



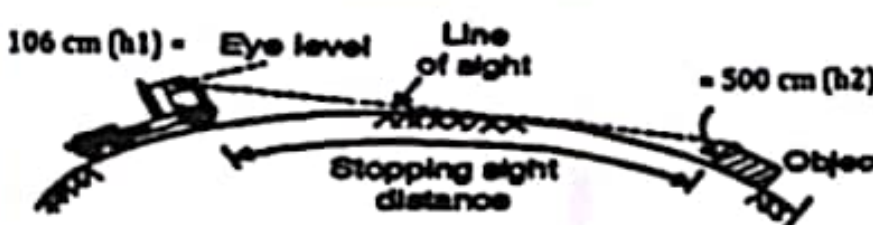
SUBJECT HIGHWAY & TRAFFIC ENGINEERING

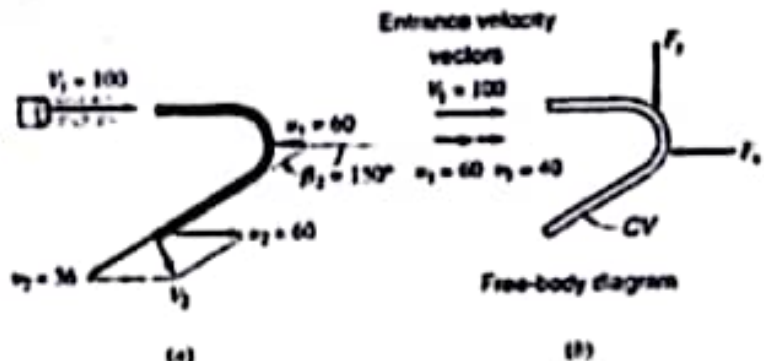
Date: 05.06.2023

Maximum Marks: 60

Time Allowed: 03 Hr

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	QUESTION	CLOs	Taxonomy Level	PL
Q. 01	What is highway planning? What are elements of a typical cross-section of road also Sketch neat and clean diagram of these sections with specifications?	1	C3	1
Q. 02	<p>A car is travelling at 90 km/hr on a crest vertical curve connecting grades of +1% and -2% and having a curve length of 300m. Further ahead of the car, a box from a truck has fallen onto the travel lane. The height of the box is 500cm. Eye height is taken as 1.06m as shown in figure. Ignore the effects of grades on Stopping Sight Distance (SSD). The road is in a rural area.</p> <p>Formulate the minimum length required for the car to stop safely and avoid colliding with the box.</p> 	2	C6	1
Q. 03(a)	Deflection angle of a 4° curve is $55^\circ 25'$, PI at station is 245+97.04. Investigate length of curve, T, and station of PT. Please note that P.I= Point of Intersection, T=Tangent and P.T= Point of Tangent	2	C6	1
(b)	A car is traveling at 30mph in the countryside at night on a wet road through a 150 ft long sag vertical curve. The entering grade is -2.4% and the existing grade is 4.0%. A tree has fallen across the road at approximately the PVT. Assuming the driver cannot see the tress until it is lit by headlights, is it reasonable to propose the driver to be able to stop before hitting the tree? Typically investigate the scenario.	2	C6	1
Q. 04	Design a flexible highway pavement using the AASHTO method of design, the estimated traffic is 2×10^6 ESAL in the design lane, the asphalt concrete modulus is $E=450 \times 10^3$ psi, resilient modulus (M_r) for base and subbase is 25×10^3 psi and 12×10^3 psi and for subgrade is 6×10^3 psi. In addition the following information are $PSI=4.0$, $P_t=2.5$, $SD=0.3$, $R=95\%$	2	C6	1
Q. 05	<p>Illustrate any three of the followings</p> <ol style="list-style-type: none"> 1. Traffic control devices, 2. Traffic signals, 3. Level of Service (LOS), 4. Traffic Management, 5. Signal Timing, Cycle Time, Traffic phases and lost time 	1	C3	1

Q. 04	(a)	A 2-in-diameter water jet with a velocity of 100 fps impinges on a series of blades moving in the same direction (thus $F_1 = F_2$) at a velocity of 60 fps. If $\beta_2 = 150^\circ$ and friction losses over the vane are such that $v_2 = 0.9v_1$. Solve the net force exerted by the water on the vane. Demonstrate the power loss due to friction.	2	C3	3
		 <p>Diagram (a) shows a water jet with velocity $V_1 = 100$ fps impinging on a curved blade moving with velocity $u_1 = 60$ fps. The blade exit velocity is $u_2 = 60$ fps. The angle between the inlet and outlet velocity vectors is $\beta_2 = 150^\circ$. The outlet velocity vector v_2 is shown at an angle $\beta_2 = 150^\circ$ to the horizontal. The blade velocity vector u_2 is also shown at an angle $\beta_2 = 150^\circ$ to the horizontal. The blade velocity vector u_1 is shown at an angle $\beta_1 = 150^\circ$ to the horizontal. The blade velocity vector u_2 is shown at an angle $\beta_2 = 150^\circ$ to the horizontal. The blade velocity vector u_1 is shown at an angle $\beta_1 = 150^\circ$ to the horizontal.</p> <p>Diagram (b) shows a free-body diagram of the blade. The forces acting on the blade are F_1 (inlet force), F_2 (outlet force), and F_3 (friction force). The control volume (CV) is indicated.</p>			
	(b)	Interpret the basic concept of impulse turbine & reaction turbine.	2	C3	3
Q. 05		Demonstrate the working principle of centrifugal pump & its construction.	2	C3	3

The End

Laminar layer:

$$C_f = 1.328 \sqrt{\frac{\mu}{\rho U}} = \frac{1.328}{\sqrt{Re}}$$

Turbulent layer:

$$C_f = \frac{0.0735}{Re^{1/4}} \text{ for } 500,000 < Re < \infty$$

$$\frac{\delta}{x} = \sqrt{\frac{2 + 1.63}{0.125}} \frac{1}{\sqrt{Re_x}} = \frac{4.91}{\sqrt{Re_x}} \quad \tau_0 = 0.332 \frac{\mu U}{x} \sqrt{Re_x}$$

Turbulent layer:

$$C_f = \frac{0.455}{(\log Re)^{1.38}} \text{ for } Re > 5 \times 10^5$$

$$\frac{1}{\sqrt{f}} = -2.0 \log \left(\frac{e/D}{3.7} + \frac{2.51}{Re \sqrt{f}} \right) \quad (\text{turbulent flow})$$

$$\frac{\delta}{x} = 0.377 \left(\frac{\nu}{U x} \right)^{1/4} = \frac{0.377}{Re_x^{1/4}} \quad \tau_0 = 0.0587 \rho \frac{U^2}{Re_x^{1/2}}$$

$$C_p = \begin{cases} \frac{0.051}{Re_x^{1/2}} - \frac{1440}{Re_x} & Re_{x_{min}} = 5 \times 10^5 \\ \frac{0.051}{Re_x^{1/2}} - \frac{4760}{Re_x} & Re_{x_{min}} = 3 \times 10^6 \end{cases}$$

$$\dot{W}_{pump} = \dot{V} \Delta P$$

$$HP_{in} = \frac{\gamma Q (V_1^2 / 2g)}{550}$$

$$HP_{transfer} = \frac{F u}{550}$$

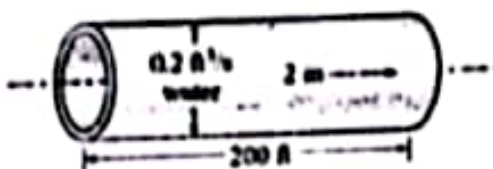


Maximum Marks: 60

Time Allowed: 3 Hr

Dated: 29.05.2023

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	QUESTION	CLOs	Taxonomy Level	POs	Mo
Q. 01	(a) Compare the efficiency of a half-hexagon and semicircle open channel if the channel is required to carry a discharge of $200 \text{ ft}^3/\text{min}$ on a slope of 0.16° . $n = 0.013$	1	C4	2	
	(b) Water at 60°F ($\rho = 62.36 \text{ lb}_m/\text{ft}^3$ and $\mu = 7.536 \times 10^{-4} \text{ lb}_m/\text{ft} \cdot \text{s}$) is flowing steadily in a 2-in-diameter horizontal pipe made of stainless steel at a rate of $0.2 \text{ ft}^3/\text{s}$. Examine the pressure drop, the head loss, and the required pumping power input for flow over a 200-ft-long section of the pipe. $\epsilon = 0.000007$.	1	C4	2	
					
Q. 02	(a) Interpret Rotational & Irrotational flow. Solve the following velocity function to demonstrate: i) flow is possible ii) flow is Irrotational or rotational flow ii) vorticity. iii) derive the relative stream function $u = -2xy - 2x^2 + 2y^2, v = 4xy - x^2 + y^2$	2	C3	3	
	(b) Sketch and Demonstrate Flow Net Diagram.	2	C3	3	
Q. 03	(a) Sketch and Interpret Boundary layer on Immersed bodies (Thin plate)	2	C3	3	
	(b) Use given formulae to solve. (a) the frictional drag on the top and sides of a box-shaped moving van 8 ft wide, 10 ft high, and 35 ft long, traveling at 60 mph through air at 50°F . (b) the thickness of the boundary layer and the shear stress at the trailing edge. $\nu = 0.000152 \text{ ft}^2/\text{sec}$ (Consider your own assumptions)	2	C3	3	

0.00232 slug/ft²


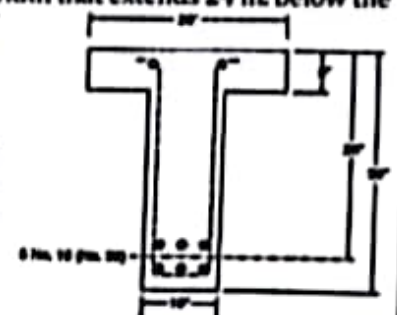
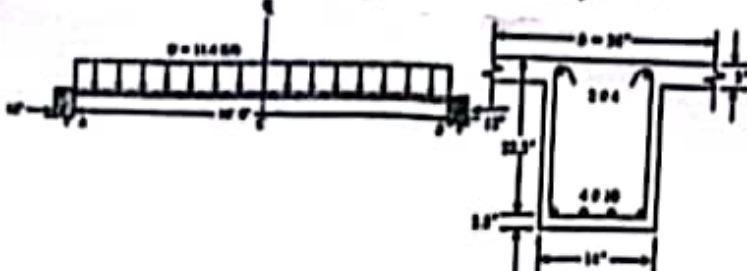


Dated: 01.06.2023

Maximum Marks: 60

Time Allowed: 3

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	QUESTION	CR	For Level
Q. 01	(a) What is meant by fresh concrete. Enlist the properties of fresh concrete. DESCRIBE bleeding and its remedies?	1	C3
	(b) What is meant by hardened concrete. Enlist the properties of hardened concrete. DESCRIBE creep and shrinkage in concrete.	1	C3
Q. 02	(a) DESIGN a simply supported rectangular beam section to resist a factored moment of 350 K-ft using $\rho = 2\%$. Determine the dimensions and apply checks for minimum width and depth of the section, given $f'_c = 4$ ksi and $f_y = 60$ ksi.	2	C6
	(b) SOLVE for the design moment strength, a rectangular beam having a width of 12 in. and an effective depth of $d = 22.5$ in. to the centroid of tension steel bars. Tension reinforcement consists of six no. 9 bars in two rows; compression reinforcement consists of two no. 7 bars placed as shown in Figure. Given $f'_c = 4$ ksi and $f_y = 60$ ksi.	2	C6
			
03	The isolated T beam shown in Figure is composed of a flange 28 in. wide and 6 in. deep cast monolithically with a web of 10 in. width that extends 24 in. below the bottom surface of the flange to produce a beam of 30 in. total depth. Tensile reinforcement consists of six No. 10 (No. 32) bars placed in two horizontal rows separated by 1 in. clear spacing. The centroid of the bar group is 26 in. from the top of the beam. The concrete has a strength of 3000 psi, and the yield strength of the steel is 60,000 psi. SOLVE for the design moment capacity of the beam.	2	C6
			
4	Check the section for shear and DESIGN the necessary shear reinforcement for a 17-ft-span simply supported beam, which has a clear span of 16 ft and carries uniformly distributed dead and live loads of 4.5 and 3.75 K/ft respectively. The dimensions of the beam section and steel reinforcement are shown in Figure below. Given $f'_c = 3$ ksi for normal-weight concrete and $f_y = 60$ ksi.	2	C6
			
	DESIGN a reinforced concrete slab which is built integrally with its supports and consists of two equal spans, each with a clear span of 15 ft. The service live load is 100 psf, and 4000 psi concrete is specified for use with steel with a yield stress equal to 60,000 psi. Design the slab, following the provisions of the ACI Code. Assume $\lambda = 1$.	2	C6



QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCE & TECHNOLOGY, NAWABSHAH

FINAL SEMESTER REGULAR EXAMINATION OF FIRST SEMESTER – THIRD YEAR, 2023 OF 20-BATCH, B.E (CE)

SUBJECT: CONSTRUCTION ENGINEERING

Dated: 08.06.2023

Maximum Marks: 30

Time Allowed: 02 H

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	QUESTION	CLO	Taxonomy Level
Q. 01	Why shoring is necessary in building? What are the benefits of shoring? Explain different methods of shoring in building.	2	C3
Q. 02	What are the requirements of brick masonry? What are the 5 steps to follow in manufacturing concrete blocks?	1	C2
Q. 03	What is the reason for underpinning? What is the procedure in underpinning building structure?	2	C3

The End

Mid



QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCE & TECHNOLOGY, NAWABSHAH

MID-SEMESTER EXAMINATION OF FIRST SEMESTER - THIRD YEAR (5TH SEMESTER) 2023, 20-BATCH, B.E (CE-C)

SUBJECT: CONSTRUCTION ENGINEERING

Dated: 10.03.2023

Maximum Marks: 10

Time Allowed: 45 Minutes

NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	Question Statement	CLO	Taxonomy Level	Marks
Q. 01	Why department needs more constraints on building? Discuss the cycle process of building construction.	CLO 1	C3	05
Q. 02	What is formwork and requirements of good formwork? Enlist different types of materials used for shuttering?	CLO 1	C3	05
Q. 03	How dampness can be avoided in building? What are the qualities of good damp proofing material?	CLO 1	C3	05

Good Luck

SUBJECT: PLAIN AND REINFORCED CONCRETE

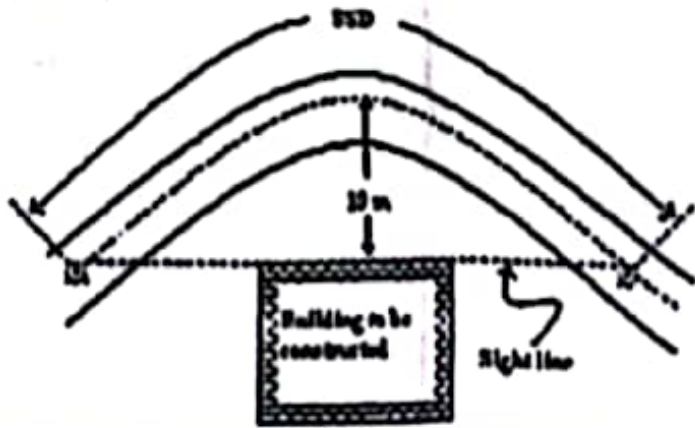
Dated: 08.03.2023

Maximum Marks: 20

Time Allowed: 01 Hour.

NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	Question	CLO	Taxonomy Level	PLO	Marks
Q. 01	(a) Describe the process of manufacturing concrete. Define each stage in the correct order	01	03	03	07
	(b) Discuss any three curing techniques which can easily be used in Pakistan.	01	03	03	03
Q. 02	(a) Define Fiber Reinforced Concrete. What are the types of fibers used? Discuss the advantages of fiber reinforced concrete.	01	03	03	07
	(b) Choose any three of the following to write a short note: (i) Self-Compacting Concrete. (ii) Fineness of Cement. (iii) Soundness of Cement. (iv) Fineness Modulus of Aggregates and its usefulness.	01	03	03	03
Q. 03	USE the ACI method to design a concrete mix for the construction of internal columns of a building. The specified strength of concrete is 30 MPa at 28 days measured on standard cylinders. The size of the column sections and the spacing of the reinforcement require a slump of 50 mm (2 in.) and a maximum size of aggregate of 20 mm (3/4 in.). The specific gravity of Fine & Coarse aggregates is 2.65 and 2.70 respectively. The dry rodded bulk density of Coarse aggregate is 1600 kg/m ³ (100 lb/ft ³) and the fineness modulus of Fine aggregate is 2.80. Ordinary Portland cement (Type 1) having a specific gravity of 3.15 will be used. Coarse aggregate is found to be absorptive to the extent of 1% with a moisture surface of 2.2% while fine aggregate has an absorption of 0.7% and free surface moisture is found to be 3.5%.	01	03	03	10

Q. No.	Question	CLOs	Proficiency Level	PLOs	Marks
Q. 01	(a) What was the composition of early roads, i.e. Telford, Tresaguet and Macadam also draw their section with neat and clean diagrams	1	C3	1	05
	(b) A motorist, travelling at 60 km/hr on a steep rural road with a gradient of 8%, sees an obstruction on the carriageway ahead of him. Calculate the minimum Stopping Sight Distance (SSD) required?	2	C6	3	05
Q. 02	(a) What is the purpose of Road Classification? Enlist the various factors that affect the classification of roads? Also enlist the classification of Highways.	1	C3	1	05
	(b) A vehicle, travelling at 80 km/hr wants to overtake a slower vehicle in front. The speed of the oncoming vehicle is 70 km/hr. Calculate the minimum Passing Sight Distance (PSD) required for this maneuver. Assume the acceleration, a is 1.0 m/s^2 on a steep rural road with a gradient of 8%, sees an obstruction on the carriageway ahead of him. Calculate the minimum Stopping Sight Distance (SSD) required?	2	C6	3	05
Q. 03	(a) What are Location Surveys? Describe Location Surveys in Rural and Urban areas to be performed while selecting a best location of highway route?	1	C3	1	05
	(b) The figure illustrates the proposed site for the construction of a building that is adjacent to a horizontal curve section of a rural highway. The suggested offset clearance is 10m. The highway design speed is 100 km/hr, while the curve length and curve radius are 200m and 600m respectively. Driver's perception-reaction time is taken as 2.5 seconds and the coefficient of friction between the tyre and the road surface is 0.28. Is the suggested offset clearance adequate to allow for Safe Stopping Sight Distance? 	2	C6	3	05

QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCE & TECHNOLOGY, NAWABSHAH**MD-SEMESTER EXAMINATION OF FIRST SEMESTER – THIRD YEAR (5TH SEMESTER) 2023, 20-BATCH, B.E (CE-C)****SUBJECT: FLUID MECHANICS AND HYDRAULICS-II (CE302)****Date: 06.03.2023****Maximum Marks: 20****Time Allowed: 01 Hour.****NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.**

Q. No.	Question	CLO	Taxonomy Level	PLO	Marks
01 (a)	Distinguish between Chézy's co-efficient and Manning's constant. Also Compare the methods to Analyze the discharge.	01	04	02	05
(b)	"There is a minimum value of E at a certain value of y" Simplify the statement with mathematical expression.	01	04	02	05
02 (a)	Distinguish between Broad crested and sharp crested weir	01	04	02	05
(b)	Water flows in a wide channel at $q = 10 \text{ m}^3/(\text{s} \cdot \text{m})$ and $y_1 = 1.25 \text{ m}$. If the flow undergoes a hydraulic jump, Analyze (a) y_2 , (b) V_2 , (c) Fr_2 , (d) h_f , (e) the percentage dissipation. $\frac{2y_2}{y_1} = -1 + (1 + 8Fr_1^2)^{\frac{1}{2}} \quad h_f = \frac{(y_2 - y_1)^3}{4y_1 y_2}$	01	04	02	05
03 (a)	Distinguish between pipe center and boundary (explain with suitable the diagram).	01	04	02	05
(b)	Based on dimension less number Classify the pipe flow.	01	04	02	05

The End



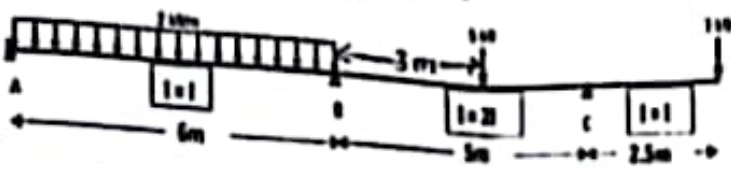
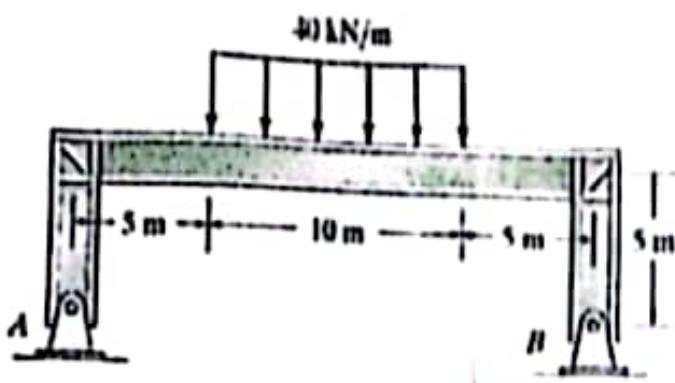
SUBJECT: STRUCTURAL ANALYSIS

Dated: 13.03.2023

Maximum Marks: 20

Time Allowed: 01 Hour,

NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	Question	CLO	Taxonomy Level	PLO	Marks
Q. 01	(a) EXPLAIN degree of indeterminacy. Describe the types of indeterminacy.	01	02	01	03
	(b) DESCRIBE the force method or the method of consistent deformation. Enlist the steps involved in the calculation of unknown reactions in a beam by the consistent deformation method.	01	02	01	07
Q. 02	<p>ANALYZE the beam as shown in figure by three moment equation to compute the end moments and support reactions.</p> <p>The beam is fixed at point A while having the pin supports at B and C respectively.</p> 	01	02	01	10
Q. 03	<p>ANALYZE the Frame by consistent deformation method as shown in figure. Joints A and B are pin supported. Assume $EI=1$ for all members.</p> 	01	02	01	10