Total number of printed pages: **Programme:Diploma/Semester:V/Code:DCE501**

2024

Construction Technology

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions. Each question carries equal marks.*

1.	a)	Draw a typical cross section of a one-way road in a straight stretch showing footpaths, kerbs, stormwater drains, shoulders, carriageways with camber and traffic separator. Describe in one sentence the changes that would occur in this section if you had to draw the section in a stretch having a horizontal curve.	5+3 = 8
	b)	List the elements of highway geometric design. What is the slope of camber and what is the width of shoulder as per Indian Road Congress (IRC)?	4+3 = 7
	c)	What is the IRC-recommended ruling gradient for roads in plains? Write a mathematical expression for computing superelevation of a road by detailing the symbols and providing appropriate units. **OR** Write what you mean by Stopping Sight Distance (SSD) and Overtaking Sight Distance (OSD). What are the driver's eye level and the height of an object above a road surface that are considered for computing SSD as per IRC?	5
2.	a)	Define a flexible and a rigid pavement. What are the types of pavements that lead you near to Gate 1 and Gate 2 of your Institute? Draw typical cross-sections of each type.	4+2+6 = 12
	b)	How is a Water Bound Macadam Road different from a soil and a gravel road?	4
	c)	Name different types of naturally available and industrially produced bitumen.	4
3.	d)	How much minimum distance would you provide between the running inner faces of two rails in a broad-gauge railway track? Why is coning of wheel of a railway vehicle required? Show with a sketch the slope at which the wheel of a railway vehicle is coned. Draw a typical single-lane section of a railway track in an embankment.	3+3+3+3 = 12
	e)	What are the functions of rails, sleepers and ballasts in a railway track?	2+3+3 = 8
4.	a)	What conditions would you look for while selecting a good site for a bridge across a river?	4
	b)	Write the types of bridges according to (i) materials of construction and (ii) the super-structure? Draw a schematic diagram of a beam bridge and label its different parts.	4+4+4 = 12
	c)	In what situation is a caisson sinking required? Name the different types of caissons.	4

5.	a)	What are the major geotechnical conditions that prompt the selection of (i) a gravity dam, (ii) an embankment dam and (iii) an arch dam for building a water reservoir? Draw sketches to show typical cross-sections of a gravity dam and an embankment dam.	(3×2) + (2×2) = 10
	b)	What are the modes of failure of (i) a gravity dam and (ii) an embankment dam? **OR** What are the forces that typically act on a gravity dam? Define a flow net and draw a homogeneous section of an embankment dam showing a flow net within the body of the dam.	4+6 = 10
6.	a)	Why are spillways provided in a reservoir? Name different types of spillways. Define a hydraulic jump. Where in a spillway is a hydraulic jump generally formed?	2+4+2+2 = 10
	b)	Why are river training works necessary? Divide river training works into three classes based on purpose. Name any four river training methods and draw an indicative sketch of each method.	3+3+4 = 10
7.	a)	Name and provide illustrative sketches of the three alignments in which a canal irrigation system may be planned. Why are some canals lined?	6+2 = 8
	b)	What are the three major categories of cross-drainage works? Name two types of these works under each category.	3+3 = 6
	c)	What are the two broad categories of mobile machinery used at construction sites? Provide a list of machineries typically used for site clearing and earthwork in excavation.	2+4 = 6