

DEPARTMENT OF BASIC SCIENCES AND ISLAMIAT

University of Engineering and Technology, Peshawar

PAPER: Probability and Statistics

Final-Term Examination 3rd Semester Fall-2019
(CIVIL Engineering Main Campus)

Time Allowed: 3 hours

Max Marks: 50

Note: Attempt ALL questions: Calculator Exchange is not allowed.

Q1. Stories and heights of buildings data is given as follows:

Stories x	64	54	40	31	45	38	42	41	37	40
Heights y	841	725	635	616	615	582	535	520	511	485

ANALYZE equation of regression line which can best fit given data. (10) (CLO3)

Q2. a) The tensile strength in a structural material is found to be highly variable, although tests showed that there is an increasing number of specimens of high strengths with a possible limit of 20 N/mm^2 in strength. Based on observations and as a first approximation, the pdf of tensile strength X is represented by the function

$$f(x) = ax^2, \quad 0 \leq x \leq 20 \text{ N/mm}^2.$$

(i) DETERMINE the constant a in the function.

(ii) FIND probability of $X > 10 \text{ N/mm}^2$ and median of X . (6) (CLO2)

b) The joint pdf of the lengths of horizontal and vertical legs, X and Y , of welding joints is given by $f(x, y) = \frac{1}{16}xy$, $4 \leq x, y \leq 8$, and 0 elsewhere.

COMPUTE (i) $P(5.5 < X < 6.5, 5.5 < Y < 6.5)$ (ii) Marginal pdfs. (4) (CLO2)

Q3. a) The foundation of a wall can fail either by excessive settlement or from bearing capacity. The respective failures are represented by events A and B , with probabilities $P(A) = 0.005$, and $P(B) = 0.002$. The probability of failure in bearing capacity given that the foundation displays excessive settlement is $P(B|A) = 0.2$. CALCULATE probability of failure of wall foundation. (5) (CLO2)

b) Two cards are drawn form a deck of 52 cards, FIND probability that the second drawn card is a spades card. (5) (CLO2)

$$f(x) = \frac{1}{266.6} x^2$$

$$0.0012$$

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$$\int f(x) + \int f(x) dx$$

3rd Semester, Final Term Examination FALL 2019

CE-206: Fluid Mechanics-I

Time Allowed-03 Hours

Max Marks:50

Note: Attempt all questions. Assume any missing data. Draw neat and labeled diagram where necessary.

Question-01: Sketch and Label the diagram for the following condition (CLO1) (10)

- Stream line, streak line and path line for steady flow condition
- Typical Hydraulic grade line and Energy Grade line for an open channel with real flow
- Typical Hydraulic grade line and Energy Grade line for a pipe system with real flow
- Venturi meter connected with differential manometer
- Partially submerged and fully submerged orifice

Question-02: A differential manometer is connected to two water tanks initially filled up to same level and open to the atmosphere. In this condition the top water surface in the tank is 100 cm higher than the mercury level in the right limb of differential manometer. Show the new mercury level difference in the two limb of differential manometer if the water in one tank is replaced by lubricating oil of Specific gravity 2.0. (CLO2) (12)

Question-03: For right angled triangular notch Show that (CLO2) (06)

$$Q = 1.46 \times H^{\frac{5}{2}}$$

Question-04: A closed vessel containing water up to a height of 1.5 meter and air at the upper part with an orifice of 100 mm at its bottom. Apply Bernoulli's equation to find the air pressure required for discharge of 5.0 liters per second through the orifice if $C_d = 0.62$. (CLO3) (10)

Question-05: (CLO3) (12)

In a horizontal pipe conveying water, two pressure gauges are installed at point A and B where the diameters are 20 cm and 10 cm respectively. A is 5m away from B. The gauges showed that the pressure at B is 0.981 N/cm² less than A. Neglecting losses, Solve for the flow rate. If the gauges at A and B are replaced by tubes of the same liquid and connected with the U-Tube Differential Manometer, calculate the difference of mercury level in the two limbs of the U-tube manometer.

$$\tan \theta = b \times h$$

$$A = b d h$$

$$V \cdot Q = \sqrt{2gh}$$

$$dQ = dA \cdot b d h \sqrt{2gh}$$

Good Luck

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Section # C

Differential Equations (BSI-231)

Department of Civil Engineering, UET Peshawar

Fall semester 2019, Final-term examination.

Time allowed 3.0 Hours

Total marks 100

Attempt all questions

Q1.

- a. Solve the following ODE and show the detail of your work

$$(D^3 - 4D)y = 10 \cos x + 5 \sin x, \quad (\text{CLO-2, Marks 12.5}).$$

- b. Find a power series solution in power of x of the following ODE

$$y'' + (1 + x^2)y = 0, \quad (\text{CLO-1, Marks 12.5}).$$

Q2.

For the following ODEs system

$$y_1' = y_2 + 6e^{2t}, \quad y_2' = y_1 - e^{2t}, \quad y_1(0) = 1, y_2(0) = 0.$$

- a. Find the complementary function y_c (CLO-1, Marks 12.5).
 b. Find the particular solution y_p and then write the general solution. (CLO-1, Marks 12.5).

Q3.

- a. Apply Laplace transform and to solve $y'' + 9y = 8 \sin t$, if $0 < t < \pi$, and 0 if $t > \pi$, $y(0) = 0$, $y'(0) = 4$, (CLO-2, Marks 12.5).
 b. Solve by Laplace transform $y'' + 4y = \delta(t - \pi)$, $y(0) = 0$, $y'(0) = 0$, (CLO-2 Marks 12.5).

Q4.

Solve the following problems,

a. $y' + y = -x/y$, (CLO-2, Marks 12.5).

b. $y' = 1/(6e^y - 2x)$, (CLO-2, Marks 12.5).

$$(s^2 + 1)(s^2 + 9) \\ s^4 + 9s^2 + s^2 + 9$$

Time Allowed: 3 hours

Total Marks: 100

Note: Attempt all questions. Programmable calculators are not allowed.

Question No. 01 (CLO-1)

[Marks: 5+5+5+5]

- Define Longitudinal and hoop stresses in thin walled pressure vessels. Support your answer with neat sketches
- Define Shear flow and Shear Center
- Discuss strain rosettes and its various types
- Differentiate among short, intermediate and long columns
- Define shape factor and discuss its significance.

Question No. 02 (CLO-2)

[Marks: 8+8]

- A cantilever hydraulic crane is required to lift a load of 50 kN as shown in figure 1. The single rope supporting the load passes over two pulleys and then vertically down the axis of the crane to the hydraulic apparatus. The section of the crane at CD is also shown. Apply theory of combined stresses for straight beams to determine the maximum compressive and tensile stresses in the section.
- If a vertical shear on the section shown in figure 2 is 4000 lb. Apply theory of mechanics of solids to calculate shear flow at points A and B.

Question No. 03 (CLO-3)

[Marks: 12+12]

- A compound thick cylinder is fabricated by shrinking and fitting a steel jacket of 300 mm diameter on to a steel tube of 100 mm inside diameter and 200 mm outside diameter. The contact pressure is 49.21 MPa. Determine the maximum tensile stress in the compound cylinder, if an internal pressure of 280 MPa is applied.
- A ring is made of round steel bar as shown in the figure 3 with a square 50x50 mm cross-section and subjected to a load $P = 10$ kN as shown. Using curved beam formulation determine the maximum tensile and compressive stress. Also plot the total stress across the cross section.

Question No. 04 (CLO-2, CLO-3)

[Marks: 10+10]

- A 6 m long steel column, one end fixed and other end free, is built up of two 40 x 10 cm standard channels placed 15 cm back to back with one 35 cm x 1 cm plate riveted to each flange, figure 4. It carries an axial load of 1000 kN on the x-x axis at an eccentricity e . Apply theory of elastic buckling to calculate the permissible eccentricity e , if the maximum permissible compressive stress is 120 MPa. $E = 200$ GPa. (Use secant formula). (CLO2)
- A hollow steel column 200 mm outside diameter and 150 mm inside diameter, 8 m long has both the ends fixed. It is subjected to an axial compressive load. Taking a factor of safety as 6, determine the safe Rankine's buckling load. Use $E = 200$ GPa, yield stress = 260 MPa. (CLO3)

Question No. 05 (CLO-2, CLO-3)

[Marks: 10+10]

- A beam with a cross-section as shown in figure 5, is made of elastic-perfectly plastic material. Apply the theory of plasticity to determine the shape factor, consider bending of beam is about x-axis. (CLO2)
- A steel beam of rectangular cross-section, 180 mm wide and 280 mm thick, is resting on an elastic foundation whose modulus is 6.5 MPa. The beam is subjected to two concentrated loads, each of magnitude, $P = 50$ kN, spaced at 500 mm, figure 6. Apply the theory of beams on elastic foundation to determine the deflection of the beam at point O, midway between the two loads. (CLO3)

$K = 6.5 \text{ MPa}$ $E = 6.5 \text{ MPa}$

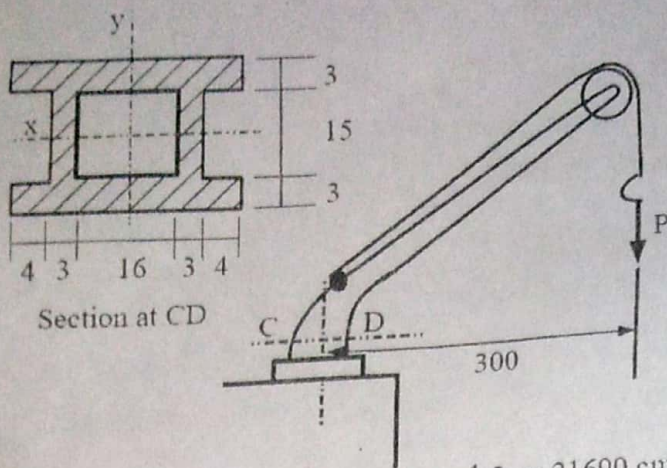


Figure 1: All dimensions are in cm

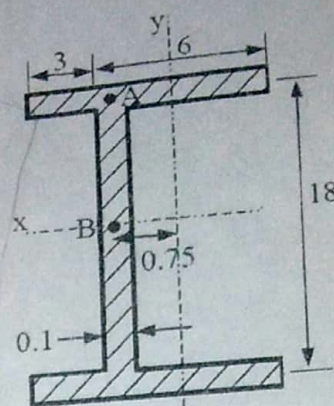


Figure 2: All dimensions are in inches

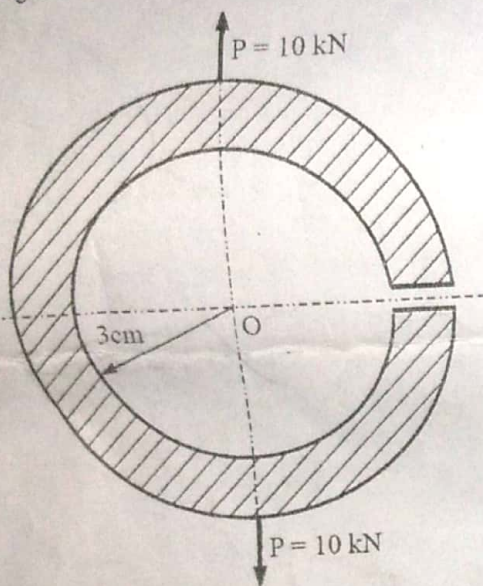


Figure 3:

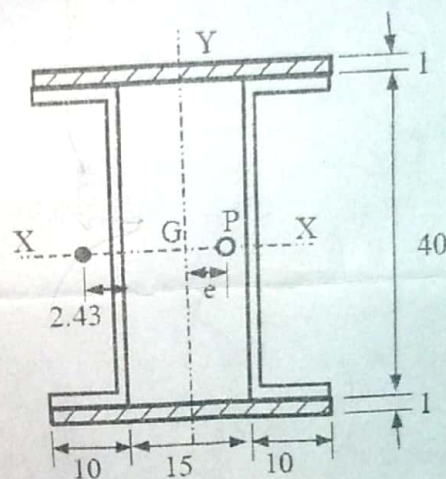


Figure 4: All dimensions are in cm

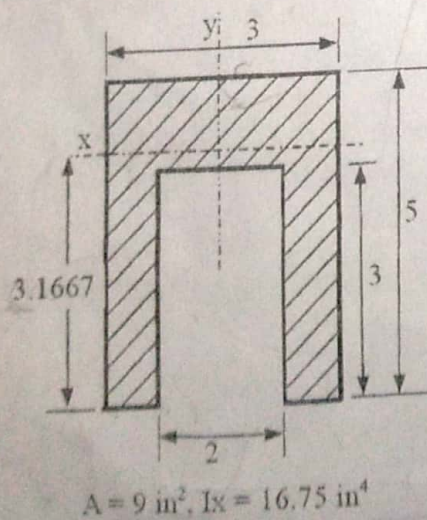


Figure 5: All dimensions are in inches

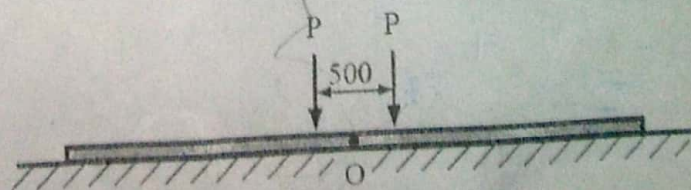


Figure 6: All dimensions are in mm

$$y = (3 \times 0.5) \times 2 + 3 \times 2 \times$$

$$y = \frac{3 \times 0.5 \times 2 \times 15 + 3 \times 2 \times 4}{2 \times 3 \times 0.5 + 3 \times 2}$$

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Department of Civil Engineering, UET Peshawar

3rd Semester, Mid Term Examination FALL 2019

CE-206: Fluid Mechanics-I

Time Allowed-90 minutes

Max Marks: 45

Note: Attempt all questions. Draw neat and properly labeled diagram where necessary.

Question-01: List the physical properties of fluid including Specific weight, Relative density, Specific mass, Viscosity, and Kinematic viscosity. Tabulate symbol, units in SI, CGS and English System and its calculating formula of each physical property. (CLO 1) (15)

Question-02:

Show that pressure at a point is the same in all directions.

(CLO 2) (10)

Question-03:

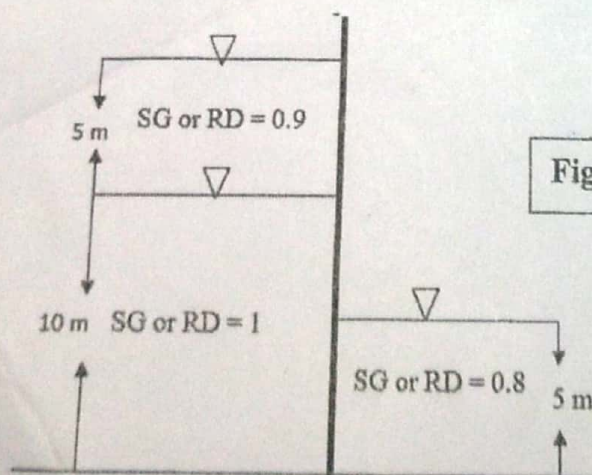
(CLO 3) (10)

The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 meter per sec requires a force of 98.1 N to maintain the speed. Apply Newton's law of viscosity to determine

- The dynamic viscosity of the oil in poise and
- The kinematic viscosity of the oil in stokes if the Specific gravity of oil is 0.95.

Question-04:

Draw pressure distribution diagram for the wall shown in figure-01. Solve for the resultant force acting per unit wall width and its center of pressure. (CLO3) (10)



University of Engineering & Technology, Peshawar

Department of Civil Engineering

3rd Semester Civil Engineering (Mid Exam Fall 2019)

CE-201: MECHANICS OF SOLIDS-II

Time Allowed: 1.5 hours

Total Marks: 100

Note: Attempt all questions. Programmable calculators are not allowed.

Question No. 01 (CLO-1)

[Marks: 7+7+7+7]

- (a) Differentiate between symmetrical and unsymmetrical bending.
- (b) Describe practical significance of kern of a section.
- (c) Differentiate among centroidal axis, neutral axis and principal axis of a section. Support your answer with neat sketch.
- (d) Discuss maximum shear stress theory.

Question No. 02 (CLO-2)

[Marks: 18+18]

- (a) A short prismatic member with a T-cross section is loaded with a compressive load of 100 kips at point A as shown in figure-1. Apply theory of mechanics of solids to determine stress at Point B. Also locate the neutral axis.

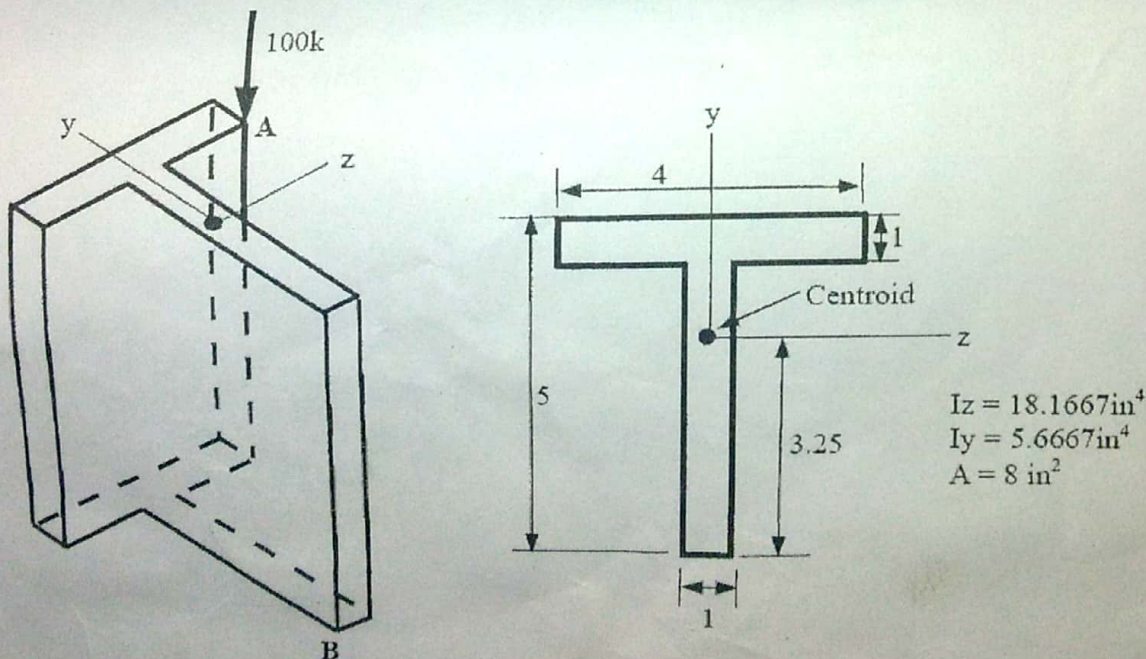
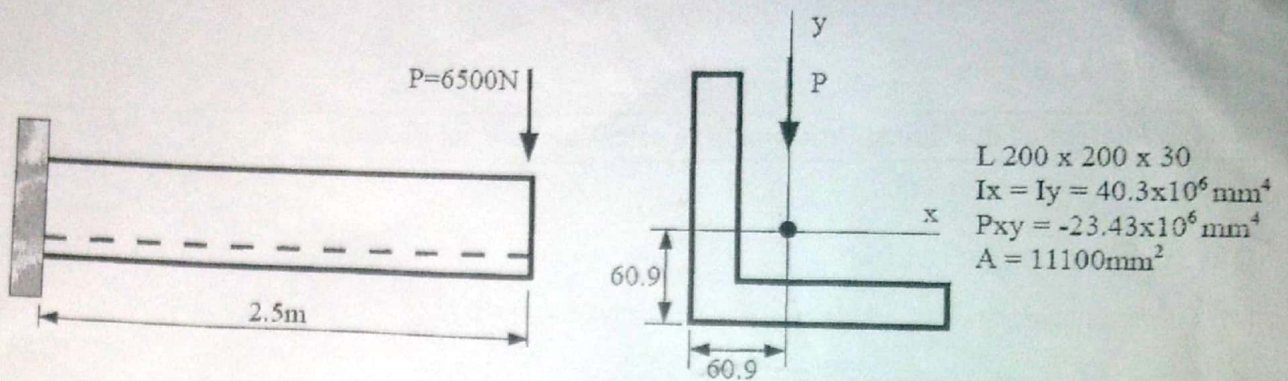


Figure 1, (Q. No. 2a)

- (b) An equal legged angle section is used as a cantilever beam loaded with a concentrated load at its free end as shown in figure-2. Apply the mechanics of unsymmetrical bending, locate neutral axis at the fixed end of beam.



Question No. 03 (CLO-3)

[Marks: 9+9+9+9]

A state of strains is defined by; $\epsilon_x = 200 \times 10^{-6}$, $\epsilon_y = -150 \times 10^{-6}$ and $\gamma_{xy} = 400 \times 10^{-6}$. Analyze the given state of strain and the corresponding state of stress using Mohr's Circle to determine:

- Principal strains and maximum in-plane shearing strains.
- Principal stress and maximum in-plane shearing stress.
- Principle plane and maximum in-plane shearing plane.
- Stress components on a plane whose normal is at a clock wise angle of 40° with x-axis.

$E = 200 \text{ GPa}$
 $\nu = 0.3$

University of Engineering and Technology, Peshawar Pakistan
Department of Civil Engineering
Mid Term Examination, 3rd Semester, Fall 2019
CE-216: Concrete Technology

Time Allowed: 1.5 Hours

Total Marks: 50

Note: Attempt all questions. No reference material is allowed. Use of mobile phone is strictly prohibited in examination hall.

Question No.1

(Marks: 15)

Define following terms

(CLO-1)

- (a) Plasticizer
- (b) Retarders
- (c) Pozzolanic action
- (d) Plasticizing action
- (e) Retarders

Setting time of Cement.

Question No.2

(Marks: 10)

List various types of cement, composition and uses.

(CLO 1)

Question No.3

(Marks: 15)

Explain factors affecting workability

(CLO 2)

Question No. 4

(Marks: 10)

Discuss different types of mineral admixtures.

(CLO 2)

University of Engineering and Technology, Peshawar Pakistan

Department of Civil Engineering

Mid Term Examination, Fall Semester 2019

Course code: CE-210: Introduction to Architecture and Urban Planning

Time Allowed: 1.5 Hours

Total Marks: 25

Note: Attempt all questions. No reference material is allowed. Use of mobile phone is strictly prohibited in examination hall. Assume suitable missing data, if any.

✓
Question No.1

(CLO 1)

Recall land use theories presented by Burgess and Hoyt. Draw neat sketches where applicable.

(04 Marks)

✓
Question No.2

(CLO 2)

Discuss SDG-6, SDG-9 and SDG-11 in context of urban planning.

(06 Marks)

✓
Question No.3

(CLO2)

Demonstrate your planning skills and knowledge by planning a housing scheme strictly following the planning process.

(10 Marks)

✓
Question No.4

(CLO 1)

State briefly five salient features of the layout of Islamabad city.

(05 Marks)

Time allowed 1.5 Hours

Attempt all questions

Q1.

b. Suppose the differential equation $M(x, y)dx + N(x, y)dy = 0$, be exact ODE. Derive the conditions of exactness for the given ODE. (Marks= 17, clo-2).

b. Test for exactness, If exact solve if not, use an integrating factor and then solve

$$(x^2 + y^2)dx - 2xy dy = 0. \quad (\text{Marks}= 16, \text{clo-1})$$

Q2.

a. Sketch the graph of some of the curves given by $y = \sqrt{x + c}$. Find the orthogonal trajectories (Marks= 16, clo-1)

b. Derive the ODE of damped mass-spring system of mass m , damping constant c and spring constant k given by $my'' + cy' + ky = 0$, Also discuss the motion, when $m = 10$, $c = 10$, $k = 90$. (Marks 17, clo-2)

Q3.

a. Find the solution of the ODE $xy'' + 2y' + xy = 0$, where one solution is given by $y_1 = (\cos x)/x$, (Marks= 17, clo-1).

b. Solve the problem $x^2y'' + xy' - y = 16x^3$, $y(1) = -1$, $y'(1) = 1$, use the method of undetermined coefficients or variation of parameters (Marks= 17, clo-1).

DEPARTMENT OF BASIC SCIENCES AND ISLAMIAT

University of Engineering and Technology, Peshawar

Mid Term Examination Fall 2019

3rd Semester CIVIL Engineering

Paper: Probability and Statistics

99

Time: 1.5 Hrs

Max. Marks: 20

Note: Attempt ALL questions.

1. a) IDENTIFY each of these statements as descriptive or inferential statistics. (CLO 1) (3+3)
- Expenditures for the cable industry were \$5.66 billion in 1996 (USA TODAY).
 - The median household income for people aged 25–34 is \$35,888 (USA TODAY).
 - Allergy therapy makes bees go away (Source: Prevention).
 - Drinking decaffeinated coffee can raise cholesterol levels by 7% (American Heart Association).
 - The national average annual medicine expenditure per person is \$1052 (The Greensburg Tribune Review).
 - Experts say that mortgage rates may soon hit bottom (USA TODAY).
- b) IDENTIFY each sample as random, systematic, stratified, or cluster.
- In a large school district, all teachers from two buildings are interviewed to determine whether they believe the students have less homework to do now than in previous years.
 - Every seventh customer entering a shopping mall is asked to select her or his favourite store.
 - Nursing supervisors are selected using random numbers to determine annual salaries.
 - Every 100th hamburger manufactured is checked to determine its fat content.
 - Mail carriers of a large city are divided into four groups according to gender (male or female) and according to whether they walk or ride on their routes. Then 10 are selected from each group and interviewed to determine whether they have been bitten by a dog in the last year.
 - University of Engineering and Technology is selected for implementation of OBE system.

2. a) From 28-day concrete cube tests made in England in 1990, the following results of maximum load at failure in kilonewtons and compressive strength in newtons per square millimetre were obtained: (CLO 2) (4+6)

Maximum load: 950, 972, 981, 895, 908, 995, 646, 987, 940, 937, 846, 947, 827, 961, 935, 956

Compressive strength: 42.25, 43.25, 43.50, 39.25, 40.25, 44.25, 28.75, 44.25, 41.75, 41.75, 38.00, 42.50, 36.75, 42.75, 42.00, 33.50

CALCULATE arithmetic means, geometric means and draw any conclusion.

b) This frequency distribution represents the commission earned (in dollars) by 100 salespeople employed at several branches of a large chain store.

Classes	150-158	159-167	168-176	177-185	186-194	195-203	204-212
Frequency	5	16	20	21	22	15	3

COMPUTE Median and Quartiles.

3. Consider data given in Question 2 part a.

DETERMINE whether or not there is greater variation among the maximum load than among the compressive strength. (CLO 3)(4)

Time Allowed: 03 Hours

Total Marks: 100

Note: Attempt all questions. No reference material is allowed. Use of mobile phone is strictly prohibited in examination hall. Assume suitable missing data, if any.

Question No.1

(CLO 1)

Define Architecture and name the key factors that influence any architecture. List the criteria on which you will evaluate an architecture of a city or buildings therein. (10 Marks)

Question No.2a.

(CLO 2)

Describe major climate change responses in your own words. (10 Marks)

Question No. 2b.

(CLO 2)

Discuss in detail the Urban planning in context of appropriate climate change response. (10 Marks)

Question No.3a.

(CLO 3)

Demonstrate your understanding regarding land use suitability analysis (LUSA) by applying step wise procedure on any assumed Khyber Pakhtunkhwa Housing Authority's housing scheme. (20 Marks)

Question No.3b.

(CLO 3)

Show what are the two important results you can derive from the LUSA carried out in Question 3a. (15 Marks)

Question No.4a.

(CLO 4)

Compare Architecture of Islamabad city with Greek architectural features. (15 Marks)

Question No.4b.

(CLO 4)

Analyze current design and constructions and outline various features you deem fit to incorporate green building construction techniques. (20 Marks)

University of Engineering and Technology, Peshawar Pakistan
Department of Civil Engineering
Final Term Examination, 3rd Semester, Fall 2019
CE-216 : Concrete Technology

Time Allowed: 3 Hours

Total Marks: 100

Note: Attempt all questions. No reference material is allowed. Use of mobile phone is strictly prohibited in examination hall.

Question No.1

(Marks: 20)

(CLO-1)

Define following terms

- (a) Bleeding
- (b) Segregation
- (c) Dry shrinkage
- (d) Creep
- (e) False setting
- (f) Flash setting
- (g) Curing of concrete

Question No.2

(Marks: 10+10)

- (a) *List* various types of concrete, composition and uses.
- (b) *List* various types of cracks in concrete and its repairing techniques (CLO1)

Question No.3

(Marks: 15+15)

- (a) *Explain* factors affecting durability of concrete.
- (b) *Explain* mixing and transportation of concrete (CLO 2)

Question No. 4

(Marks: 15+15)

- (a) *Discuss* cold weather concrete and hot weather concrete.
- (b) *Discuss* the effect of aggregate size and fineness modulus on mix design of concrete (CLO 2)