SECTION - A

There are FOUR questions in this section. Answer any THREE.

1. (a) If \( f(x) = \begin{cases} 1 & x < 0 \\ 1 + \sin x, & 0 \leq x < \frac{\pi}{2} \\ 2 + (x - \frac{\pi}{2})^2, & x \geq \frac{\pi}{2} \end{cases} \)

Discuss the continuity and differentiability of the function at \( x = \frac{\pi}{2} \).

(b) If \( y = e^{\cos^{-1} x} \) then show that \( (1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2 + m^2)y_n = 0 \). Hence evaluate \( y_n(0) \).

2. (a) Find the \( n \)th derivative of \( \sin^7 x \).

(b) Find the maximum or the minimum values of \( y \) when \( y^7 = (x-3)^4 \).

(c) The cost of fuel for running a train is proportional to the square of the speed generated in Kms. per hour and costs Tk. 48 per/hr at 16 Kms/hr. What is the most economical speed if the fixed charges are Tk. 300/hr.?

3. Carry out the following integrals:

(a) \( \int \frac{dx}{1 + \sin x + \cos x} \),

(b) \( \int \frac{dx}{x^2 \sqrt{x^2 - 1}} \),

(c) \( \int \frac{x e^x dx}{(x+1)^2} \).

4. (a) Evaluate

\[
\lim_{n \to \infty} \left[ \frac{1}{n^3 + 1} + \frac{2}{n^3 + 2^3} + \frac{3}{n^3 + 3^3} + \cdots + \frac{n}{n^3 + n^3} \right]
\]

(b) Find the common area between the circles \( x^2 + y^2 = 4 \) and \( x^2 + y^2 = 4x \).
5. (a) Find the differential equation corresponding to the family of curves, \( y = c(x-c)^2 \), where \( c \) is an arbitrary constant.

(b) Solve: \( \frac{dy}{dx} = \frac{x+y-1}{x+y+1} \)  

(c) Solve: \( x^2 \frac{dy}{dx} + x(x+2)y = e^x \). 

6. (a) Solve: \( (y^2 - y^2 \sin x - x)dx + (3xy^2 + 2y \cos x)dy = 0 \)  

(b) Solve: \( \frac{dy}{dx} + \frac{1}{x} \sin 2y = x \cos y \).  

(c) The population of a certain country is known to increase at a rate proportional to the number of people presently living in the country. If after two years the population has doubled, and after three years, the population is 20,000, estimate the number of people initially living in the country and the population after five years.

7. Solve the following differential equations:

(a) \( \frac{d^4 y}{dx^4} + 2\frac{d^3 y}{dx^3} + 5\frac{d^2 y}{dx^2} - 8\frac{dy}{dx} + 4y = 0 \). 

(b) \( \frac{d^3 y}{dx^3} + 4\frac{d^2 y}{dx^2} + 4\frac{dy}{dx} = e^{3x} \). 

(c) \( \frac{d^2 y}{dx^2} + 2\frac{dy}{dx} + y = x^3 + x^2 + x + 1 \). 

8. Solve the following:

(a) \( x^2 \frac{d^3 y}{dx^3} + 3x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} + 2y = 0 \). 

(b) \( x^2 \frac{d^2 y}{dx^2} + 4x \frac{dy}{dx} + 2y = e^x \).
SECTION – A

1. (a) Planning is a logical decision making process which tries to balance between demand and supply. Explain the statement with relevant examples. (13 2/3)
   (b) How do strategic decisions ensure qualitative and quantitative changes in an activity system like a city? (10)

2. (a) What is spatial planning? Why do we need different levels of planning? Explain briefly. (4+14=18)
   (b) What do you understand by 'development indicators'? Write about four indicators of development. (5 1/2)

3. (a) One of the main objectives of spatial planning is to ensure social justice. Explain the statement with examples. (15)
   (b) What is the importance of the 'generation and evaluation of alternative courses of action' phase of a planning process? (8 1/2)

4. (a) Traditional approach of planning is entirely physical in scope. Do you agree with the statement? Explain your answer with necessary arguments. (18)
   (b) Define 'a system' according to System Approach of Planning. (5 1/2)

SECTION – B

5. (a) How would you define planning? (3 1/2)
   (b) Discuss the essential nature of planning with reference to the following aspects:
      (i) Contribution to purpose and objectives, (5)
      (ii) Primacy of planning, (5)
      (iii) Pervasiveness of planning, (5)
      (iv) Efficiency of plans. (5)
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6. (a) What are the requirements of a good plan? (9)
   (b) What are the barriers to effective planning? (8½)
   (c) Give five reasons why planning is important. (6)

7. (a) What are the major characteristics of planning objectives? (8)
   (b) Using a flow diagram show the various factors in man-made environment. (10)
   (c) Who are the stakeholders in planning? What steps would you follow in doing stake-
       holder analysis? (5½)

8. (a) What do you mean by top-down approach to planning? What are the main features of
      this approach? (12½)
   (b) Discuss various types of participatory planning and their characteristics. (11)
SECTION-A

There are FOUR questions in this section. Answer any THREE.

1. (a) Define cartography. Why is cartography considered as a way of human communication? (4)
   (b) What is the difference between weather map and climatic map? (4)
   (c) Describe with examples the different types of maps based on scale. (12)
   (d) "Map projections based on the position of tangent surface are named differently" – do you agree? Justify your answer. Also explain the different types of this projection with a rough sketch. (4+6=10)
   (e) The scale of a map is 1 cm to 1.27 km. Derive the R.F and find this scale in yard to furlongs, given that 1 furlong = 0.125 miles. (5)

2. (a) You are given a map of a linear river, which is to be enlarged on the scale of 4:9. Which method do you choose and why? Explain the procedure with a figure. (2+10=12)
   (b) Why is shape in the continuous area cartogram more distorted than in the disjointed area cartogram? Explain with a figure. (6)
   (c) What is the difference between grid and graticule? (4)
   (d) Illustrate with a figure how angle of the alignment of the projection surface can create varied projections, considering the developable surface area is a cylinder. (8)
   (e) Mr. Ahmed took 12 readings of his position with a GPS device and calculates his orthometric height of 1203.8 cm. Ahmed used his average latitude and longitude to find his geoid height, which was a negative 1.23 meter. What was his ellipsoidal height as shown in GPS? (5)

3. (a) While preparing a choropleth map by equal class interval what is the main problem one faces to determine class interval and how can you overcome it? (5)
   (b) What is the relation between datum and projection? (5)
   (c) What do you understand by Datum? What are the basic principles used to define a datum? Explain and give examples of two type of datum. (6+4+5=15)
   (d) Trigonometrically construct a graticule on simple conic projection of one standard parallel on 1: 50,000,000 scale at the interval of 5° for an area stretching between 45°N-65°N and 10°E – 40°E. Radius of the earth is 3960 miles. (10)

Contd .......... P/2
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4. (a) What is the implication of "standard" in standard parallel? (4)
(b) Explain Azimuth and Bearing. What do you understand by – Bearing S 45°W? (8)
(c) "Direction is not considered in Route Segment Routed cartogram" – Briefly explain with a figure. (8)
(d) "The amount of information to be presented on a map depends on different factors" – what are these factors? – briefly explain. (10)
(e) On an isotherm map of 1 cm = 1 km scale, two temperature stations A(28.3°C) and B(33.5°C) are 3 cm apart. What is the field distance in miles between interpolated 30°C Celsius and point A. (5)

SECTION-B

There are FOUR questions in this section. Answer any THREE.

5. (a) Describe the different methods of contouring. (10)
(b) A length of a road section was measured by an Engineer’s chain and found to be 160 meter long when the surrounding temperature was 75°F. This chain is known to give accurate measurement at 40°F and it has a cross-sectional area of 0.025 inch². In addition to higher temperature, the chain was stretched with an excess pull of 10 kg. Find the correct length of the chain and the road if the coefficient of thermal expansion and modulus of elasticity of the chain is 6.25×10⁻⁶ per °F and 2.1×10⁶ kg/cm² respectively. (15)
(c) Discuss about the benefits and limitations of choosing plane table survey over traverse survey. (10)

6. (a) Describe the process of setting the table at first station in a plane table survey before taking any measurements. (10)
(b) With the help of necessary sketches illustrate Lehman’s rules for locating the approximate position of station on plane table. (15)
(c) What are the general characteristics of contour lines? Draw neat sketches where necessary. (10)

7. (a) What are the different types of levelling techniques? Briefly explain their applications. (20)
(b) Explain the use of various kinds of stations and the lines in chain surveying. (10)
(c) You are given the task of conducting a precise survey of a large area consisting of many obstacles in the form of buildings and vegetation. Which survey method would you choose and why? (5)

8. (a) Explain in detail how chaining can be accomplished along sloping ground. Your answer should include diagrams and the names of instruments required to carry out the measurements. (15)
(b) The following bearings and lengths are determined from a closed traverse survey ABCDE A.
Determine the presence of any closing error. If there is a closing error, find its length and direction (WCB). (20)

<table>
<thead>
<tr>
<th>Station</th>
<th>AB</th>
<th>BC</th>
<th>CD</th>
<th>DE</th>
<th>EA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
<td>49°30'</td>
<td>67°10'</td>
<td>120°4'</td>
<td>219°22'</td>
<td>300°50'</td>
</tr>
<tr>
<td>Bearing (WCB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>22.5</td>
<td>37.5</td>
<td>48</td>
<td>53.5</td>
<td>62</td>
</tr>
</tbody>
</table>
L-1/T-2/URP Date: 05/08/2015
BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA
L-1/T-2 BURP Examinations 2013-2014
Sub: ARCH 145 (Elements of Architecture)
Full Marks: 140 Time: 3 Hours
USE SEPARATE SCRIPTS FOR EACH SECTION
The figures in the margin indicate full marks.

SECTION – A
There are FOUR questions in this section. Answer Q. No. 1 and any TWO from the rest.

1. Write short notes on any three of the followings:
   (a) Primary Elements of Architectural Design
   (b) Golden Section
   (c) Ken
   (d) Axis and Hierarchy. (10×3=30)

2. (a) What is a point?
   (b) What does a point serve
   (c) What ‘TWO POINTS’ Suggest in Architecture and Planning.
   (d) Example some point like elements in your city. (5×4=20)

3. (a) What is a Plane
   (b) What is the primary identifying Characteristic of a Plane?
   (c) Is there any supplementary properties of plane? How does a plane serve to define limits?
   (d) In architectural design we manipulate three generic types of planes — Explain with neat sketches. (5×4=20)

4. (a) What is a FORM. — Explain in terms of its Shape, Size, Color and Texture.
   (b) Form also have relational properties — Explain in terms of Position, Orientation and Visual Inertia. (10×2=20)

SECTION – B
There are FOUR questions in this section. Answer Q. No. 8 and any TWO from the rest.

5. Write short notes on any three:
   (i) Agora
   (ii) Roman Vault
   (iii) Chaita Hall
   (iv) Salient feature of Gothic Architecture. (20)

Contd …….. P/2
6. What do you understand by the term "Evolution and Revolution" in the history of architecture? Critically explain it with appropriate example. \(4+16=20\)

7. How do you differentiate between "Romanticism and Realism"? Briefly discuss it with appropriate example. \(20\)

8. (a) How climatic factors are related to urban planning and architecture? Discuss its importance in the urban planning process. \(4+4=8\)

(b) What are the key building design criteria for any climatic context? Briefly explain for "Hot-Humid Climate". (Focus only on planning issues). \(4+18=22\)
SECTION - A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) What is inflation? What are the causes of demand pull and cost push inflation? (8)
   (b) Compare graphically the effects of demand pull and cost push inflation on the price level and output. (10)
   (c) Make a comparison between the effects of demand pull and cost push inflation. What do you mean by stagflation? (10)
   (d) How will you determine macroeconomic equilibrium with the help of aggregate demand and aggregate supply? (7)

2. (a) Explain the various methods of measuring national income of a country. (10)
   (b) Discuss the circular flow of income and expenditure in a two sector economy. (10)
   (c) Calculate national income from the following information (15)
       \[ \text{GNP} = \text{Tk.} 1,12,000 \text{ crore} \]
       \[ \text{Depreciation} = \text{Tk.} 9,000 \text{ crore} \]
       \[ \text{Indirect tax} = \text{Tk.} 12,000 \text{ crore} \]
       Subsidy is 20% of indirect tax.

3. (a) What do you mean by money? Write about the functions of money. (15)
    (b) Briefly discuss the different forms of money. (10)
    (c) Write about the costs of holding money. Explain the three official measures $M_1$, $M_2$, $M_3$ of money. (10)

4. (a) Narrate the stages of growth given by Professor Rostow. (10)
    (b) What is meant by investment? Briefly narrate the following criteria for making an investment decision:
       (i) Labour-intensive vs. capital-intensive technique (10)
       (ii) Balance of payment criterion
    (c) Show that the growth rate of a country is directly related to its savings-ratio and inversely related to its capital-output ratio. (15)

Contd .......... P/2
SECTION – B
There are **FOUR** questions in this section. Answer any **THREE**.
Symbols indicate their usual meaning.

5. (a) What do you understand by monetary policy and fiscal policy? (5)
(b) How can expansionary monetary policy be implemented? (15)
(c) What is the effect of expansionary monetary policy on economy in both short run and long run? Discuss. (15)

6. (a) What do you understand by unemployment? Why is unemployment a problem? (10)
(b) Define structural unemployment, frictional unemployment, cyclical unemployment and full employment. (10)
(c) Discuss the efficiency wage theory of unemployment. (15)

7. (a) What do you understand by foreign exchange market? Discuss export effect and expected profit effect of foreign exchange demand. (10)
(b) What are the factors that can change the supply of U.S. Dollar in foreign exchange market? (10)
(c) Discuss different exchange rate policies. (15)

8. (a) Briefly discuss consumption function and savings function. (10)
(b) Discuss the determinants of consumption function. (10)
(c) Write short notes on APC (average propensity to consume) and APS (average propensity to save) using a table. (15)