Program: B.E. Civil Engineering

Curriculum Scheme: Revised 2016

Examination: Fourth Year Semester :VIII

Course Code CE C801 and Course Name: Design and Drawing of Reinforced Concrete Structures

	MODULE 1 COMPREHENSIVE DESIGN OF BUILDING
1.1	The section of singly reinforced beam in which the permissible stress in steel and concrete reaches earlier than that in concrete is called
Option A:	Under reinforced section
Option B:	Over reinforced section
Option C:	balanced section
Option D:	Economic section
1.2	The Partial factor of safety for steel in LSM may be taken as
Option A:	1.5
Option B:	1.15
Option C:	1.78
Option D:	3
1.3	Characteristic strength is defined as the value of strength below which not more that …….% of the test results are expected to lie.
Option A:	5
Option B:	15
Option C:	25
Option D:	50
1.4	The design Strength of Concrete is taken as ___________ in Limit State of Collapse
Option A:	0.45fck
Option B:	0.67fck

Option C:	Fck
Option D:	0.23fck
1.5	Partial safety factor in case of dead load for stability against overturning or stress reversal is
Option A:	1.2
Option B:	0.9
Option C:	0.7
Option D:	2.3
1.6	Live load comprises of
Option A:	Permanently attached loads
Option B:	Temporarily attached loads whose value and position may change
Option C:	Permanent as well as temporary loads
Option D:	Snow loads
1.7	The balance moment of resistance of the singly reinforced beam effective depth of beam is 450 mm having is 139.73 kNm. If M20 concrete and Fe 415 steel are used ,the width of the section is
Option A:	250mm
Option B:	200 mm
Option C:	300 mm
Option D:	350 mm
1.8	A beam of cross section of 200mm *450mm and is subjected to bending moment of 135 kNm. If M20 concrete and Fe250 steel are used, beam should be designed as ……….
Option A:	Singly reinforced beam
Option B:	Doubly reinforced beam
Option C:	Singly as well as doubly reinforced beam
Option D:	Singly reinforced beam with more steel

1.9	An isolated T beam has an effective span of 4800 mm and flange width of 800 mm. the flange thickness is 130 mm and the rib is 300 mm wide. The effective flange width is
Option A:	1000mm
Option B:	780 mm
Option C:	350 mm
Option D:	450 mm
1.10	For a T beam, if main reinforcement of slab must be
Option A:	parallel to beam,
Option B:	Perpendicular to beam
Option C:	Inclined to axis of beam at 30 degrees
Option D:	Partly parallel partly perpendicular
1.11	A simply supported beam has 350mm width and 500 mm effective depth. The beam subjected to a factored shear force of 62.5 kN. The nominal shear stress in Mpa is
Option A:	0.15
Option B:	0.35
Option C:	0.50
Option D:	0.75
1.12	A beam 300 mm* 600 mm is subjected to factored bending moment of 115 kNm and factored torsion 45 kNm. The equivalent bending moment is
Option A:	194.41 kNm.
Option B:	102.54 kNm
Option C:	322.12 kNm

Option D:	112.95kNm
1.13	A beam 300 mm* 600 mm is subjected to factored shear force 95 kN and factored torsion 45 kNm. The equivalent ultimate shear is
Option A:	100 kN
Option B:	235 kN
Option C:	335 kN
Option D:	475 kN
1.14	What is the max spacing of stirrups for a beam of effective depth 400 mm. mm for
Option A:	100 mm
Option B:	150 mm
Option C:	300 mm
Option D:	450 mm
1.15	The load on footing is 1650kN inclusive of its own weight. If safe bearing capacity of soil is 100 kN per sq. meter. The diameter of circular footing are
Option A:	4.58 m
Option B:	5.12 m
Option C:	8.19 m
Option D:	1.1 m
1.16	What is shear resisted by a bent up bar of 16 mm diameter of Fe415 steel.
Option A:	72.21 kN
Option B:	51.06 kN
Option C:	87.81 kN
Option D:	100.23 kN
1.17	Depths of different beams are given. Which of these beams needs side face reinforcement.
Option A:	350 mm

Option B:	450 mm
Option C:	950 mm
Option D:	600 mm
1.18	For a one way slab the area of main reinforcement required is 300 mm. find spacing (centre to centre distance) for 8 mm bar.
Option A:	250 mm
Option B:	125 mm
Option C:	166 mm
Option D:	400 mm
1.19	For deflection control of slab, the basic span to effective depth ratio for cantilever slab is
Option A:	7
Option B:	20
Option C:	26
Option D:	40
1.20	In case of one way slab, the main reinforcement is
Option A:	Along shorter span
Option B:	Along longer span
Option C:	Along both shorter and longer spans
Option D:	At corners only
1.21	The depth of slab is 250 mm. the Fe 415 distribution steel is provided. Area of distribution steel in sq mm is
Option A:	300
Option B:	400
Option C:	150
Option D:	100

1.22	If for Columns with helical reinforcement, if the requirement for ratio of the volume of helical reinforcement to the volume of the core is satisfied then Load Carrying capacity of column is increased by …… percent compared to similar column with lateral tie.
Option A:	5
Option B:	4
Option C:	6
Option D:	7
1.23	A RCC short column is 400mm*400 mm is carrying a factored load of 1800 kN. If M20 concrete and Fe 415 steel are used, the area of steel required in sq. mm is
Option A:	1287
Option B:	869
Option C:	1926
Option D:	2541
1.24	A RCC short column is 400mm*425 mm is carrying a load of 1195kN. If M20 concrete and Fe 415 steel are used, the area of steel required in sq. mm is
Option A:	1287
Option B:	869
Option C:	1560
Option D:	2541
1.25	The load on footing is 1650kN inclusive of its own weight. If safe bearing capacity of soil is 150 kN per sq. meter. The dimensions of square footing are
Option A:	3.32m*3.32m
Option B:	2.42m *2.52 m
Option C:	1.43m*1.43m

Option D:	2.81m*2.81m
	MODULE 2 STAIRCASE
2.1	The pitch of stair should never exceed
Option A:	20˚
Option B:	25˚
Option C:	30˚
Option D:	40˚
2.2	A series of steps without any platform, break or landing in their direction, is called
Option A:	Riser
Option B:	Tread
Option C:	Flight
Option D:	Nosing
2.3	Live load on stairs not subjected to overcrowding is…….kN/m^2
Option A:	1.5
Option B:	6
Option C:	3
Option D:	5
2.4	Landing is provided in stairs for
Option A:	Increasing length of stair
Option B:	To make staircase economical
Option C:	For comfort of users
Option D:	To reduce load
2.5	For dog legged stair case floor to floor height is 3.2 m, rise: 160 mm , tread:250mm , depth of waist slab: 200 mm, L.L = 3 kN/Sq.m, F.F= 1 kN/Sq.m, total working load on stair case is about
Option A:	18 kN/m^2

Option B:	12 kN/m²
Option C:	16 kN/m²
Option D:	20 kN/m²
2.6	Choose correct value of tread and width of staircase for residential building.
Option A:	250mm and 600 mm
Option B:	250 mm and 1200 mm
Option C:	350mm and 700 mm
Option D:	150 mm and 1000mm
2.7	Live loads on stairs for dwelling houses liable to overcrawding shall be
Option A:	2 kN/m²
Option B:	2.5 kN/m²
Option C:	3 kN/m²
Option D:	5 kN/m²
	MODULE 3 RETAINING WALL
3.1	The safe bearing capacity of soil is 120kN/m^2 , unit weight of soil is 18kN/m^3 and angle of repose is 30^0 degrees. Minimum depth of foundation as per Rankine's formula is
Option A:	0.25 m
Option B:	0.50 m
Option C:	0.74 m
Option D:	1.00 m
3.2	Cantilever retaining walls can safely be used for a height not more than
Option A:	3m
Option B:	4m
Option C:	5m
Option D:	6m
3.3	Which one of the following is the correct statement about retaining wall

Option A:	Toe slab and heel slab are provided at top face
Option B:	Toe slab and heel slab are provided with reinforcement at bottom face
Option C:	Toe slab is provided reinforcement at top face and heel slab at bottom face
Option D:	Toe slab is provided with reinforcement at bottom face and heel slab at top face
3.4	Weep holes provided into retaining wall for the purpose of
Option A:	To provide drainage
Option B:	To prevent cracks
Option C:	To avoid friction behind the wall
Option D:	To improve appearance
3.5	The shear key is provided to
Option A:	Avoid sliding failure of the wall
Option B:	Improve appearance
Option C:	Increase passive resistance
Option D:	To resist overturning
3.6	Weight of a retaining wall is 200 kN, coefficeient of friction is 0.65, horizontal soil pressure force per metre run of wall is 100 kN. The factor of safety against sliding is
Option A:	1.3
Option B:	1.97
Option C:	1.74
Option D:	2.21
3.7	The minimum depth of foundation depends upon….
Option A:	Safe bearing capacity of soil
Option B:	Width of stem
Option C:	Provision of weep holes
Option D:	Reinforcement in toe slab

3.8	Weight of a retaining wall is 142 kN, coefficeient of friction is 0.6, horizontal soil pressure force per metre run of wall is 54 kN. The factor of safety against sliding is
Option A:	1.58
Option B:	2.16
Option C:	3.18
Option D:	1.21
3.9	In counterfort retaining walls the upright slab
Option A:	Acts like cantilever
Option B:	Like fixed beam
Option C:	As a continuous slab
Option D:	Simply supported beam
3.10	To have pressure wholly compressive under the base of a retaining wall of width b, the resultant of the weight of the wall and the pressure exerted by the retained, earth should have eccentricity not more than
Option A:	b/3
Option B:	b/6
Option C:	b/4
Option D:	b/8
3.11	Cantilever retaining walls can safely be used for a height not more than
Option A:	3m
Option B:	4m
Option C:	5m
Option D:	6m
3.12	Total pressure on the vertical face of a retaining wall of height h acts parallel to free surface and from the base at a distance of
Option A:	h/4
Option B:	2h/3
Option C:	h/3

Option D:	h/2
3.13	Minimum grade of concrete for retaining wall is
Option A:	M20
Option B:	M25
Option C:	M30
Option D:	M40
3.14	The heel slab of a retaining wall is subjected to factored bending moment of 229 kNm. If effective depth of slab is 490 mm, the area of steel required is …… mm2. (use M20 concrete and Fe 415 steel)
Option A:	1521
Option B:	1834
Option C:	1372
Option D:	2738
	Module 4 WATER LANK
4.1	In case of the circular water tank with flexible base, due to internal water pressure the wall is subjected to hoop force equal to …….. (ϒ= sp. weight of water, H= depth D= diameter of tank)
Option A:	ϒ H (D /2)
Option B:	ϒ H
Option C:	ϒ H2
Option D:	ϒ D
4.2	Haunch reinforcement is provided in circular tanks at corners to avoid
Option A:	Moment
Option B:	Couple
Option C:	Absolute pressure
Option D:	Bursting pressure
4.3	A movement joint which allows the adjoining parts of a structure to slide relative to each other with minimum restraint is known as
Option A:	Sliding joint

Option B:	Expansion joint
Option C:	Contraction joint
Option D:	Construction joints
4.4	What will be the hoop force if unit weight of water=ϒ=9.81KN/m3 , height of tank=H= 5m, Diameter of circular tank= D= 10m.
Option A:	125 Kn
Option B:	383 kN
Option C:	245 kN
Option D:	90 kN
4.5	A rectangular water tank is resting on ground. If pull in wall at a level is 58860 N, the area of steel required to resist pull is…… mm2 . (Use Fe415 steel)
Option A:	392
Option B:	492
Option C:	183
Option D:	256
4.6	Wall of a circular water tank with flexible base is 265 mm thick. The vertical distribution steel required is…… mm2 .
Option A:	125
Option B:	418
Option C:	795
Option D:	129
4.7	If front counterfort are not provided then toe slab is designed as
Option A:	Cantilever slab
Option B:	Simply supported slab
Option C:	Fixed slab
Option D:	Continuous slab

4.8	A rectangular water tank is resting on ground. If pull in wall at a level is 49050 N, the area of steel required to resist pull is…… mm2 . (Use Mild steel steel)
Option A:	392
Option B:	427
Option C:	183
Option D:	256
4.9	For a water tank of size 4m*9m, the longer wall is designed as
Option A:	Vertical cantilevers
Option B:	Walls fixed at both ends
Option C:	Horizontal cantilevers
Option D:	Walls simply supported at ends.
4.10	If front counterfort are provided then toe slab is designed as
Option A:	Cantilever slab
Option B:	Simply supported slab
Option C:	Fixed slab
Option D:	Continuous slab
4.11	An elevated water tank is provided so that
Option A:	Water can be provided at gravity pressure to large population
Option B:	To reduce water pressure
Option C:	To reduce soil pressure on walls of tank
Option D:	To reduce cost of tank
4.12	Net load on heel slab is
Option A:	Downward load
Option B:	Upward load
Option C:	Horizontal load
Option D:	Vertically upward load

4.13	The circular water tank with rigid base, the upper portion of wall near top is having predominantly
Option A:	Simply supported action
Option B:	Cantilever action
Option C:	hoop action
Option D:	Sliding action
4.14	The circular water tank with rigid base, the lower portion of wall near base is having predominantly
Option A:	Simply supported action
Option B:	Cantilever action
Option C:	Bending action
Option D:	Sliding action
4.15	For circular water tank capacity of tank $800m^3$, depth of water tank is limited to H=5m, then what will be the diameter of circular water tank?
Option A:	14.27m
Option B:	203.71m
Option C:	28.54m
Option D:	7.85m
4.16	Heel slab of a counterfort retaining wall is designed as
Option A:	Continuous horizontal slab
Option B:	Continuous vertical slab
Option C:	Simply supported slab
Option D:	Fixed slab
4.17	A water tank wall is subjected to a hoop tension of 132788 N. Find spacing of 12 mm bars to resist this tension.(MS bars)
Option A:	95
Option B:	134
Option C:	45

Option D:	252
4.18	In IS code approximate method table for shear force coefficients, for design of water tank
Option A:	Positive sign for shear shows inward shear
Option B:	Positive sign shows out word shear
Option C:	Positive sign shows out downwords shear
Option D:	Negative sign shows inward shear
4.19	Circular water for smaller capacities are not preferred as
Option A:	They do not look good
Option B:	The cost of formwork offsets the saving of materials
Option C:	Circular tanks are structurally inefficient
Option D:	Rectangular tanks are water tight
4.20	For design of elevated water tank the bending moment due to horizontal thrust is taken as….. P=lateral force, y= vertical distance from hinge.
Option A:	Py/4
Option B:	Py/3
Option C:	Py/6
Option D:	Py/12
4.21	To avoid cracks in concrete
Option A:	A high permissible tensile stress is adopted in steel.
Option B:	A low permissible tensile stress is adopted in steel
Option C:	Concrete is allowed to reach its max permissible tensile stress.
Option D:	Factor of safety against cracking is kept high compared to factor of safety required for structural safety.
	MODULE 5 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
5.1	Which of the following statements best describes the state of earthquake prediction?
Option A:	scientists can accurately predict the time and location of almost all earthquakes
Option B:	scientists can accurately predict the time and location of about 50% of all earthquakes
Option C:	scientists can accurately predict the time and location of about 50% of all earthquakes
Option D:	scientists can characterize the seismic risk of an area, but can not yet accurately predict most earthquakes

5.2	State which statement is correct.
Option A:	Most earthquakes can be predicted
Option B:	The time and location of most major earthquakes can be predicted several days in advance
Option C:	Earthquakes are caused by heavy winds
Option D:	P waves travel faster
5.3	New Zealand is an example of
Option A:	Convergent plate boundary
Option B:	Divergent plate boundary
Option C:	Conservative plate boundary
Option D:	Both convergent and conservative plate boundaries
5.4	Love waves cause motion similar to S waves
Option A:	With vertical component
Option B:	Without vertical component
Option C:	With inclined component
Option D:	Without inclined component at 45 degrees
5.5	Mercalli indices of VII or higher measure the effects of an earthquake on
Option A:	cows
Option B:	horses
Option C:	people
Option D:	Buildings
5.6	Surface along which the block of rock slip is called _____?
Option A:	Fault zone
Option B:	Fault Plane
Option C:	Fault scarp
Option D:	None of these

5.7	On a seismic record, the S-P time interval is the _________ in arrival time between the P- and S waves.
Option A:	DELAY
Option B:	Twice the delay
Option C:	Four times the delay
Option D:	Five times the delay
5.8	Given three differently located seismic stations, the time-travel graph can be used to determine the position of the ____________________
Option A:	Epicentre
Option B:	Radius of earth
Option C:	Elasticity
Option D:	Mass of earth
5.9	From the S-P interval a seismologists can determine the __________ to an earthquake.
Option A:	Distance
Option B:	Earthquake force
Option C:	Mass of earth
Option D:	Elasticity
5.10	While considering the design of R.C. buildings for providing ductility, IS codes prohibit the steel grade greater than
Option A:	Fe 250
Option B:	Fe 320
Option C:	Fe 415
Option D:	Fe 550
5.11	The height of building is 10.5m. base dimension is 8m. the fundamental natural period of vibration is
Option A:	0.334 sec
Option B:	0.9 sec

Option C:	1.5 sec
Option D:	2.1 sec
5.12	Now India is divided into _____________ seismic zones.
Option A:	1
Option B:	2
Option C:	3
Option D:	4
5.13	During an eathquke which of following may be generated
Option A:	Draught
Option B:	Tsunami
Option C:	Heavy rains
Option D:	Low temperatures
5.14	Which of the following is depends on shear strength of the material?
Option A:	Density of material
Option B:	Internal friction
Option C:	Position of material
Option D:	Mass of the material
5.15	As rupture along a fault initiates, waves of energy travel outward from the hypocenter in a:
Option A:	linear fashion,
Option B:	linear fashion
Option C:	a spherical fashion,
Option D:	none of the above
5.16	At a seismic station the first waves to arrive are
Option A:	P Wave
Option B:	S Wave

Option C:	Surface wave
Option D:	Love wave
5.17	At a seismic station the last waves to arrive are
Option A:	P Wave
Option B:	S Wave
Option C:	Surface wave
Option D:	light ray waves
5.18	Love waves are .
Option A:	Dispersive
Option B:	Displace material in elliptical path
Option C:	Fastest among all
Option D:	Are principal component of ground roll
5.19	____________ are the most destructive to buildings.
Option A:	P Wave
Option B:	S Wave
Option C:	P waves are two times than S wave
Option D:	P and S wave similar
5.20	Each unit increase in magnitude on the Richter scale corresponds to an increase in seismic activity.
Option A:	10
Option B:	100
Option C:	50
Option D:	25
5.21	Great earthquakes, on average, occur
Option A:	30,000 times annually
Option B:	500 times annually

Option C:	20 times annually
Option D:	once every 5 to 10 years
5.22	The modified Mercalli scale varies from ____ to _____.
Option A:	I to XII
Option B:	I to X
Option C:	I to VII
Option D:	I to IV
	MODULE 6 PRESTRESSED CONCRETE
6.1	A post tensioned beam has span of 25m. If the slip at the jacking end is 4 mm, and E=210 kN/mm^2, the percentage loss of stress due to this cause is
Option A:	12.2 N/mm^2
Option B:	33.6 N/mm^2
Option C:	18.3 N/mm^2
Option D:	54.7 N/mm^2
6.2	When the prestressing cable is passing through upper kern point
Option A:	the stress at the lower fibre of the beam is zero.
Option B:	the stress at the lower kern point is zero.
Option C:	the stress at the centroidal axis is zero
Option D:	the stress at the top fibre of the beam is zero.
6.3	The concept of load balancing is useful in selecting?
Option A:	Anchorage profile
Option B:	Shaft profile
Option C:	Tendon profile

Option D:	Span profile
6.4	A prestressed concrete beam is loaded with two point loads .The profile of the cable is laid based on the load balancing concept, the shape of profile is
Option A:	Parabolic
Option B:	Triangular
Option C:	Trapezoid
Option D:	Circular
6.5	From the following which steel grade is recommended as tendons for post tensioned concrete girder.
Option A:	Fe 250
Option B:	Fe 415
Option C:	Fe 275
Option D:	Fe 1500
6.6	The pressure line is also known as ___________
Option A:	C line
Option B:	E line
Option C:	G line
Option D:	I line
6.7	If in a post tensioned beam the age of concrete at prestress transfer is 7 days. If E=210 kN/mm^2 , the loss in prestress due to residual shrinkage strain is
Option A:	44 N/mm^2
Option B:	8 N/mm^2

Option C:	23 N/mm^2
Option D:	32 N/mm^2
6.8	The change in the external moments in the elastic range of prestressed concrete beam results in
Option A:	Bending moment in pressure line
Option B:	Torsion in pressure line
Option C:	Flexure in pressure line
Option D:	Shift of the pressure line
6.9	The method of prestressing the concrete after it attains its strength is known as
Option A:	Pre tensioning
Option B:	Post tensioning
Option C:	Chemical prestressing
Option D:	Axial prestressing
6.10	From the following which concrete grade is recommended for posttensioned concrete girder.
Option A:	M 20
Option B:	M 40
Option C:	M 15
Option D:	M 25
6.11	The frictional and anchorage slip losses are observed in ______________
Option A:	Post tensioned members
Option B:	Pre tensioned members

Option C:	Ruptured members
Option D:	Axial member
6.12	In which method the prestress is developed due to the bond between the concrete and steel?
Option A:	Pre tensioning
Option B:	Post tensioning
Option C:	Thermo electric prestressing
Option D:	Prefix beam prestressing
6.13	A rectangular prestressed concrete beam 400mm*600mm is subjected to BM of 72kNm. If the axial prestreesing force is 960 kN, the extreme fibre stresses in $N/mm^2$are
Option A:	7 N/mm^2 and 1 N/mm^2
Option B:	4 N/mm^2 and 5 N/mm^2
Option C:	4 N/mm^2 and 9 N/mm^2
Option D:	5 N/mm^2 and 1 N/mm^2
6.14	The tendons in the pretensioning system are tensioned between
Option A:	Rigid anchorages
Option B:	Hydraulic jacks
Option C:	Concrete beds
Option D:	Variable beams
6.15	Which is one of the systems used for pretensioning
Option A:	Magnel-Balton system
Option B:	Freyssinet system
Option C:	Gifford-Udall system
Option D:	Hoyer’s long line method