GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fifth Semester – Regular) Examinations, December – 2022
BPCCV5010 – REINFORCED CONCRETE DESIGN
(Civil Engineering)

Time: 3 hrs   Maximum: 70 Marks

Answer ALL Questions
The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)   **(1 x 10 = 10 Marks)**

Q.1. Answer *ALL* questions   [CO#]   [PO#]

a. Characteristic strength of material is   CO1   PO1
   - i. 5% test as likely to fail
   - ii. 6% test as likely to fail
   - iii. 7.5% test as likely to fail
   - iv. 10% test as likely to fail

b. Characteristic strength of M20 grade is   CO2   PO2
   - i. 20 N/m
   - ii. 20 MPa
   - iii. 20 N/m^2
   - iv. 20 N/mm

c. Basic depth to span length ratio for simply supported beam as per code is   CO2   PO2
   - i. 15
   - ii. 20
   - iii. 25
   - iv. 30

d. Quality of water in concrete should be   CO1   PO1
   - i. Potable water
   - ii. Ocean water
   - iii. Brackish water
   - iv. Bore well water

e. Effective cover for foundation should be   CO2   PO2
   - i. 10
   - ii. 15
   - iii. 25
   - iv. 50

f. Workability for pumpable concrete   CO1   PO2
   - i. 10-25
   - ii. 50-60
   - iii. 130-150
   - iv. 75-100

g. Curing of concrete is done for   CO1   PO1
   - i. 3 days
   - ii. 7 days
   - iii. 14 days
   - iv. 28 days

h. Tensile strength of concrete is   CO2   PO2
   - i. $0.5 (f_{ck})^{0.5}$
   - ii. $0.7 (f_{ck})^{0.5}$
   - iii. $2 (f_{ck})^{0.5}$
   - iv. $1.5 (f_{ck})^{0.5}$

i. In M20 grade concrete, 20 is the   CO1   PO1
   - i. Characteristic compressive strength
   - ii. Characteristic tensile strength
   - iii. Characteristic shear strength
   - iv. Characteristic torsional strength

j. Full form of HYSD bar is   CO1   PO1
   - i. High yield strength durable
   - ii. High yield strength deform
   - iii. High yield steel deform
   - iv. High yield short deform

PART – B: (Short Answer Questions)   **(2 x 10 = 20 Marks)**

Q.2. Answer *ALL* questions   [CO#]   [PO#]

a. Define limit state of collapse.   CO1   PO1

b. What are the various limit states?   CO2   PO1

c. Differentiate between concrete and steel structures.   CO2   PO1

d.	Explain the importance of development length.	CO3	PO2
e.	Calculate the value of $X_{u\,max}/d$ for Fe 500.	CO1	PO1
f.	State the quality of water to use for concreting.	CO1	PO1
g.	Differentiate between nominal mix and design mix concrete.	CO2	PO1
h.	What are the various grades of concrete.	CO2	PO1
i.	Draw stress block and strain diagram for singly reinforced rectangular beam.	CO1	PO1
j.	Explain creep in concrete.	CO1	PO1

PART – C: (Long Answer Questions)   (10 x 4 = 40 Marks)

Answer **ALL** questions

		Marks	[CO#]	[PO#]
3.a.	Determine the moment of resistance of a rectangular beam of size 230mmX375mm (bXd) reinforced with 4X16 mm dia steel bars in tension and 3X16 mm dia steel bars in compression.	7	CO1	PO2
	(Use M20 concrete and Fe 500 grade steel)			
b.	Check for deflection as per codal provision, if the span is 5m for problem no 3(a).	3	CO1	PO2
	(OR)		CO2	PO2
c.	Design a circular column to carry an axial load of 1000 kN.	7	CO1	PO1
	(Use M20 concrete and Fe 415 grade steel)			
d.	Calculate xumax/d value for Fe 500 steel	3	CO2	PO2
4.a.	Design a rectangular beam of size 230mmX400mm (bXd) for flexure. Beam is subjected to a bending moment of 150 kNm.	7	CO1	PO1
	(Use M20 concrete and Fe 500 grade steel) Assume any other data required.			
b.	Describe various methods of curing.	3	CO2	PO1
	(OR)			
c.	Design a rectangular beam of size 230mmX350mm (bXd) for shear. Beam is subjected to an shear force of 100 kN. The beam is reinforced with 4X16 mm dia steel bars in tension.	7	CO1	PO1
	(Use M20 concrete and Fe 500 grade steel) Assume any other data required.			
d.	How to ensure quality in concreting ?.	3	CO2	PO1
5.a.	Design a slab for a room of size 4mX6m as per the following data	7	C02	PO2
	Live load 10 kN/m^2, Floor finish 1 N/m^2 , slab is supported on all four sides.			
	(Use M20 concrete, Fe 500steel)			
b.	Calculate the value of $X_{u\,max}/d$ for Fe 415 steel	3	CO1	PO1
	(OR)			
c.	Design a square foundation for a column of size 300X300 mm. Axial load of column is 1000kN. Bearing capacity of soil is 250 kN/m^2	7	CO1	PO2
d.	Differentiate between one way and two way slab with example.	3	CO2	PO2
6.a.	Design a singly reinforced beam of width 250mm for flexure. Beam is subjected to a bending moment of 150 kNm.	7	CO1	PO2
	(Use M20 concrete and Fe 500 grade steel) Assume any other data required.			
b.	Differentiate between a short column and long column. What are the various assumptions for limit state method in flexure.	3	CO3	PO3
	(OR)			
c.	Calculate the load carrying capacity of rectangular column of size 230X450 mm reinforced with 6X16 mm dia. (Use M25 concrete and Fe 500 grade steel)	5	CO2	PO1
d.	Check the deflection of a singly supported beam for the following data	5	CO3	PO2
	Span of beam 4.75 m, Width 2.5m, Over all Depth of 400 mm			
	(Use M25 concrete and Fe 500 grade steel)			

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