

Department of Civil Engineering
Spring Semester Mid Term Examination-2019.

Calculus BSI-122
Spring - 2019

Max Marks: 25.

Time: 1.30 hours

Note: Attempt all questions. All questions carries equal marks.

- Q 1. (a) For what values of a and b is $f(x) = ax + b$, $x \leq 0$
 $= x^2 + 3a - b$, $0 < x \leq 2$,
 $= 3x - 5$, $x > 2$
 continuous at every x . (CLO-1) (4)

- (b) The height of a moving body vertically is given by $S(t) = -1/2 gt^2 + v_0 t + s_0$, $g > 0$, with
 s in meter and t in second. Find the body maximum height. (CLO-3) (5)

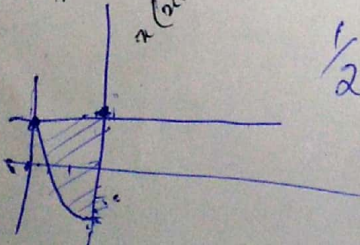
- Q. 2. (a) If $f(x) = \sqrt{|x|} = \sqrt{x}$, $x \geq 0$
 $= \sqrt{-x}$, $x < 0$.

Find the local extreme values, discuss the concavity and find the Point of inflection. (CLO-3) (4)

- (b) Evaluate the integral $\int \sec^n x dx$. (CLO-3) (4)

- Q. 3 (a) Find the area of the the region bounded by the $y = x^3$, and $y = 3x^2 - 4$. (CLO-3) (4)

- (b) Find the volume of the solid generated by revolving the region between by the the lines and curves $y = 4 - x^2$, $y = 2 - x$ and $y = x + 3$ (CLO-3) (4)



$\sqrt{4-y} = 2-y$, $x^2 = 4-y$
 $x = \sqrt{4-y}$
 $x = 2-y$

$\frac{1}{2\sqrt{x}} \Rightarrow \frac{1}{2} x^{-1/2}$
 $\frac{1}{2} x^{-1/2} \Rightarrow \frac{1}{2} \cdot \frac{1}{-1/2} x^{-1/2+1} = -\frac{1}{4} x^{1/2}$
 $\frac{1}{4\sqrt{x}} \Rightarrow \frac{1}{4} x^{-1/2} \Rightarrow \frac{1}{4} \cdot \frac{1}{-1/2} x^{-1/2+1} = -\frac{1}{2} x^{1/2}$
 $\sec^n \cdot \sec^{n-2}$
 $-\frac{1}{2} (-1/2) \frac{1}{x^{3/2}} (-1) = -\frac{1}{4} x^{-1/2}$

DEPARTMENT OF CIVIL ENGINEERING, UET PESHAWAR

CE-119: Mechanics of Solid-I

MID TERM EXAMINATION, 2nd Semester Spring 2019

Time allowed: 1:30 Hours

Total Marks = 70

Note: Attempt all questions. Cell Phones and reference materials of any kind are not allowed.

Question No. 1

Define the following

- Normal stress
- Shear stress
- Bearing stress
- Modulus of rigidity

[CLO1, C1, PLO1]

(2.5)

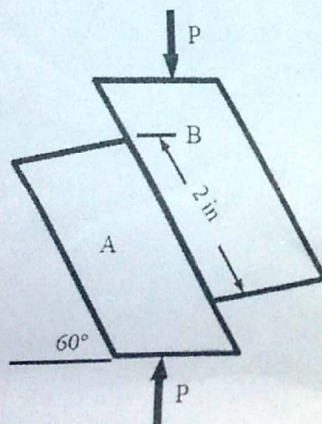
(2.5)

(2.5)

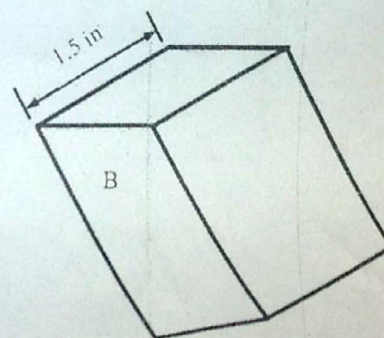
(2.5)

Question No. 2

Two blocks of wood (A and B) are glued together along the joint inclined at the angle 60° as shown in figure 1. The blocks are 1.5 in deep in a direction perpendicular to the plane of the paper. Show that the shearing stress on the glued joint is $P / (2\sqrt{3})$ [CLO2, C2, PLO1] (10)



(a)



(b)

Figure 1: Question No. 2

Question No. 3

A pulley is keyed to a 60 mm diameter shaft. The unequal belt pulls, T_1 and T_2 on the two sides of the pulley give rise to a net turning moment of 120 N-m. The key is 10 mm by 15 mm in cross-section and 75 mm long, as shown in figure 2. Determine the average shearing stress on a horizontal plane through the key. [CLO3, CLO4, C3, C4, PLO2] (10)

P.T.O

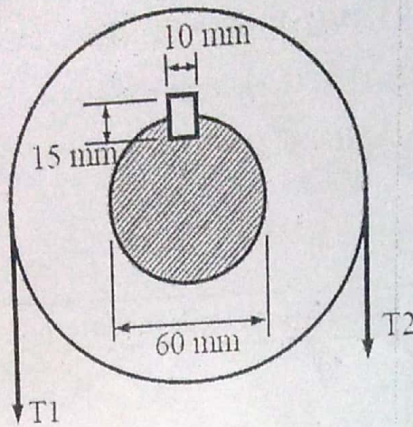


Figure 2: Question No. 3

Question No. 4

The composite bar shown in figure 3 is firmly attached to unyielding supports. Calculate the change in temperature that will cause a tensile stress of 20 ksi in the steel rod. Assume that the bar is suitably braced against buckling. [CLO3,CLO4,C3,C4, PLO2] (20)

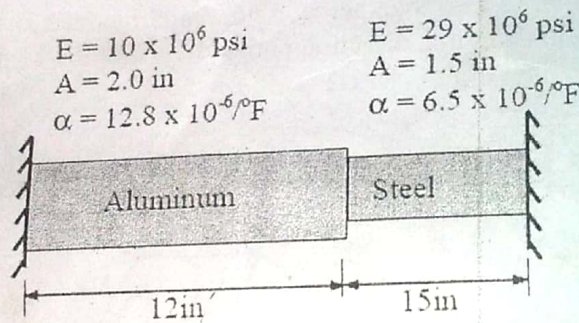


Figure 3: Question No. 4

Question No. 5

A rigid bar of negligible weight is supported as shown in figure 4. What maximum weight W can be applied without exceeding stresses of 150 MPa in the steel rod and 70 MPa in the bronze rod. [CLO3,CLO4,C3,C4, PLO2] (20)

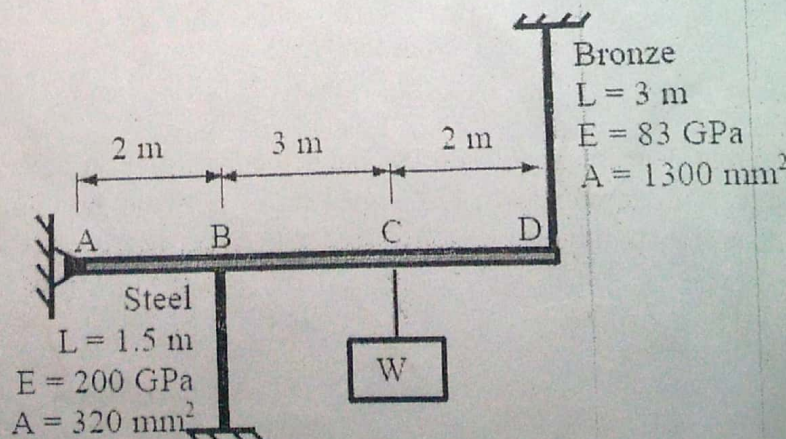


Figure 4: Question No. 5

Department of Civil Engineering
University of Engineering & Technology Peshawar
Mid Term Exam 2nd Semester, Spring 2019

CE-121 Civil Engineering Materials

Time Allowed: 90 Minutes

Total Marks: 25

Note: Attempt all questions.

✓
Q-1: (a) Write the names of the main chemicals found in Portland cement, and explain their importance. ^{CLO 1} (PLO1, Marks-05)

(b) Explain the different types of cement and its applications. ^{CLO 1} (PLO1, Marks-05)

✓
Q-2: List and explain different types of Concrete. ^{CLO 1} (PLO1, Marks-05)

✓
Q-3: Explain the different uses of plastics, ceramics and bricks as construction materials. ^{CLO 2} (PLO4, Marks-05)

Q-4: Explain different physical and chemical properties of aggregates. ^{CLO 2} (PLO4, Marks-05)

-GOOD LUCK-



Department of Civil Engineering
University of Engineering and Technology Peshawar
ME-191 Mechanical Tech. & Heavy Construction Machinery
2nd Semester Mid Term Examination
Spring 2019

Note: Attempt all questions. Mobile Phones and Programmable calculators are not allowed. Steam and Properties tables are allowed. Draw p-v and T-s diagram where needed. Assume reasonable value for any missing data.

Time allowed: 90 Minutes

Maximum marks : 50

- Q.1 a. 1 kg of steam at 100 bar and 375°C, specific volume of $v_1 = 0.02453 \text{ m}^3/\text{kg}$ and enthalpy $h_1 = 3017 \text{ kJ/kg}$ expands reversibly in a perfectly thermally insulated cylinder behind a piston until the pressure is 38 bar $u_2 = 2602 \text{ kJ/kg}$. Calculate the work done. [CLO 1] 6

- b. Sketch the Carnot cycle on T-s diagram and prove that $\eta_{\text{carnot}} = 1 - (T_2/T_1)$. [CLO 1] 2+6

- Expansion process as adiabatic
Q.2 a. A mass of gas, at an initial internal energy of 300 kJ, is allowed to expand behind a piston until its internal energy is 200 kJ; the values for final pressure and volumes are 4.59 bar and 0.148 m^3 respectively; the law of expansion is $PV^2 = C$, calculate: 6

- The work done;
- The initial volume

[CLO 2]

- b. 0.25 kg of steam at 7 bar, entropy 6.705 kJ/kg-K, is heated reversibly at constant pressure until the temperature is 250°C. Calculate the heat supplied in kJ, and show on a T-s diagram the area which represents the heat flow. [CLO 2] 6

- Q.3 A steam power plant operates between a boiler pressure of 42 bar and a condenser pressure of 0.035 bar. Calculate for these limits the cycle efficiency, the work ratio, and specific steam consumption and show the cycle on T-s diagram: 12

- For a Rankine cycle with dry saturated steam at entry to the turbine and dryness fraction (x_2) at exit of turbine is 0.696.

Note: Neglect pump work i-e ($W_p = 0$)

[CLO 3]

- Q.4 0.1 kg of nitrogen ($R = 0.297 \text{ kJ/kg-K}$) is compressed reversibly and isothermally from 1.01 bar, 20°C to 4.2 bar. Calculate the work done and the heat flow (in kJ) during the process. Assume nitrogen to be a perfect gas. 12

[CLO 2]

Department of Civil Engineering
University of Engineering & Technology Peshawar
Final Term Exam 1st Semester, Spring 2019

CE-121 Civil Engineering Materials

Total Marks: 50

Time Allowed: 3 Hours

Note: Attempt all questions.

- ✓ Q-1: (a) Explain Various Methods for Seasoning of Timber. (CLO2, Marks-05)
(b) Explain the main constituents of Glass. (CLO1, Marks-05)
- ✓ Q-2: (a) Draw the structure of a tree and explain its different parts. (CLO2, Marks-05)
(b) Explain Types of paints for Interior and Exterior surfaces of buildings. (CLO1, Marks-05)
- ✓ Q-3: (a) Explain the different uses of Bitumen, Rubber, Plaster of Paris, Asbestos and Cork as construction materials. (CLO2, Marks-06)
(b) Explain the practical applications of lime in building construction. (CLO1, Marks-04)
- ✓ Q-4: Explain XRD, XRF, SEM and EDAX and write its practical applications in the field of Civil Engineering (CLO2, Marks-10)
- ✓ Q-5: (a) Describe Different types of chemical attacks and their effects on concrete structures. (CLO1, Marks-06)
(b) Explain the physical, Mechanical, Electrical and thermal Properties of Engineering Materials. (CLO1, Marks-04)



Department of Civil Engineering
University of Engineering & Technology Peshawar

Final Term Examination

2nd Semester Spring 2019

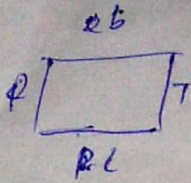
CE-120 Building Construction Engineering

Time allowed: 3 hours

Maximum marks: 100

Attempt all questions. Electronic gadgets are not allowed in the examination hall. Provide your answers to the point. Draw neat sketches where necessary. This question paper covers CLO-1 of the course.

Question #	Statement	Max. marks
1	Discuss any one type of support system for ground floor, and any two types for suspended floors.	17
2	Explain block masonry. Illustrate types of shallow foundations.	17
3	What is flat and sloping roof? Discuss types of sloping roof.	17
4	Describe the terminologies used in doors and door frames along with necessary sketches.	17
5	What is the purpose of providing windows in building? Discuss the selection of location and size of windows. Explain the types of windows based on their position.	17
6	Define the following. i. Weathered pointing ii. Shelled roof and its types iii. Three components of door hinge iv. Plinth protection v. Three techniques for strengthening/retrofitting of masonry and RC buildings	15



Department of Civil Engineering
University of Engineering and Technology, Peshawar
ME-191 Mechanical Tech. & Heavy Construction Machinery
2nd Semester Final Term Examination
Spring 2019

Note: Attempt all questions. Mobile Phones and Programmable calculators are not allowed. Steam and Properties tables are allowed. Draw T-s and thermal circuit diagram where needed. Assume reasonable value for any missing data.

Maximum marks : 50

Time allowed: 3 hours

✓
Q. 1 Steam is supplied, at 42 bar and specific entropy of 7.066 kJ/kg-K, to a turbine, condenser pressure is 0.035 bar and enthalpy at exit of feed water pump is 115.8 KJ/kg. If the plant operates on Rankine cycle, draw the cycle on T-s diagram and calculate, per kilogram of steam:

- i. ✓ The work output by the turbine; 2
- ii. ✓ The heat supplied in boiler; 2
- iii. ✓ The pump work input; 2
- iv. ✓ The Rankine efficiency (neglect pump work); 2
- v. ✓ Consider dry saturated steam at entry to the turbine with same pressure values of 42 bar and 0.035 bar, calculate the Carnot efficiency. 3

[CLO 3]

✓
Q. 2 Determine the average rate of heat transfer through each wall for a house that has a 10-m x 20-m base and a 4-m-high wall. All four walls of the house have an R-value of $2.0 \text{ m}^2 \cdot ^\circ\text{C}/\text{W}$. The two 10-m x 4-m walls have no windows. The third wall has one window made of 0.5-cm-thick glass ($k = 0.78 \text{ W/m} \cdot ^\circ\text{C}$), 2 m x 3 m in size. The fourth wall has the same size and number of double-paned window, with a 1.5-cm-thick stagnant air space ($k = 0.026 \text{ W/m} \cdot ^\circ\text{C}$) enclosed between two 0.5-cm-thick glass layers. The thermostat in the house is set at 18°C and the average temperature outside at that location is 8°C .
Disregarding any direct radiation gain or loss through the windows and taking the heat transfer coefficients at the inner and outer surfaces of the house to be 5 and $12 \text{ W/m}^2 \cdot ^\circ\text{C}$, respectively.
If the house is electrically heated and the price of electricity is \$0.08/kWh, determine the amount of money this household will save per heating season by converting the single-pane windows to double-pane windows.

[CLO 4]

- Q.3 a Draw and label schematic and T-s diagram of window air-conditioner. 3+2
- b Write down the steps and equations (if required) to calculate the sensible summer air-conditioning load for a Room. 3
- c Derive expression for coefficient of performance (CoP_{ref}), for Carnot vapor compression refrigeration cycle. 4
- [CLO 3]
- Q.4 a Air at 40°C blows over a hot plate (made of 1% carbon steel with $k = 43 \text{ W/m} \cdot ^\circ\text{C}$), 25 by 50 cm and 2cm thick, is maintained at 300°C . 300 W is lost from the plate surface by radiation. The convection heat transfer coefficient is $5 \text{ W/m}^2 \cdot ^\circ\text{C}$. Calculate the inside plate temperature. 5
- b Find the heat transfer per unit area through the composite wall in Figure 4-1. Assume one-dimensional heat flow. 7

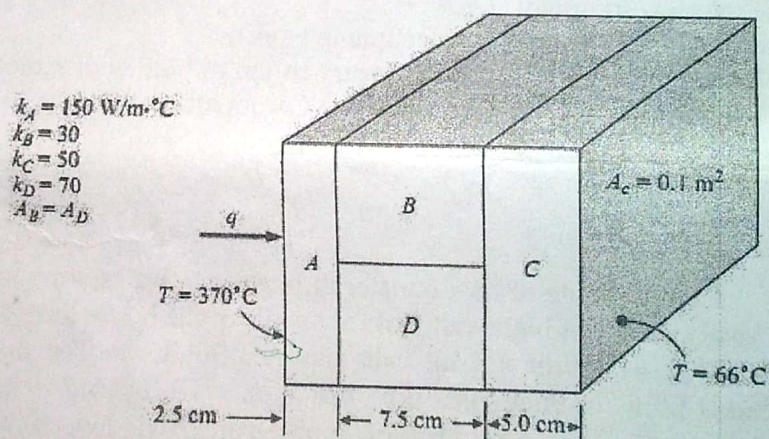


Figure: 4-1

[CLO 4]

DEPARTMENT OF CIVIL ENGINEERING, UET PESHAWAR

CE-119: Mechanics of Solids-I

FINAL TERM EXAMINATION, 2nd Semester Spring 2019

Time allowed: 3:00 Hours

Total Marks = 100

Note: Attempt all questions. Cell Phones and reference materials of any kind are not allowed.

Question No. 1

- What is the difference between single shear and double shear? [CLO1, C1, PLO1] (5)
- What is the difference between bearing stress and normal compressive stress? [CLO1, C1, PLO1] (5)
- Enlist key assumptions of the torsion formula. [CLO2, C2, PLO2] (10)

Question No. 2

Three plates are fastened by four $\frac{3}{4}$ -in diameter rivets, figure 1. Calculate the maximum safe load P that can be applied if the shearing stress in the rivets is limited to 14 ksi and bearing stress in the plates is limited to 18 ksi. Assume the applied load is uniformly distributed among the four rivets.

[CLO3, CLO4, C3, C4, PLO2] (20)

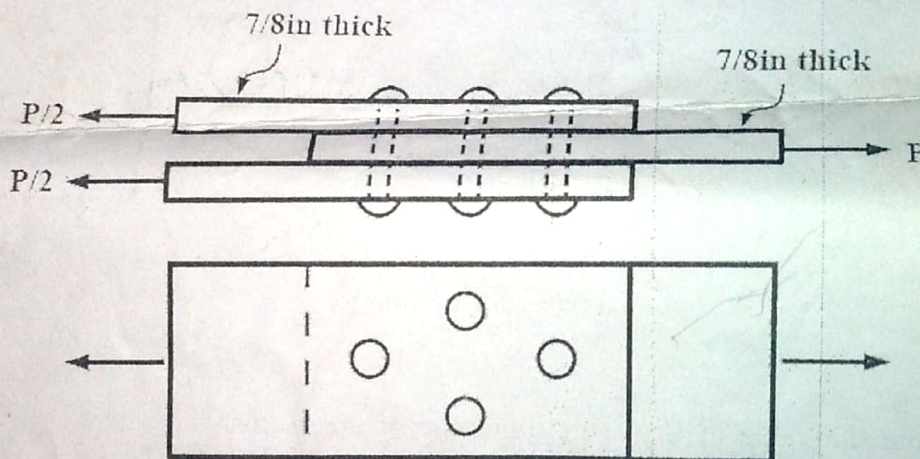


Figure 1: Question No. 2

Question No. 3

Draw shear and moment diagrams for the beam shown in figure 2, specifying values at all change of loading positions and at all points of zero shear.

[CLO4, C4, PLO2] (20)

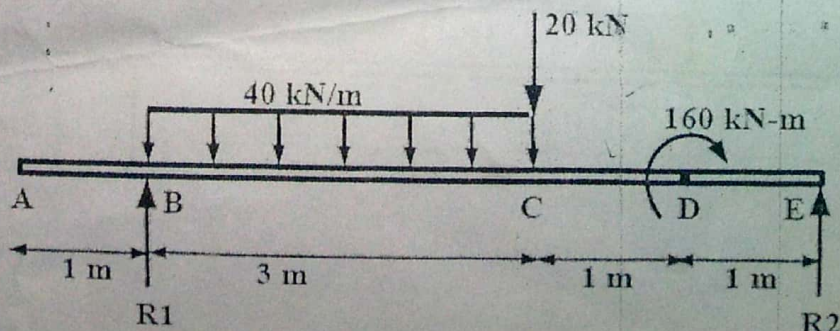


Figure 2: Question No. 3

Question No. 4

Shear force and bending moment diagrams of a rectangular beam is shown in figure 3.

- Determine the maximum tensile and compressive bending stresses developed in the beam. [CLO3,C3,PLO2] (10)
- Determine the maximum shearing stress in the beam [CLO3,C3,PLO2] (10)

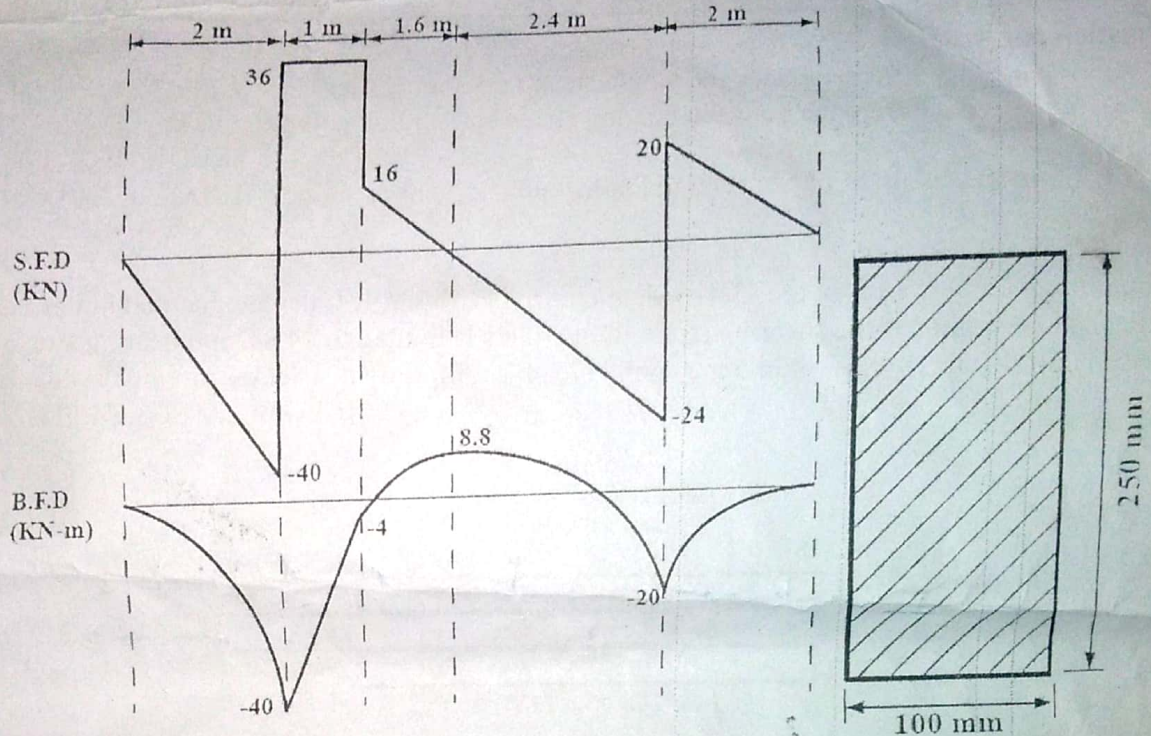


Figure 3: Question No. 4

Question No. 5

- Compute the value of $EI\delta$ at the right end of the overhanging beam shown in figure 4. [CLO3,CLO4,C3,C4,PLO2] (10)
- Calculate the slope $EI \frac{dy}{dx}$ of the elastic curve at point D for the beam shown in figure 4. [CLO3,CLO4,C3,C4,PLO2] (10)

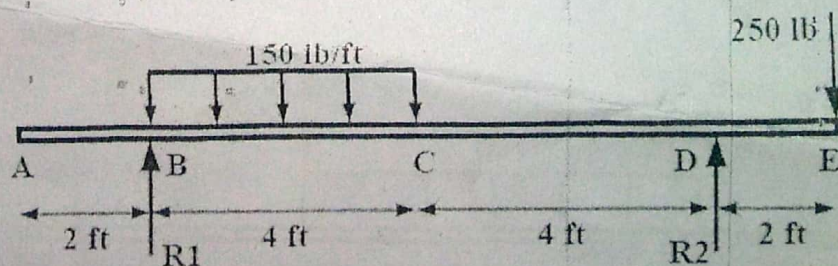


Figure 4: Question No. 5



Department of Civil Engineering
University of Engineering & Technology Peshawar

Mid Term Examination

2nd Semester Spring 2019

CE-120 Building Construction Engineering

Time allowed: 90 minutes

Maximum marks: 100

Attempt all questions. Electronic gadgets are not allowed in the examination hall. Provide your answers to the point. Draw neat sketches where necessary. This question paper covers CLO-1 of the course.

Question #	Statement	Max. marks
1 a	Classify the types of buildings according to occupancy as per Building Code of Pakistan.	15
1 b	Describe orientation of buildings, effect of sun-path in orientation, and the recommended method of orientation of rooms in residential building.	15
2 a	Illustrate the English and Flemish bonds of brick masonry in detail.	15
2 b	Discuss rubble stone masonry. Uncoursed and coursed rubble masonry.	15
3 a	Explain Shoring and its types.	15
3 b	Distinguish between the Test pit and probing methods of sub-surface investigation.	15
4	Define the following. i. Raft footing ii. Nominal brick size iii. Two basic building components. iv. Pile and pier v. Confined brick masonry	10

Civil Engineering
Final Term Examination
Calculus (Second Semester Spring 2019)

Time: 3 hours

Max Marks: 50

Note: Attempt all questions. All questions carries equal marks.

Q.1 (a) Use definition method find the values of a and b that makes the following function

differentiable for all values of x ,

$$f(x) = ax + b, \quad x > -1$$

$$= bx^2 - 3, \quad x \leq -1$$

CLO-1 (4)

(b). Find the Derivative of $x^m y^n = (x+y)^{m+n}$

CLO-1 (4)

Q.2 (a). The region bounded by the curve $y = x^2 + 1$ and the line $y = -x + 3$ is revolved about the x -axis to generate a solid. Find the volume of a solid.

CLO-3 (4)

(b). Find the area of the region enclosed by the line and curve $y = x^2 - 2x$ and $y = x$.

CLO-3 (4)

Q.3. (a) Test for continuity at the origin if $f(x, y) = \frac{x^2 + xy + x + y}{x + y}$, $x \neq 2, y \neq 2$

CLO-1 (4)

$$= 4 \quad x = 2, y = 2.$$

(b) Find the directional derivative of $\text{div}(\vec{u})$ at $(1, 2, 2)$, in the direction of the outer normal of the sphere $x^2 + y^2 + z^2 = 9$ for $\vec{u} = x^4 \hat{i} + y^4 \hat{j} + z^4 \hat{k}$.

CLO-2 (4)

Q.4. (a). If $u = e^{xyz}$, then find the value of $\frac{\partial^3 u}{\partial x \partial y \partial z}$.

Clo-2 (4)

(b) Show that the vector $\vec{F} = (y^2 - z^2 + 3yz - 2x)\hat{i} + (3xz + 2xy)\hat{j} + (3xy - 2xz + 2z)\hat{k}$ is both solenoidal and irrotational.

CLO-3 (4)

Q.5. (a) Compute $\int_C \vec{F} \cdot d\vec{r}$ where $\vec{F} = \frac{\hat{i}y - \hat{j}x}{x^2 + y^2}$ and $C: x^2 + y^2 = 1$ traversed counterclockwise

(Clo-3) (5)

Page 1/2

✓(b) Find the constant a, b, c , so that $\vec{F} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2z)\vec{k}$ is irrotational and hence find scalar potential ϕ such that $\vec{F} = \nabla\phi$. Clo-3 (5)

Q 6. (a) Find the equation of tangent plane and normal line to the surface

$$2x^2 + y^2 + 2z = 3 \text{ at the point } (2, 1, -3).$$

Clo-3 (4)

(b). Show that function $f(x, y) = x^3 + y^3 - 63(x + y) + 12xy$ is maximum at $(-7, 7)$ and minimum at $(3, 3)$ Clo-3 (4)