

Khulna University, Khulna

Urban and Rural Planning Discipline
1st Year, Term-II Examination, Session 2024-2025

Course No. 0314 04 Soc 1175

Full Title of Course: Sociology for Planners

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

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|----|-----|---|----|
| 1. | (a) | What do you understand by sociology? [L1, CLO1] | 03 |
| | (b) | Discuss critically the functionalist perspective of sociology. [L5, CLO1] | 07 |
| 2. | (a) | Analyse critically the social dynamics of marriage in global perspectives. [L4, CLO3] | 10 |
| 3. | (a) | Distinguish between norms and values. [L4, CLO5] | 04 |
| | (b) | Illustrate the 'Cultural Lag' theory. [L2, CLO1] | 06 |
| 4. | (a) | What do you mean by social structure? [L1, CLO1] | 03 |
| | (b) | Briefly narrate about the sociological significance of social structure. [L3, CLO3] | 07 |

Section B

There are **four** questions in this section. Answer any **three** questions.

- | | | | |
|----|-----|---|----|
| 1. | (a) | What is social stratification? [L1, CLO1] | 03 |
| | (b) | Discuss the functions of social stratification in the society. [L3, CLO3] | 07 |
| 2. | (a) | What is functionalism? [L1, CLO3] | 03 |
| | (b) | Illustrate functionalist perspectives of education in society. [L2, CLO4] | 07 |
| 3. | (a) | What is social movement? [L1, CLO6] | 03 |
| | (b) | Analyze the types and tactics of social movement. [L4, CLO6] | 07 |
| 4. | (a) | List different forces of social changes. [L1, CLO1] | 04 |
| | (b) | How does technology impact on social change? Explain with examples in the context of Bangladesh. [L4, CLO5] | 06 |

Khulna University, Khulna

Urban and Rural Planning Discipline
1st Year, Term-II Examination, Session 2024-2025
Course No. 0731 04 URP 1121

Full Title of Course: History of Human Settlements

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

- List three Neolithic innovations other than farming. [L1, CLO1] 03
 - Discuss briefly how farming changed human settlement patterns. [L2, CLO1] 03
 - Explain with examples why some early villages grew into cities. [L3, CLO1] 04
- State four factors, with examples, that supported the birth of Ancient Egyptian cities. [L1, CLO2] 04
 - Identify four key urban features of Kahun. [L2, CLO2] 04
 - Suggest two lessons from Ancient Egyptian cities for modern urban planning. [L3, CLO2] 02
- Draw a simple plan of Mohenjo-daro and identify key urban features. [L1, CLO2] 04
 - Outline planning features of ancient Harappa. [L2, CLO2] 03
 - Use the example of the Great Bath to describe the role of public space in Mohenjo-daro. [L3, CLO2] 03
- Explain cardo and decumanus in simple words. [L1, CLO2] 03
 - Compare the forum and the amphitheatre in terms of their public functions. [L2, CLO2] 03
 - Draw a simple plan of Pompeii and label its key urban features. [L3, CLO2] 04

Section B

There are **four** questions in this section. Answer any **three** questions.

- Explain why it led to the "ruralization" of the European population. [CLO1, L1] 05
 - Describe the geographical and strategic significance of Pundranagara (Mahasthangarh) as a major urban center in ancient Bengal. [CLO1, L1] 05
- Discuss the role of the Guild system in shaping the economic life and the street-level morphology of Medieval towns. [CLO2, L2] 05
 - Examine how the political history of the Sultani period influenced the settlement pattern of Khalifatabad (Bagerhat). [CLO 2, L4] 05
- Critically assess the City Beautiful Movement from an urban planning perspective. [L5, CLO3] 03
 - Evaluate the shift in early city planning from "make no small plans" to "small is better" planning. [L5, CLO3] 07
- Explain how the presence of the Buriganga River acted as a primary planning determinant for the historical growth of Dhaka. [CLO 3, L2] 05
 - Relate the concept of the "Real City" to modern urban planning challenges regarding sprawl and infrastructure. [CLO 3, L4] 05

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Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2024-2025

Course No. 0311 04 Econ 1157

Full Title of Course: Principles of Economics

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

1. (a) What are the core principles of economics? [L1, CLO1] 02
(b) Define the Scarcity Principle and the Cost-Benefit Principle. Explain how an urban resident evaluates their Opportunity Cost when deciding whether to live in a dense downtown apartment or a spacious rural homestead. [L1, CLO1] 03
(c) A municipal commuter is deciding whether to travel from a rural satellite town to the city center by public express bus or by private car. The bus ticket costs 50 Tk per day, and the commute takes 1 hour. Driving costs 250 Tk per day in fuel and tolls, but cuts the commute down to 30 minutes. If the commuter values their time at 300 Tk per hour, calculate the economic surplus of the driving option compared to the bus option. Which mode represents a rational resource optimization for this individual? [L3, CLO1] 05
2. (a) State the Principle of Comparative Advantage. Explain how an agricultural rural district and an industrialized urban center can both maximize resource optimization and benefit from mutual trade, even if the urban center has an absolute advantage in producing all economic goods. [L1, CLO1] 04
(b) Consider a regional economy consisting of two production blocks, an Urban Tech Zone and a Rural Cooperative, that produce two goods: Software Packages (Y) and Organic Crop Bundles (X). Their maximum hourly output rates are given below:
Urban Tech Zone: 6 Software Packages OR 18 Crop Bundles per hour.
Rural Cooperative: 4 Software Packages OR 20 Crop Bundles per hour.
Calculate the opportunity cost of producing one software package for both blocks, and determine which region holds the comparative advantage in software and which holds it in agriculture. [L3, CLO1] 06
3. (a) Define the Price Elasticity of Demand. [L1, CLO1] 02
(b) If a city's public water utility increases municipal water tariffs by 10% and notes only a 4% decline in aggregate household consumption, calculate the elasticity coefficient. Is this market response elastic or inelastic, and how does this affect utility revenues? [L2, CLO3] 03
(c) Suppose a city public transit currently charges a flat fare of 40 Tk and records 10,000 riders per day. To fund urban expansion, the transit authority raises the fare to 50 Tk, causing daily ridership to drop to 8,000 riders. Calculate the price elasticity of demand using the midpoint formula. [L3, CLO3] 05
4. (a) The market for essential utility piping in an expanding municipal zone is represented by the following linear equations, where P represents the price per meter in hundreds of Tk, and Q represents the quantity in thousands of meters:
Market Demand Equation: $Q = 120 - 4P$
Market Supply Equation: $Q = 20 + 6P$
Calculate the mathematical equilibrium price (P^*) and equilibrium quantity (Q^*) for this utility market. Show all your algebraic steps clearly. [L3, CLO2] 04
(b) Draw a standard Supply and Demand diagram based on the equations in (a). Plot and label the Demand curve, the Supply curve, the equilibrium point, and indicate the exact price intercepts where the curves cross the axes. Then, explain how the market's "Invisible Hand" automatically resolves a temporary price imbalance without government intervention. [L4, CLO2] 06

Section B

There are **four** questions in this section. Answer any **three** questions.

1. (a) Define Gross Domestic Product (GDP) and Gross National Product (GNP). [CLO5, L1] 02
 (b) Consider a developing national economy that tracks output across three vital domestic sectors: Agriculture, Manufacturing, and Urban Construction. Production and price data for two consecutive fiscal years are recorded below: 05

Economic Sector	Year 1 Quantity	Year 1 Price	Year 2 Quantity	Year 2 Price
Agriculture	500 metric tons	200 Tk	600 metric tons	250 Tk
Manufacturing	300 crates	500 Tk	250 crates	600 Tk
Urban Construction	10 project sites	5,000 Tk	12 project sites	5,500 Tk

Using Year 1 as the base year, calculate Nominal GDP for Year 2 and Real GDP for Year 2. What is the real economic growth rate of this nation? [L3, CLO5]

 (c) Why do economic development planners rely on Real GDP per capita rather than Nominal GDP to gauge improvements in a nation's material welfare? [L2, CLO5] 03
2. (a) Differentiate between Microeconomics and Macroeconomics. 02
 (b) What are the macroeconomic variables that are used to understand national economy? 03
 (c) Describe the process of measuring the nation's output which is termed as Gross Domestic Production. 05
3. (a) Define Price Level and the Consumer Price Index (CPI) conceptually. [L1, CLO6] 02
 (b) A standard lower-income family consumption basket consists of 20 kilograms of rice and 10 liters of cooking oil. The regional market prices across three years are recorded as follows: 05

Year 1: Rice = 60 Tk per kg, Oil = 160 Tk per liter
 Year 2: Rice = 70 Tk per kg, Oil = 180 Tk per liter
 Year 3: Rice = 80 Tk per kg, Oil = 200 Tk per liter

Using Year 1 as the base year (CPI = 100), calculate the CPI for Year 2 and Year 3. Using these indices, compute the annual inflation rate between Year 2 and Year 3. [L3, CLO6]

 (c) Suppose a rural migrant worker's nominal wage in the city was 400 Tk per day in Year 1 and rose to 550 Tk per day by Year 3. Using your calculated CPI values from (b), calculate the worker's real wage in Year 3 (expressed in Year 1 Taka). Did this worker experience a genuine improvement in his/her urban purchasing power? [L4, CLO6] 03
4. (a) An official census survey collects the following labor force data for a newly designated metropolitan development zone: 03

Total Civilian Population (Aged 16+) = 50,000
 Number of Economically Employed Workers = 28,000
 Number of Unemployed Workers actively seeking work = 2,000

Calculate the total size of the Labor Force, the Unemployment Rate, and the Labor Force Participation Rate for this metropolitan zone. [L3, CLO5]

 (b) Differentiate between structural unemployment and frictional unemployment. [L1, CLO5] 02
 (c) Explain how rapid rural-to-urban migration can temporarily worsen a nation's structural unemployment problems. [L3, CLO5] 02
 (d) A core goal of national development public policy is boosting long-run productivity. Sketch a simple economic growth trend line diagram plotting National Real GDP over time, and visually illustrate how public investments in nationwide technical education alter the long-run slope of this economic trajectory. [L4, CLO5] 03

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Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2025-2026

Course No. 0541 04 Math 1173

Full Title of Course: Mathematics I

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

- (a) If $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents two straight lines equidistant from the origin, show that $f^4 - g^4 = c(bf^2 - ag^2)$. [L1, CLO1] 05
 - (b) Show that the four straight lines given by $12x^2 + 7xy - 12y^2 = 0$ and $12x^2 + 7xy - 12y^2 - x + 7y - 1 = 0$ belong to the sides of a square. [L2, CLO2] 05
- (a) Find the equation of bisector of the angle between the straight lines represented by the equation $12x^2 - 10y^2 + 7xy + 13x + 45y - 35 = 0$. [L5, CLO3] 05
 - (b) Find nature and center of the conic $2x^2 + 3xy - 2y^2 - 5x + 5y = 0$. [L4, CLO2] 05
- (a) Reduce the equation $9x^2 + 24xy + 16y^2 - 2x + 14y + 1 = 0$ to the standard form and find its any three properties. [L4, CLO3] 06
 - (b) Find the equation of the parabola whose focus is the point (1, -2) and whose directrix is the line $x + 2y - 3 = 0$. [L5, CLO4] 04
- (a) If l_1 and l_2 are the length of the segments of any focal chord of the parabola $y^2 = 4ax$, then prove that $\frac{1}{l_1} + \frac{1}{l_2} = \frac{1}{a}$. [L6, CLO3] 05
 - (b) Find the equation of a circle which passes through the points (3, 5) and (5, -3) and has its center on the line $2x + y = 27$. [L5, CLO1] 05

Section B

There are **four** questions in this section. Answer any **three** questions.

- (a) Draw the graph of the following functions and find the domain and range. [L2, CLO2] 05
 - i) $f(x) = |x + 1| + |x - 2|$
$$f(x) = \begin{cases} -x & \text{if } x \leq 0 \\ x & \text{if } 0 < x < 1 \\ 2 - x & \text{if } x \geq 1 \end{cases}$$
Discuss the continuity and differentiability of the function [L3, CLO2]
 - (b) $f(x) = \begin{cases} 2x - 4 & \text{when } x \leq 3 \\ 2 & \text{when } 1 \leq x < 3 \\ 4 - 2x & \text{when } x < 1 \end{cases}$ at $x = 3$ 05
- (a) Show that $\sqrt{3} \sin x + 3 \cos x$ has maxima at $x = \frac{\pi}{6}$. [L5, CLO2] 05
 - (b) If $x + y = 2$ then find the maxima and minima of $u = \frac{4}{x} + \frac{36}{y}$. [L3, CLO4] 05
- (a) Integrate $\int \frac{2x+7}{\sqrt{x^2-2x+8}} dx$. [L4, CLO4] 02
 - (b) Integrate $\int \frac{dx}{(x^2+1)\sqrt{1-x^2}}$. [L4, CLO4] 04
 - (c) Evaluate $\int_0^{\frac{\pi}{4}} \ln \sin 2\theta d\theta$. [L4, CLO4] 04
- (a) Find a reduction formula for $\int \sec^n x dx$ and hence evaluate $\int \sec^5 x dx$. [L3, CLO3] 05
 - (b) Find the common area bounded by the parabolas $y^2 = 12x$ and $x^2 = 12y$. [L6, CLO3] 05

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Urban and Rural Planning Discipline

1st Year, Term-I Examination, Session 2024-2025

Course No. 0731 04 URP 1131

Full Title of Course: Geography for Planners

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

- Define geography. [L1, CLO1] 02
 - Why studying geography is important for Urban and Rural Planning? [L3, CLO1] 04
 - Discuss the major phenomena caused by the interactions of the Earth, Moon, and Sun. [L2, CLO1] 04
- What are the main elements of a map? [L1, CLO2] 03
 - Compare and contrast the uses of topographic and thematic maps for urban planning [L4, CLO2] 04
 - Illustrate your idea about map misuse. [L2, CLO2] 03
- Define different types of rocks with examples. [L1, CLO1] 06
 - Judge whether igneous rocks are more durable than sedimentary rocks for construction. [L5, CLO1] 04
- Write short notes on the following (any four) 2.5×4 = 10
 - Coriolis Force [L2, CLO2]
 - Precipitation [L2, CLO2]
 - Lapse Rate [L2, CLO2]
 - Humid Continental Climates [L2, CLO2]
 - Arctic Climates [L2, CLO2]

Section B

There are **four** questions in this section. Answer any **three** questions.

- Define diffusion in geography. [L1, CLO3] 02
 - Compare the impacts of contagious vs. hierarchical diffusion on cultural change. [L4, CLO3] 04
 - Assess which type of diffusion is more influential in globalization. [L5, CLO4] 04
- What is a mental map? Explain how it can influence people's perception of distance and accessibility within a city. [L2, CLO3] 02
 - Differentiate between acculturation and assimilation, using examples from Bangladeshi cultural contexts. [L3, CLO4] 04
 - Distinguish between push factors and pull factors of migration, providing one example of each from Bangladesh. [L4, CLO4] 04
- Define Crude Death Rate. [L1, CLO3] 02
 - Analyze how crude death rate is influenced by age structure and healthcare facilities. [L4, CLO3] 04
 - Assess the usefulness of population pyramids in predicting future economic growth. [L5, CLO3] 04
- Write short notes on the following (any four) 2.5×4 = 10
 - Primate City [L2, CLO3]
 - Squatter Settlements [L2, CLO3]
 - Concentric Zone Model [L2, CLO3]
 - Sector Model [L2, CLO3]
 - Multiple-Nuclei Model [L2, CLO3]

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Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2024-2025

Course No. 0232 04 Eng 1171

Full Title of Course: Communicative English

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

1. Read the passage carefully and answer the following questions: [L2, CLO2]

To fulfil the demand of the time, it is crucial to utilise newly introduced teaching and testing materials. Technology assisted language testing (TALT) is very convenient for teachers and learners to meet the challenges of this century. With the advent of science and technology, different testing devices have been introduced; especially digital technology supportive test has materialised a tremendous change in case of language teaching and testing. The technology-based assessment incorporates innovative methods and techniques to measure language proficiency improvement. Computer-based listening and speaking tests is becoming more popular day by day. It saves time and money and the test score is published immediately after finishing the test. This is an aspect of technology in assessment that is diminishing with time as greater proportion of the test taking population is becoming adept at using computers, to make digital Bangladesh, it is very crucial to ensure digitalized testing system as it assists and enhances language learning. Most of the developed countries are using the digital technology for testing. But Bangladesh is, so far, lagging behind in using it. It is now unthinkable that there is no use of technology in any language class. The computer assisted language test (CALT) is uniquely tailored to each individual. In addition, CALT is automatically determined when the examinees' ability level has been determined. The result is a test that is more precious yet generally much shorter than conventional paper and pencil tests. To use computer in language test is a part and parcel for test givers and test takers. As it is the demand of the time, we could fill the utility of it in our teaching and testing process.

- | | |
|--|----|
| (a) What is digital technology? | 02 |
| (b) Why is Bangladesh lagging behind to apply Computer Assisted Language Test? | 02 |
| (c) How can we introduce listening and speaking test? | 02 |
| (d) How does CALT save time and money for testing? | 02 |
| (e) What is the relationship between teaching and testing? | 02 |

2. (a) Transform the following sentences as directed: [L2, CLO1] 05

- As the chief guest entered into the room, the audience welcome him warmly. (Simple)
- She is working hard to reach into his goal. (Complex)
- Without isolating good and bad, you cannot give your comment. (Compound)
- Everybody loves the beauty of blossomed flowers. (Negative interrogative)
- She practices speaking in English in every morning. (Tag question)

- (b) Make sentences using the following structure: [L2, CLO1] 05
- Subject+ transitive verb+ object+ noun compliment.
 - Subject + transitive verb+ indirect object+ direct object+ compliment.
 - Present Participle+ adverbial phrase+ main clause.
 - Why + auxiliary verb+ subject+ main verb+ adverbial phrase?
 - How+ adjective+ subject+ verb!

3. Make single sentence using the sentences: [L2, CLO2] 2.5×4 = 10

- The king made a decision. His advisors disagreed. He ignored their advice their advice. The plan failed. He accepted responsibility.
- Socrates was very famous in his period. He was different from his contemporary people. They did not understand his philosophy. They arranged his execution.
- The company expanded globally. It faced cultural challenges. It adapted its strategy. It built local partnerships. It achieved success.
- Smart phone has made our lives both easy and complex. We can get thousands of information using this phone. It is also dangerous for young generation. It has snatched away our mental peace.

- | | | | |
|----|-----|--|----|
| 4. | (a) | Make antonyms of the following words and make sentences with them:
i. Fantastic ii. Dynamic iii. Sensitive iv. Fragile v. Guide [L2, CLO1] | 05 |
| | (b) | Choose the correct answer in parenthesis and write the correct sentence.
i. The furniture in the room (is, are) quite expensive.
ii. None of the food (was, were) wasted during the party.
iii. bread and butter (is, area) my favourite breakfast.
iv. The number of people attending in the seminar (is, are) increasing.
v. Either my sister or mother (is, are) going o the market. | 05 |

Section B

There are **four** questions in this section. Answer any **three** questions.

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|----|-----|--|----|
| 1. | (a) | Define Gesture and Posture. [L3, CLO4] | 02 |
| | (b) | Explain the importance of eye contact and body language during presentation. [L3, CLO4] | 08 |
| 2. | (a) | Discuss the Importance of fluency for artistic communication. [L4, CLO4] | 05 |
| | (b) | Write short note on the following: [L3, CLO4]
Speaker-listener rapport | 05 |
| 3. | | Write an application to the discipline head for seeking permission to form a language club. [L2, CLO3] | 10 |
| 4. | | Write a paragraph on the “Development of Bangladesh”. [L2, CLO3] | 10 |

Khulna University, Khulna

Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2025-2026

Course No. 0542 04 Stat 1277

Full Title of Course: Statistics for Planners

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

- Discuss the scopes of statistics for urban planners. (L2, CLO2) 04
 - Differentiate between descriptive and inferential statistics. (L3, CLO2) 03
 - Differentiate between qualitative and quantitative variables with examples from each. [L2, CLO1] 03
- Explain the steps needed to be followed for designing a good questionnaire. (L3, CLO1) 04
 - What types of graphs and charts are used to show data distributions? Explain separately how we present discrete data and continuous data. [L2, CLO1] 06
- What do you mean by outlier and trimmed mean in a statistical analysis? [L1, CLO3] 02
 - Identify an appropriate measure of central tendency for different scales of measurement. Explain your answer with an imaginary dataset. [L4, CLO3] 03
 - Calculate arithmetic mean and weighted mean from the below mentioned mean fitness score and sample size for lean, overweight, and obese participants. [L3, CLO3] 04

Sample	M	n
Lean	46	12
Overweight	58	14
Obese	73	30

- The mean daily water consumption of 5 households is 100 litres. If one household consuming 120 litres leaves the sample and is replaced by another consuming 80 litres, what happens to the mean? [L3, CLO3] 01
- Draw your concept on the degrees of freedom. (L1, CLO3) 02
 - Suppose that at least 68% of scores in a normal distribution fall between a score of 7 to 10. Using the empirical rule, what is the approximate mean and standard deviation of these data? (L3, CLO3) 02
 - Based on the frequency distribution given below, compute the following statistical measures to characterize the distribution. (L3, CLO3) 06
 - Coefficient of variation
 - Inter-quartile range and
 - Modal value

Age group	No. of beneficiaries
5-10	18
10-15	30
15-20	46
20-25	28
25-30	20
30-35	12
35-40	6

Section B

There are **four** questions in this section. Answer any **three** questions.

1. (a) What is standard normal distribution? [L1, CLO4] 02
- (b) "The shape and position of a normal distribution curve depend on two parameters, the *mean* and the *standard deviation*"—explain with illustrations. [L2, CLO4] 04
- (c) Each month, an American household generates an average of 28 pounds of newspaper for garbage or recycling. Assume the standard deviation is 2 pounds. If a household is selected at random, find the probability of its generating 04
 - i. Between 27 and 31 pounds per month
 - ii. More than 30.2 pounds per month

Assume the variable is approximately normally distributed. [L3, CLO4]

2. (a) Describe stratified sampling technique. [L2, CLO7] 02
- (b) "Correlation does not imply causation" – do you think so? Defend your position. [L2, CLO6] 03
- (c) Compute and explain the value of the correlation coefficient (r) for the data obtained in the study of the number of absences and the final grade of the seven students in the statistics class given in the following table. [L4, CLO6] 05

Student	Number of Absences (x)	Final Grade (y)
A	6	82
B	2	86
C	15	43
D	9	74
E	12	58
F	5	90
G	8	78

3. (a) What is the law of large numbers? [L1, CLO4] 02
 - (b) A coin is flipped and a die is rolled. Find the probability of getting a head on the coin and a four on the die. [L3, CLO4] 03
 - (c) In a hospital unit there are 8 nurses and 5 physicians; 7 nurses and 3 physicians are females. If a staff person is selected, find the probability that the subject is a nurse or a male. [L3, CLO4] 05
4. Write short notes on the following (any four) 2.5×4 = 10
 - (a) R^2 [L2, CLO6]
 - (b) Level of significance [L2, CLO6]
 - (c) Poisson distribution [L2, CLO4]
 - (d) Confounding variable [L2, CLO6]
 - (e) Line of best fit [L2, CLO6]

Khulna University, Khulna

Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2025-2026

Course No. 0732 04 CE 1281

Full Title of Course: Engineering Survey

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are four questions in this section. Answer any three questions.

- Engineering survey is important for the planners. Why? Explain. [L2, CLO3] 03
 - How will you overcome a canal during chain survey? Show with sketch. [L1, CLO2] 03
 - The true distance from Academic Building-1 to Khanjahan Ali Hall is 1500 ft. The distance was measured by an engineering chain and found to 1505 ft. Calculate the correct length of the chain and how much correction need in the chain. [L2, CLO3] 04
- Define closed traverse and open traverse. Where will you use the closed and open traverse? [L1, CLO2] 03
 - Forward Bearing of line AB, BC, CD and DE are 40°, 145°, 215° and 310° respectively. Calculate the Reduced Bearing (RB) of the lines. [L2, CLO3] 03
 - Calculate the angle $\angle A$, $\angle B$, $\angle C$ and $\angle D$ using the following data: [L2, CLO3] 04

Line	FB	BB
AB	48°	232°
BC	147°	323°
CD	162°	300°
DA	290°	110°
- What are the instruments used in plane table survey? Illustrate the advantages of plane table survey. [L1, CLO2] 03
 - How will you orient a plane table by using a trough compass? [L1, CLO2] 03
 - Briefly discuss the radiation method of plane table surveying with neat sketch. [L2, CLO3] 04
- Define Geoid. RL of point A is 35 ft. and RL of point B is 55 ft. Which point is in lower position? [L2, CLO1] 03
 - A man on the deck of a ship observes a luminous object, which is 50 m above sea level. If the man's eye-level is 10 m above sea level, find the distance between him and the object. [L2, CLO3] 04
 - Show that curvature correction $C_c = D^2 / 2R$. [L2, CLO3] 03

Section B

There are four questions in this section. Answer any three questions.

- The slope distance (S) and slope angle (α), or the zenith angle ($90^\circ - \alpha$), are given. A slope distance between two points is 78.22 ft and the slope angle is $+1^\circ 20'$ (the equivalent zenith angle is $88^\circ 40'$). What is the corresponding horizontal distance? [L2, CLO3] 05
 - As an urban planner you are about to construct a road between contour 150m and 250m. There are stock piles beside the contours with elevation 10m and 15m respectively. Calculate the volume of earth work needed using appropriate formula. [L4, CLO3] 05

2. (a) Evaluate how has the integration of EDM technology into "Total Station" instruments improved the comparative efficiency and accuracy of modern engineering surveys over traditional chaining methods. [L5, CLO4] 05
- (b) Compare the traditional method of mapping from aerial photographs with modern LiDAR technology in generating high-resolution Digital Elevation Models (DEM) in densely forested areas. [L4, CLO4] 05
3. As an urban planner, you are tasked with measuring a highly precise baseline across the Rupsha River for a new bridge project. You have access to two different classes of EDM instruments: 10

Instrument A (Microwave EDM): Operates at a modulation frequency of 30 GHz (30×10^9 Hz).

Instrument B (Infrared EDM): Operates at a modulation frequency of 15 MHz (15×10^6 Hz).

 - i) Calculate the signal wavelength for both Instrument A and Instrument B.
 - ii) Based on your calculated wavelengths and the physical properties of these waves, analyze which instrument is more appropriate for this specific river-crossing survey if the area is prone to heavy morning fog and rain. Justify your technological choice. [L4, CLO4]
4. (a) Explain the characteristics of contour. [L2, CLO1] 02
- (b) Illustrate how can the contour lines help in planning the location of a dam? [L3, CLO1] 03
- (c) Examine the process of detection and correction of angular misclosure in a traverse computation? [L4, CLO1] 05

Khulna University, Khulna

Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2025-2026

Course No. 0541 04 Math 1273

Full Title of Course: Mathematics II

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

- (a) Define order and degree of a differential equation. [L1, CLO1] 02
 - (b) Determine the order, degree and the linearity of the differential equations: [L5, CLO2] 04
 - (i) $y = x \frac{dy}{dx} + a \sqrt{18 + \left(\frac{dy}{dx}\right)^5}$ and (ii) $k \frac{d^2y}{dx^2} = 10[k + \left(\frac{dy}{dx}\right)^2]^{\frac{5}{2}}$
 - (c) Find a differential equation (D.E.) from the relation $y = c_1 e^{2x} + c_2 e^{-x} + x^2$. Also indicate the order, degree, linearity and homogeneity of the obtained D.E. [L2, CLO1] 04
- Identify and solve the following:
 - (i) $(e^x + 1)ydy = (y + 1)e^x dx$ [L1, CLO3] 02
 - (ii) $(x^3 + y^2 + 2) dx + xydy = 0$ [L3, CLO4] 04
 - (iii) $\frac{dy}{dx} + xy = xy^2$ [L3, CLO4] 04
- Solve the following differential equations, where $D = \frac{d}{dx}$.
 - (i) $y'''' - 5y'' + 4y = 0$ [L3, CLO3] 02
 - (ii) $(D^2 + 4D + 4)y = e^{-2x}x^2$ [L4, CLO3] 04
 - (iii) $(D^2 + 3D - 4)y = 2e^x + \cos 3x$ [L4, CLO3] 04
- (a) What is linear differential equation with constant coefficients? Solve $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} - 5y = xe^{-x}$ given that $y=0$ and $\frac{dy}{dx} = 0$ when $x=0$. [L5, CLO2] 04
 - (b) Evaluate $y'' - 3y' - 4y = 16x - 12e^{2x}$ by using the method of undetermined coefficient. [L5, CLO1] 06

Section B

There are **four** questions in this section. Answer any **three** questions.

1. (a) Define matrix, symmetric, skew symmetric matrix, Idempotent matrix and Unitary Matrix with examples. [L1, CLO3] 05
(b) Find the values of a, b, c if matrix A given by $A = \frac{1}{2} \begin{bmatrix} a & 2 & 2 \\ 2 & 1 & b \\ 2 & c & 1 \end{bmatrix}$ obeys the law $AA^T = I$, where A^T is the transpose of A and I is the unit matrix of order 3. [L2, CLO3] 05
2. (a) Define inverse matrix. Find the inverse matrix of $\begin{bmatrix} 1 & 0 & -4 \\ -2 & 2 & 5 \\ 3 & -1 & 2 \end{bmatrix}$ by using adjoint matrix. [L1, CLO2] 05
(b) Determine rank of a matrix. Reduce the following matrix $A = \begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ to echelon form and hence find the rank of the matrix. [L5, CLO2] 05
3. (a) Show that the following vectors $3\mathbf{i} - 4\mathbf{j} + 2\mathbf{k}$, $5\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$ and $7\mathbf{i} - 2\mathbf{j} + 5\mathbf{k}$ are linearly independent. [L2, CLO4] 05
(b) If $\vec{A} = 2\mathbf{i} + 6\mathbf{j} - 3\mathbf{k}$ and $\vec{B} = \mathbf{i} + 4\mathbf{j} + 8\mathbf{k}$ then find the projection of (i) $\vec{A}$ along $\vec{B}$ and (ii) $\vec{B}$ along $\vec{A}$. [L1, CLO4] 03
(c) Find the sine of the angle between the vectors $\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$ and $3\mathbf{i} + 4\mathbf{j} + 2\mathbf{k}$. [L1, CLO4] 02
4. (a) If $\vec{A} = x^2y\mathbf{i} - 2xz\mathbf{j} + 2yz\mathbf{k}$, then find curl $\vec{A}$. [L2, CLO4] 04
(b) Find the directional derivative of $\phi = x^2yz + 4xz^2$ at the point (1,-2,-1) in the direction $2\mathbf{i} - \mathbf{j} - 2\mathbf{k}$. [L2, CLO4] 03
(c) Find the angles which the vector $\mathbf{A} = 3\mathbf{i} - 6\mathbf{j} + 2\mathbf{k}$ makes with the coordinate axes. [L2, CLO4] 03

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Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2024-2025

Course No. 0732 04 CE 1283

Full Title of Course: Introduction to Construction Engineering and Management

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

- Briefly explain the ductility and brittleness properties of materials. [L2, CLO1] 04
 - How would you identify good-quality bricks at the site? [L3, CLO1] 03
 - Illustrate the stress-strain curve for ductile, brittle, and plastic materials and label key regions. [L6, CLO2] 03
- Define Segregation of concrete. [L1, CLO1] 01
 - Illustrate slump test for concrete with sketch. [L2, CLO1] 03
 - Calculate the quantity of cement, sand, and stone chips required for a concrete column with the following specifications: [L6, CLO6] 06
Height: 10 feet
Cross-sectional width: 12 inches
Cross-sectional depth: 12 inches
Concrete mix ratio: 1 : 2 : 4
- Briefly explain functions of a foundation. [L2, CLO2] 03
 - Distinguish between shallow foundation and deep foundation. [L4, CLO3] 03
 - Discuss the construction procedure of a pile foundation. [L6, CLO3] 04
- Discuss field application of soil mechanics. [L4, CLO2] 05
 - In a soil sample used in Geotechnical Engineering, the total volume is 100 cm³, the volume of solids is 60 cm³, and the volume of water is 25 cm³. Determine the void ratio (e), porosity (n), and degree of saturation (S) of the soil sample. [L3, CLO2] 05

Section B

There are four questions in this section. Answer any three questions.

1. (a) List the data required to prepare a construction estimate. [L1, CLO6] 04
(b) Determine the number of bricks required for 100 feet long and 8 feet wide herringbone bond brick soling road. Also determine the number of bricks required for the edging on both sides of the road. [L3, CLO6] 06
2. (a) Illustrate a typical project life cycle. [L2, CLO5] 03
(b) Propose safety measures for a construction project. [L6, CLO5] 03
(c) Construct a network diagram based on the given table and analyze the network diagram to determine the critical path. [L6, CLO4] 04

Activity	Name	Duration (Weeks)
1-2	A	5
1-3	B	6
1-4	C	3
2-5	D	5
3-6	E	7
3-7	F	10
4-7	I	4
5-8	J	2
6-8	K	5
7-9	L	6
8-9	M	4

3. (a) Discuss the advantages and disadvantages of direct purchase and hiring of construction equipment in a project. [L6, CLO5] 06
(b) Demonstrate general format of a BOQ with example. [L2, CLO7] 04
4. (a) Define i) Critical Path ii) Slack Time iii) Dummy Activity. [L1, CLO4] 03
(b) Differentiate between PERT and CPM. [L2, CLO4] 03
(c) Propose a Work Breakdown Structure (WBS) for a building construction project. [L6, CLO4] 04

Khulna University, Khulna

Urban and Rural Planning Discipline

1st Year, Term-II Examination, Session 2025-2026

Course No. 0731 04 URP 1221

Full Title of Course: Introduction to Urban Affairs and Planning

Full Marks: 60

Time: 3 hours

- The figures in the margin indicate full marks.
- Use separate sheet for each section.

Section A

There are **four** questions in this section. Answer any **three** questions.

- Explain the necessity of understanding urban science. [L2, CLO1] 05
 - Simplify the statement “the structure of connections and interdependencies of cities as problems of organized complexity is not an abstraction”. [L4, CLO1] 05
- Develop a pathway to use migration as a tool for inclusive city. [L3, CLO2] 03
 - Cities are consuming land faster than they grow in population – Explain the topic. [L4, CLO2] 07
- How SDG 11 can address the pressing challenges of cities? [L1, CLO1] 03
 - Why does low-density suburban sprawl at the city periphery pose a serious structural challenge to local agricultural lands and food security? [L2, CLO2] 03
 - Explain why secondary and intermediary cities in developing regions face greater structural difficulties in managing urbanization compared to primary capital cities. [L2, CLO2] 04
- Write short notes on the following (any four) 2.5×4 = 10
 - Urban Inequality [L1, CLO1]
 - DEGURBA [L1, CLO1]
 - Functional Classification of Cities [L1, CLO1]
 - Value of Urbanization [L2, CLO1]
 - Post Pandemic Urban Challenges in Developing Cities [L2, CLO2]

Section B

There are **four** questions in this section. Answer any **three** questions.

- Why does urban science define individual cities as open systems rather than self-contained, isolated geographic entities? [L1, CLO1] 02
 - State Gibrat’s Law of urban growth and explain how it models a city’s growth rate relative to its initial population size. [L1, CLO1] 02
 - Explain Tobler’s First Law of Geography and how it forms the conceptual foundation for modern urban gravity models. [L1, CLO1] 03
 - According to Ravenstein’s classic laws of migration, explain the concepts of Short-distance bias and Countercurrents in demographic flows. [L2, CLO1] 03
- Explain why urban planning is inherently political rather than purely technical, considering how zoning decisions create winners and losers. [L2, CLO1] 03
 - Distinguish between the government’s use of Police Power and Eminent Domain regarding property owner compensation and public health. [L2, CLO3] 03
 - Identify the primary elements that make up a standard Zoning Ordinance, and explain how they dictate the physical envelope of a building plot. [L1, CLO3] 04

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| 3. | (a) | Outline the strategic and operational differences between a broad Structure Plan and a plot-level Detailed Area Plan (DAP). [L1, CLO3] | 03 |
| | (b) | Why is a plot-level tool like the Floor Area Ratio (FAR) critical for development control within urban residential zones? [L2, CLO3] | 02 |
| | (c) | Explain how a mid-to-long-range Master Plan (Comprehensive Plan) serves as a critical bridge connecting a broad Structure Plan with an operational Detailed Area Plan (DAP). [L4, CLO3] | 05 |
| 4. | (a) | How did the introduction of Cybernetics and the systems view of the world change the modern style of urban planning from a rigid "blueprint" approach to a continuous loop process? [L1, CLO3] | 04 |
| | (b) | Explain how urban planners use abstract Theories and Models to understand complex spatial patterns and simulate the future impacts of a plan before it is built. [L2, CLO3] | 03 |
| | (c) | Outline the core sequential steps of the Rational-Systemic Planning Process as derived from cybernetics and modern systems theory. [L1, CLO3] | 03 |