the plate will swing.	10	3	4	1.3.1

4	(a)Explain working of turbine. Define hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine.	10	4	2	6.1.1
	(b) A hydroelectric power plant having gross head of 160 meters delivers 0.95 cumecs of water to a Pelton wheel through a 1800 meter long pipeline at maximum efficiency of transmission. The bucket speed is 15 meter/sec. Design a Pelton Wheel type turbine for the outlet vane angle of 150 and determine diameter of pipeline required.	10	4	5	3.2.1
5	(a)Explain Draft Tube theory and lists out types of Draft tubes with sketches.	10	4	2	1.3.1
	(b) A Kaplan turbine develops 14000 kilowatts of power at a head of 28 meter. The boss diameter to runner diameter ratio is 0.34, speed ratio is 2.10, flow ratio is 0.66 and overall efficiency is 0.92. Find; (i) runner diameter (ii) boss diameter (iii) runner rpm and (iv) specific speed of the turbine.	10	4	3	3.1.6
6	(a) Explain work done, head and efficiencies of a centrifugal pump.	10	3	1	6.1.1
	(b) A centrifugal pump impeller has an outer diameter of 30 cm. and inner diameter of 15 cm. The pump runs at 1050 rpm. The impeller vanes are set at a blade angle of 300 at the outlet. If the velocity of flow is constant at 2.10 meter/sec, calculate: (i) The velocity and direction of water at outlet (ii) the head developed, by assuming a manometric efficiency of 0.85 and (iii) The blade angle at inlet.	10	4	5	2.2.3
7	(a)Explain working of: (i) Hydraulic press; and (ii) Hydraulic crane.	10	3	1	2.2.2
	(b) Derive Hagen-Poiseuille equation for laminar flow through circular pipe.	10	2	4	1.3.1

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Munshi Nagar, Andheri (W) Mumbai – 400058

Re-Examinatiohs, January-2020

Program: Civil   Engineering

Course Code: PC-BTC506

Course Name: Environmental Engineering-II

Duration: 3 HOUR

Maximum Points: 100

Semester: V

Notes:

i.   Question No. 1 is compulsory.
ii.   Attempt any four questions out of remaining six.
iii. Draw neat sketches/diagrams wherever required
iv.   Assume suitable data if necessary and state them clearly
v.   Figure on right indicate maximum points for the given question, course outcomes attained, Blooms level and Performance Indicators.

Q.No.	Questions	Points	CO	BL	PI
1	*Question No. 1 (solve any four from a to f)*				
	(a) Why it is necessary to treat wastewater before disposal? What is the objective of the sewerage works?	05	3	L1,	1.3.1
	(b) What should be properties of the material to be used for sewer construction?	05	2	L1	2.1.2
	(c) Explain Reuse and Recycling of wastewater from sustainable perspective.	05	3	L1	2.3.1
	(d) What are the pollutants that should be removed before the sewage is considered safe for discharging back to water body?	05	1	L1	1.3.1
	(e) Describe the criteria for selection of site for pumping station.	05	1	L2	2.4.2
	(f) What is dry weather flow? How it affect on the working of sewerage system?	05	3	L2	2.3.1
2	a) Find the efficiency of standard rate trickling filter from the following data: Total flow = 4.7 MLD BOD present in raw sewage = 190 mg /L Organic loading = 165 g/m^3/d Surface loading = 2000 L/m^2/d.	10	4	L4	1.3.1
	b) What are the drawbacks of the conventional activated sludge process? Explain any two modifications in the conventional activated sludge process	05	2	L3	2.4.2
	) Write short notes on the estimation of storm water runoff.	05	2	L2	2.3.1

3	a) Design a septic tank for a hostel of 300 capacity with water supply of 200 LPCD. Also design a suitable soil absorption system for disposal of effluents from the septic tank.	10	4	L4	3.1.4
	b) Describe merits and drawback of separate system.	06	01	L1	1.3.1
	c) Why aerobic treatment systems produce more sludge than anaerobic treatment systems?	04	01	L2	2.2.4
4	a) Classify different treatment methods used in wastewater treatment plant with suitable examples.	07	1	L1	2.3.2
	b) Design a grit chamber for population 70000 with water consumption of 135 LPCD.	08	4	L4	3.1.4
	c) Highlight the importance of recirculation factor and recirculation ratio in the design of trickling filters.	05	2	L1	1.3.1
5	(a) Design a sewer to serve a population of 50000 from following data: Water supply 135 lpcd; slope available for laying sewer is 1 in 500.	07	4	L4	3.1.4
	(b) Write note on (i) Aerated lagoon (ii) Catch basin	08	2	L2	2.1.2
	(c) State the guidelines for disposal of wastewater into the river body.	05	3	L3	2.3.2
6	a) Determine designed discharge for a combined system serving population of 40000 with rate of water supply of 135 LPCD. The catchment area is 120 hectares and the average coefficient of runoff is 0.80. The time of concentration for the design rainfall is 30 min and the relation between intensity of rainfall and duration is $I = 1020/(t + 20)$.	06	2	L4	1.3.1
	b) What are the operational problems in the working of trickling filters?	06	4	L3	2.3.1
	c) Explain with neat sketch working of imhoff tank.	08	2	L2	1.3.1
7	(a) State the purpose of Provision of Freeboard in Sewers.	05	3	L3	2.4.2
	(b) Describe design guidelines for the bar racks.	05	3	L2	1.3.1
	(c) Explain the importance of following terms: (i) MLSS (ii) MCRT (iii) Recirculation ratio	06	1	L2	2.3.1
	(d) Give the approximate reasonable value in percentage removal of BOD for following unit processes : (i) Plain sedimentation (ii) ASP (iii) TF (iv) Imhoff tank	04	2	L1	1.3.2

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058

Re- Examination January 2020

Program: Civil Engineering
Course Code: PCBTC505
Course Name: Foundation Engineering

Duration: 3hr
Maximum Points: 100
Semester: V

Instructions:

1. Attempt any 5 questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI
1	a	A gravity retaining wall retains 12 m backfill,	8	CO2	BL3	2.1.3.
		γ= 17.7 kN/m3, ϕ= 25°, with a uniform horizontal surface. Assume the wall interface to be vertical, determine the magnitude and point of application of the total active pressure. Water table is a height of 6m.				
	b	Differentiate rigid and flexible retaining wall.	4	CO1	BL2	1.2.1
	c	Discuss the stability criteria of gravity type of retaining wall.	8	CO1	BL2	1.3.1
2	a	Draw pressure distribution diagram for partially submerged cohesion less backfill for Rankine's Active earth pressure.	7	CO2	BL4	1.3.1
	b	Determine the ultimate bearing capacity of a circular footing of 1m diameter resting on the surface of saturated clay of unconfined compression strength of 100kN/m2. Also calculate safe value if factor of safety is 3. Diameter=1, Df=0 ϕ= 0°,N_q=1 and N_γ=0, N_c=5.7	5	CO1	BL1	1.2.1
	c	Brief about the applications of underground Conduits along with their classification.	8	CO2	BL2	1.2.1
3	a	Discuss soil reinforcement failure mechanism.	6	CO1	BL3	1.3.1
	b	Discuss the effect of water table on bearing capacity of a soil.	8	CO1	BL2	1.2.1
	c	Determine whether failure is by group or individual action using following data:	6	CO2	BL4	1.3.1
		No. of piles in group=16, diameter of pile=50cm, spacing both ways=1.0m c/c, Cohesion=30kN/m², Length of pile=9m, Shear mobilization factor for each pile=0.6, Neglect bearing.				
4	a	Draw pressure distribution diagram for cantilever sheet pile in cohesive soil with granular backfill.	6	CO1	BL3	1.2.1
	b	Explain how load carrying capacity of pile is determined and Discuss the Pile load test.	10	CO1	BL2	1.4.1

	c	Discuss the procedure for the construction of Gabion wall	4	CO1	BL4	1.4.1
5	a	Discuss the modes of bearing capacity failure	6	CO1	BL3	1.3.1
	b	Discuss applications of geotextiles in earth dam and road construction.	6	CO2	BL5	1.3.1
	c	A vertical wall 6m high with a smooth back has sand behind it. The level of the sand is horizontal. What will be the active earth pressure distribution and total active force on the wall if there is water table behind the wall at 2m below the surface of the sand? C=0, $\varphi=30°$, $\gamma=18KN/m^3$, γ sat=21KN/m³	8	CO1	BL2	1.3.1
6	a	A 3 m square footing is located in a dense sand at a depth of 2.0 m	8	CO2	BL3	1.4.1
		Determine the ultimate bearing capacity for the following water table position (i) At ground surface,(ii) At footing level (iii) At 1 m below the footing The moist unit weight of sand above the water table is $18kN/m^3$ and saturated weight is $20kN/m^3$. $\phi= 35°$; c=0; N_q=33 and N_γ=34.0				
	b	Discuss in detail pile driving.	6	CO2	BL2	1._.1
	c	Explain negative skin friction in case of pile foundation.	6	CO1	BL2	1.3.1
7	a	A wooden pile of 10 m length is driven by a 1500kg drop hammer falling through 3m to final set equal to 1.25 cm per blow. Calculate the safe load on the pile using Engineering News Formula	5	CO2	BL4	4.1.1
	b	Discuss about earth pressure at rest, active and passive state condition.	6	CO1	BL2	1.2.1
	c	Discuss Feld's rule for the determination of efficiencies of 2, 3, 4, 5, & 9 piles in group.	5	CO4	BL2	1.2.1
	d	Brief the procedure for construction of diaphragm wall foundation.	4	CO1	BL3	1.3.1

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Q. No.		Questions	Points	CO	BL	PI
1	a	A gravity retaining wall retains 12 m backfill, γ= 17.7 kN/m3, ϕ= 25°, with a uniform horizontal surface. Assume the wall interface to be vertical, determine the magnitude and point of application of the total active pressure. Water table is a height of 6m.	8	CO2	BL3	2.1.3.
	b	Differentiate rigid and flexible retaining wall.	4	CO1	BL2	1.2.1
	c	Discuss the stability criteria of gravity type of retaining wall.	8	CO1	BL2	1.3.1
2	a	Draw pressure distribution diagram for partially submerged cohesion less backfill for Rankine's Active earth pressure.	7	CO2	BL4	1.3.1
	b	Determine the ultimate bearing capacity of a circular footing of 1m diameter resting on the surface of saturated clay of unconfined compression strength of 100kN/m2. Also calculate safe value if factor of safety is 3. Diameter=1, Df=0 ϕ= 0°,N_q=1 and N_γ=0, N_c=5.7	5	CO1	BL1	1.2.1
	c	Brief about the applications of underground Conduits along with their classification.	8	CO2	BL2	1.2.1
3	a	Discuss soil reinforcement failure mechanism.	6	CO1	BL3	1.3.1
	b	Discuss the effect of water table on bearing capacity of a soil.	8	CO1	BL2	1.2.1
	c	Determine whether failure is by group or individual action using following data: No. of piles in group=16, diameter of pile=50cm, spacing both ways=1.0m c/c, Cohesion=30kN/m², Length of pile=9m, Shear mobilization factor for each pile=0.6, Neglect bearing.	6	CO2	BL4	1.3.1
4	a	Draw pressure distribution diagram for cantilever sheet pile in cohesive soil with granular backfill.	6	CO1	BL3	1.2.1
	b	Explain how load carrying capacity of pile is determined and Discuss the Pile load test.	10	CO1	BL2	1.4.1

		... the procedure for the construction of gabion wall	4	CO1	BL4	1.4
		Discuss the modes of bearing capacity failure	6	CO1	BL3	1.3.1
5	b	Discuss applications of geotextiles in earth dam and road construction	6	CO2	BL5	1.3.1
	c	A vertical wall 6m high with a smooth back has sand behind it. The level of the sand is horizontal. What will be the active earth pressure distribution and total active force on the wall if there is water table behind the wall at 2m below the surface of the sand? C=0, φ=30°, γ=18KN/m³, γ sat=21KN/m	8	CO1	BL2	1.3.1
6	a	A 3 m square footing is located in a dense sand at a depth of 2.0 m	8	CO2	BL3	1.4.1
		Determine the ultimate bearing capacity for the following water table position (i) At ground surface, (ii) At footing level (iii) At 1 m below the footing. The moist unit weight of sand above the water table is 18kN/m³ and saturated weight is 20kN/m³. ϕ= 35°; c=0; N_q=33 and N_γ=34.0				
	b	Discuss in detail pile driving.	6	CO2	BL2	
	c	Explain negative skin friction in case of pile foundation.	6	CO1	BL2	1.3.1
7	a	A wooden pile of 10 m length is driven by a 1500kg drop hammer falling through 3m to final set equal to 1.25 cm per blow. Calculate the safe load on the pile using Engineering News Formula	5	CO2	BL4	4.1.1
	b	Discuss about earth pressure at rest, active and passive state condition.	6	CO1	BL2	1.2.1
	c	Discuss Feld's rule for the determination of efficiencies of 2, 3, 4, 5, & 9 piles in group.	5	CO4	BL2	1.2.1
	d	Brief the procedure for construction of diaphragm wall foundation	4	CO1	BL3	1.3.1

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058

Re-Examination January 2020

Program: Civil Engineering Duration: 3hr

Course Code: PC-BTC502 Maximum Points: 100

Course Name: Hydrology & Water Resources Engineering Semester: V

Instructions:

1. Attempt any 5 questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly

Q. No.		Questions	Points	CO	BL	PI
1	a	Discuss the different forces acting on gravity dam.	7	CO1	BL3	1.3.1
	b	Elaborate the design procedure of Irrigation channel by Lacey's Method.	6	CO4	BL3	1.2.1
	c	The normal annual rainfall at station A, B, C and D over a basin are 80.97, 60.76, 82.67 and 92.55 cm respectively. In a particular year the station D was not operated and the station A, B and C recorded annual precipitation of 91.64, 82.36 and 79.89 cm respectively. Find the missing rainfall value at station D for that year.	7	CO1	BL5	1.3.1
2	a	Derive expression of permeability of confined aquifer for steady state flow condition.	7	CO3	BL2	1.2.1
	b	Given the ordinates of a 2 h UH as below. Derive the ordinate of a 6h hydrograph for the same catchment.	8	CO1	BL3	2.3.1
	c	Derive the relationship between duty & delta	5	CO2	BL2	1.2.1
3	a	Differentiate detention basin and retarding reservoir.	6	CO4	BL2	2.3.1
	b	Calculate the maximum discharge at the outlet of a distributaries from the following cropped areas and duties of water	6	CO1	BL5	1.3.1

Time hr	0	2	4	6	8	10	12	14	16	18	20	22
Ordinates Of 2 hr	0	3	5	8	14	19	26	34	20	8	6	0

Crops	Areas in hectares	Duty in thousand/hec/cumec
Rice	1500	0.60
Maize	2000	0.50
Sugarcane	5700	1.00
Rabi crop	8500	1.50
Other Kharif crop	3500	1.25

	c	Discuss in detail hydraulic failure of earth dam	4	CO4	BL2	1.3.1
4	a	Explain the method of plotting phreatic line for An earth dam with horizontal filter at D/S.	8	CO3	BL5	2.3.1
	b	Discuss the classification of earth dam	6	CO4	BL2	1.3.1
	c	Discuss the forms of precipitation.	6	CO1	BL2	1.1.1
5	a	A rectangular masonry dam is 2 m at the base Compute the permissable height H i) When no tension is permissable ii) When F.S.= 1.5 against sliding μ=0.5, Density of masonry=24 times density of water, C=1 iii) What will be corresponding values of H if the uplift is neglected?	12	CO4	BL4	1.1.1
	b	Discuss in detail single and double infiltrometer	8	CO1	BL2	1.3.1
6	a	Design an irrigation channel in alluvial soil by using Kennedy's theory. Q= 45cumecs, N= 0.0225, m= 1.05 and S= 1/5000	8	CO4	BL3	1.4.1
	b	Discuss the procedure for design of an ogee spillway.	8	CO4	BL2	1.3.1
	c	Discuss Lacey's regime channel theory	4	CO4	BL2	1.3.1
7	a	A well penetrates fully a 10m thick water bearing stratum of medium sand having K= 0.005m/sec. The well radius is 10cm & is to be worked under a drawdown of 4 m at the well face. Calculate the discharge from the well. What will be the % increase in the discharge if the radius of the well is doubled?	9	CO2	BL4	4.1.1
	b	Brief about recommendations of WMO for minimum number of rain gauges in a catchment.	5	CO1	BL2	1.2.1
	c	Differentiate detention basin and retarding reservoir.	6	CO4	BL2	2.3.1