University of Mumbai
Examination 2022 under cluster __ (Lead College: _____)
Examinations Commencing from 17 May 2022
Program: **CIVIL ENGINEERING**
Curriculum Scheme: Rev 2016
Examination: BE Semester VII
Course Code: CE-C702 and Course Name: Theory of Reinforced Concrete Structures

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks.
1.	Factor of safety for concrete and steel in Working stress method are ……... respectively
Option A:	1.5 and 1.15
Option B:	3 and 1.78
Option C:	3.and 1.5
Option D:	1.78 and 3
2.	For a singly reinforced beam of size 400 x 900 mm, types of reinforcement required are
Option A:	Tension reinforcement, shear reinforcement, side face reinforcement, Hanger bars.
Option B:	Tension reinforcement, shear reinforcement, side face reinforcement
Option C:	Tension reinforcement, shear reinforcement, Hanger bars
Option D:	Tension reinforcement, shear reinforcement
3.	In WSM, for a reinforced concrete beam of b=300, d=450, M25, Fe415, xc (mm) is
Option A:	219.9
Option B:	192.9
Option C:	129.9
Option D:	122.9
4.	If shear reinforcement in beam includes both vertical stirrups and bent up bars, the maximum shear resistance of bent up bars will be ….. of total shear to be resisted by shear reinforcement.
Option A:	25%
Option B:	50%
Option C:	15%
Option D:	35%
5.	A rectangular beam section of size 300 x 500 mm overall depth is subjected to factored sagging bending moment of 50 kNm, factored shear force of 50 kN and a factored torsional moment of 20 kNm. The equivalent shear V_e (kN) is
Option A:	4848.0
Option B:	156.67

Option C:	48.00
Option D:	126.26
6.	In a RC beam of size 300 x 600 mm, with 0% redistribution, the minimum number of 16 mm diameter bars required on tension side in single layer is
Option A:	2
Option B:	3
Option C:	4
Option D:	5
7.	A reinforced concrete beam of rectangular section 230 x 450 mm effective is reinforced on tension side by 4 - 20#. M20 and Fe415 are used (LSM). The section is,
Option A:	Balanced
Option B:	Under reinforced
Option C:	Over reinforced
Option D:	Failure
8.	In a two-way simply supported slab, the maximum moment occurs at,
Option A:	Midspan of Shorter span
Option B:	Midspan of Longer span
Option C:	End support
Option D:	Quarter of long span
9.	Minimum number of 20 mm bars in a column of size 500 x 500 mm required is
Option A:	4
Option B:	5
Option C:	6
Option D:	8
10.	A rectangular footing is subjected to varying soil pressures. The maximum and minimum factored upward soil pressure at ends are 350.00 kN/sqm and 25.00 kN/sqm. The SBC is 200 kN/sqm. Footing is……
Option A:	Safe for maximum and minimum pressure
Option B:	Safe for maximum pressure and unsafe for minimum pressure
Option C:	Unsafe for maximum and minimum pressure
Option D:	Unsafe for maximum pressure and safe for minimum pressure

Q2.	Solve any Four out of Six	5 marks each
A	What are the limitation of working stress method and how are they overcome in limit state method?	
B	Explain why steel is used as reinforcement in concrete?	
C	Why is over reinforced design not preferred?	
D	In which cases the calculation for deflection are required and how is the crack width in flexure member controlled?	
E	Why helical reinforced column gives better strength than ordinary columns?	
F	When and why is it necessary to combine the footings?	

Q3.	Solve any Two Questions out of Three	10 marks each
A	Determine the moment of resistance of the beam whose section is 300 x 600 mm overall and reinforced with 2 bars of 16 mm diameter at top and 6 bars of 20 mm diameter HYSD of Fe415 bars at bottom. Take effective cover = 50 mm for tension and compression steels. Use M 20 concrete (Use WSM).	
B	A R.C. beam 230 mm wide x 450 mm overall is reinforced on tension side with 4 nos. of 16 mm diameter bars of grade Fe415 with an effective cover of 40 mm. The beam is subjected to a shear force of 90 kN at a section. Design the shear reinforcement. (Use LSM)	
C	A RCC column of size 350 mm x 350 mm reinforced with 8 nos. 16 mm diameter bars carries a characteristic load of 800 kN. The SBC is 200 kN/sqm. Design an isolated square pad footing. Use M20 and Fe 415. Apply one way shear check only. (Use LSM)	
Q4.	Solve any Two Questions out of Three	10 marks each
A	A simply supported one way slab of effective span 3.75 m is supported on masonry walls of 230 mm thickness. Design the slab. Take LL = 2.0 kN/sqm, FF = 1 kN/sqm. Use M25 and Fe 415. Apply check for deflection only. (Use LSM)	
B	A short RCC column of size 350 mm x 350 mm has to carry an axial factored load of 1200 kN. Assume e_{min} < 0.05 D. Design the column using M25 and Fe500. (Use LSM)	
C	Calculate the ultimate moment of resistance of a L-beam for the following data: Width of flange = 1200 mm, depth of slab = 110 mm, Effective depth = 600 mm, width of web = 300 mm, Concrete = M20, steel = Fe415, Area of tension steel = 6 bars of 25 mm diameter. (Use LSM)	

Examination First Half 2022 under cluster __ (Lead College: _____)

Examinations Commencing from_____

Program: Civil Engineering

Curriculum Scheme: Rev 2016

Examination: BE Semester VII

Course Code: CEC703 and Course Name: WRE II

Time: 2-hour 30 minutes   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The horizontal component of an earthquake wave, producing instability in a dam is the one, which acts:
Option A:	Towards the dam
Option B:	towards the dam and then reservoir
Option C:	towards the reservoir and dam
Option D:	towards the reservoir
2.	The one major difference between straight drop spillway and ogee spillway is
Option A:	underside of nappe to be ventilated
Option B:	underside of nappe to be not ventilated
Option C:	underside of nappe not provided
Option D:	underside of nappe before weir wall
3.	Point out the correct statement with reference to earthen dams:
Option A:	they are less susceptible to failure as compared to rigid dams
Option B:	these dams are very costly as compared to other types
Option C:	they can be constructed almost on every type of foundation
Option D:	highly skilled labour is generally nor required
4.	The velocity Vo as per Kennedy's theory, carrying a discharge of 50 cumec through a channel having depth 3 metre and critical velocity ratio = 1.10 is
Option A:	1.111 m/s
Option B:	1.222 m/s
Option C:	1.444 m/s
Option D:	0.9 m/s
5.	The area of cross section required as per Kennedy's theory, carrying a discharge of 50 cumec through a channel having depth 3 metre and critical velocity ratio = 1.1 is
Option A:	45.005 m^2
Option B:	55.555 m^2
Option C:	34.626 m^2
Option D:	40.917 m^2
6.	Select the correct statement from the following
Option A:	Water logging increases in area where canals are lined
Option B:	Water logging reduces in area where canals are lined
Option C:	Seepage losses increase in lined canals area
Option D:	Water logging is unaffected in area where canals are lined

7.	For a most economical trapezoidal channel section:
Option A:	Hydraulic mean radius equals the depth of flow
Option B:	Hydraulic mean radius equals half the depth of flow
Option C:	Bottom width is twice the depth of flow
Option D:	Bottom width is half the depth of flow.
8.	Which one of the following spillways is least suited to earthen dams?
Option A:	Side channel spillway
Option B:	Chute spillway
Option C:	Ogee spillway
Option D:	Shaft spillway
9.	Major and minor distributor are part of _____
Option A:	canal system
Option B:	spillway system
Option C:	water distribution
Option D:	intake structures
10.	The spacing of construction joint in unreinforced lining is kept as
Option A:	50 times the lining thickness
Option B:	75 times the lining thickness
Option C:	100 times the lining thickness
Option D:	115 times the lining thickness

Q2	Solve any Two Questions out of Three	10 marks each
A	Design the practical profile of a gravity dam from the following data: Reduced Level of base of Dam is 1600m Reduced Level of F. R. L. = 1625m, Specific Gravity of masonry = 2.5. Safe compressive stress for masonry = 1500 kPa. Height of waves = 1m. Assume any suitable data if required and state the same clearly.	(10 marks)
B	(i). Compare theoretical and practical profile of Gravity dam. (ii) Write Exhaustive note on Gravity dam.	(5 marks) (5 marks)
C	(i). Write short note on failure of earthen dams and its remedial measures. (ii) Write advantages and limitations of Rock Fill dams.	(5 marks) (5 marks)

Q3	Solve any Two Questions out of Three	10 marks each
A	A homogeneous earth dam 30 has a crest width of 6.5m, upstream slope of 4:1 and downstream slope of 3:1. The properties of soil mass in the dam are as follows: 1.Submerged unit weight = 15 kN/m^3 2. Dry weight of soil in the dam = 18 kN/m^3 3. Angle of internal friction = 26° 4. Cohesion 'c' = 38 kPa. Check the stability of downstream portion of the dam against the horizontal shear at the base of dam. At the top shoulder of the downstream slope of the dam, the seepage line may be assumed to be 8m below the crest of the dam. The area of the downstream portion of the dam above the seepage line may be taken as 300m^2. Assume any suitable data, if required and state the same clearly. (10 marks)	
B	Sketch and explain Volute Siphon spillway in detail. (10 marks) .	
C	(i) A saddle siphon has following data: Full Reservoir Level = 540m, Level of centre of siphon outlet = 534m. Highest Flood Level = 541m. Highest Flood Discharge = 600 cumecs. If the dimensions of throat of siphon are: Width = 4m, Height =2m. Calculate the number of siphon units required to pass the flood safely. Take C = 0.65. The siphon discharges freely in air. Assume any suitable data, if required and state the same clearly. (5 marks) (ii) Compare Kennedy's and Lacey's Theories (5 marks)	

Q4.	Solve any Two Questions out of Three	10 marks each
A	Design an irrigation channel to carry a discharge of 14 cumecs. Take N=0.0225 and critical velocity ratio as 1.05. Assume B/D = 5.7. Assume any suitable data, if required and state the same clearly. (10 marks)	
B	(i) Sketch and explain Aqueduct. (5 marks) (ii) Sketch and explain Super passage. . (5 marks)	
C	List various materials used for canal lining. Write properties of good canal lining materials. Also write advantages and disadvantages of canal lining. (10 marks)	