Program: **Civil Engineering**

Curriculum Scheme: **Rev 2016**

Examination: **TE** Semester **V**

Course Code: **CEC501**   Course Name: **Structural Analysis II**.

Time: 2-hour   Max. Marks: 80

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	Choose correct option for the following questions. All the Questions are compulsory and carry 2 marks each.
1.	A 2-span continuous beam has left support as a fixed support & right support as a roller support. The intermediate support is a roller support. The number of independent degrees of freedom are
Option A:	5
Option B:	4
Option C:	3
Option D:	2
2.	A single-span fixed beam is
Option A:	Statically determinate and kinematically determinate
Option B:	Statically determinate and kinematically indeterminate
Option C:	Statically indeterminate and kinematically determinate
Option D:	Statically indeterminate and kinematically indeterminate
3.	A statically indeterminate structure is the one
Option A:	Which cannot be analyzed at all.
Option B:	Which can be analyzed using equations of static equilibrium only.
Option C:	Which can be analyzed using equations of static equilibrium & compatibility equations.
Option D:	Which can be analyzed using compatibility equations only.
4.	In a rigid jointed frame, the external temperature for a member is 40^0C and the internal temperature for that member is 30^0C. The average temperature is
Option A:	20^0C.
Option B:	25^0C.
Option C:	30^0C.
Option D:	35^0C.
5.	A simply supported beam is provided with an internal hinge. The beam can be called as
Option A:	A mechanism
Option B:	A structure
Option C:	An indeterminate element
Option D:	An elastic body
6.	Internal work of displacement multiplied by incremental load over the total loads and over the volume is called
Option A:	Potential energy

Option B:	Kinetic energy
Option C:	Resilience
Option D:	Complimentary energy
7.	A single-span fixed beam is to be analyzed by Clapeyron's three moment theorem. Which of the following statements is correct?
Option A:	An imaginary span has to be created at one end only.
Option B:	Imaginary spans have to be created at both the ends.
Option C:	No need to create any imaginary span.
Option D:	It cannot be analyzed by three moment theorem.
8.	For a rigid-jointed plane frame, both the ends are fixed. The flexibility matrix has a size
Option A:	(1 X 1)
Option B:	(2 X 2)
Option C:	(3 X 3)
Option D:	(4 X 4)
9.	A continuous beam ABCD of length 6 m has left end A fixed and right end D hinged. At intermediate supports B and C, there are roller supports. AB = BC = CD = 2 m. The beam carries a UDL of 20 kN/m throughout its length. The bending moment at D is
Option A:	50 kNm sagging
Option B:	50 kNm hogging
Option C:	25 kNm hogging
Option D:	Zero
10.	Which of the following is a force method of analysis?
Option A:	Clapeyron's three moment theorem
Option B:	Slope deflection method
Option C:	Moment distribution method
Option D:	Stiffness matrix method
11.	A beam ABCD is hinged at the left support A and fixed at the right support D. Intermediate supports B and C are roller supports. Using slope deflection method of analysis, the unknowns to be determined are
Option A:	θ_a , θ_b , θ_c & θ_d
Option B:	θ_a , θ_b & θ_c
Option C:	θ_a & θ_b
Option D:	θ_a
12.	In Moment Distribution Method, at a joint, if distribution factor for one member is 0.45, what is the distribution factor for the other member at the same joint?
Option A:	0.55
Option B:	0.65
Option C:	0.75
Option D:	Zero
13.	A continuous beam ABC, with A and C as fixed supports and intermediate support B as a roller support carries a UDL of 20kN/m on span AB and 10 kN/m on span BC. The spans AB and BC are of length 8m each. EI is constant

	throughout the section. What will be the rotation factor for member BC?
Option A:	0.45
Option B:	- 0.55
Option C:	- 0.25
Option D:	0.35
14.	The stiffness coefficient K_{ij} means
Option A:	Force at (i) due to a unit deformation at (j)
Option B:	Deformation at (i) due to a unit force at (j)
Option C:	Deformation at (j) due to a unit force at (i)
Option D:	Force at (j) due to a unit deformation at (i)
15.	A single-span beam is fixed at the left end and roller-supported at the right end. The number of plastic hinges needed to convert the beam in to a mechanism is
Option A:	1
Option B:	2
Option C:	3
Option D:	4
16.	Plastic analysis of structures is valid for
Option A:	Brittle material only
Option B:	Ductile material only
Option C:	Both ductile & brittle materials
Option D:	Any structural material
17.	A pin-jointed plane frame (truss) has (m) members, (j) joints and (r) external reaction components. The degree of kinematic indeterminacy is given by
Option A:	2j + r
Option B:	3j - r
Option C:	2j - r
Option D:	3j + r
18.	A beam AB is fixed at left end A and roller-supported at right end B. A clockwise moment (M) is applied at B. The moment developed at A is
Option A:	M (clockwise)
Option B:	M/2 (clockwise)
Option C:	M (anticlockwise)
Option D:	M/2 (anticlockwise)
19.	A spring has force (P) & deformation (Δ). Stiffness of the spring is
Option A:	2PΔ
Option B:	3PΔ
Option C:	P / Δ
Option D:	2P / Δ
20.	Cantilever method of frame analysis is analogous to a long cantilever with
Option A:	Axial tensile load
Option B:	Axial compressive load
Option C:	No load
Option D:	Transverse load

Q. 2	Solve **_Any Two Questions_** out of the Three.	**10 marks each**
A	A 2-span continuous beam ABC of length 8 m. is roller-supported at left end A and has fixed support at right end C. Intermediate support B is a roller-support. AB = BC = 4 m. A point load of 80 kN acts at the centre of span AB. Span BC carries a UDL of 60 kN/m. Flexural rigidity is constant throughout the beam. Analyse the beam by Clapeyron's Three Moment Theorem **OR** Flexibility Matrix Method and draw Bending Moment Diagram.	
B	A rigid-jointed portal frame ABCD has fixed supports at left end A as well as right end D. Vertical columns AB and CD have a height of 5 m each. Horizontal beam BC of length 4 m carries a UDL of 20 kN/m on its entire length. Moments of inertia of AB, BC and CD are I, 2I and 3I respectively. Analyse the frame by Slope Deflection Method and draw Bending Moment Diagram.	
C	A 2-span continuous beam ABC of length 7 m. is fixed at left end A as well as right end C. Intermediate support B is a roller support. AB = 4 m. and BC = 3 m. A point load of 30 kN acts at the centre of span AB. Span BC carries a UDL of 15 kN/m. Flexural rigidity is constant throughout the beam. Analyse the beam by Stiffness Matrix Method and draw Bending Moment Diagram.	

Q. 3	Solve **_Any Two Questions_** out of the Three.	**10 marks each**
A	A 2-span continuous beam ABC of length 10 m. has fixed support at left end A and roller support at right end C. Intermediate support B is a roller support. AB = BC = 5 m. Span AB carries a UDL of 30 kN/m and span BC carries a UDL of 20 kN/m. The moments of inertia of AB and BC are I and 2I respectively. Analyse the beam by Moment Distribution Method **OR** Kani's Method and draw Bending Moment Diagram.	
B	Write a detailed note on Cantilever Method and Substitute Frame Method used for Approximate Analysis of building frames.	
C	Two mild steel planks of dimensions (150 mm X 20 mm) each, are joined together to form a symmetrical T-section. Taking f_y = 250 MPa, determine the shape factor.	

University of Mumbai
Examination 2021 under cluster __(Lead College: __KJSIEIT_____)
Program: **CIVIL ENGINEERING**

Curriculum Scheme: Rev2016

Examination: TE Semester: V

Course Code: CEC502 and Course Name: GEOTECHNICAL ENGINEERING-I

Time: 2 hour   Max. Marks: 80

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	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	For a Standard Proctor test, the mass of hammer and the drop of hammer are
Option A:	2.6 kg and 310 mm
Option B:	2.6 kg and 450 mm
Option C:	4.9 kg and 310 mm
Option D:	4.9 kg and 450 mm
2.	Cohesion-less soils are formed due to...
Option A:	Physical disintegration
Option B:	Chemical decomposition
Option C:	Oxidation
Option D:	Hydration
3.	How do degree of saturation effect permeability of soil?
Option A:	By reducing the pore size
Option B:	By entrapping air in the voids
Option C:	Not allowing soil particles to move freely
Option D:	By changing the void ratio
4.	Rise of water table above the ground surface causes
Option A:	Equal increase in pore water pressure and total stress
Option B:	Equal decrease in pore water pressure and total stress
Option C:	Increase in pore water pressure but decrease in total stress
Option D:	Decrease in pore water pressure but increase in total stress
5.	Water content is given by:
Option A:	Weight of water/mass of soil
Option B:	Mass of water/mass of solid
Option C:	Mass of water/mass of soil
Option D:	Mass of water/weight of solid
6.	How many tests in the lab can be performed to get permeability of soil?
Option A:	5
Option B:	4
Option C:	3
Option D:	2
7.	The constant head permeability test is conducted for

Option A:	coarse grained soils
Option B:	silty soils
Option C:	clayey soils
Option D:	organic soils
8.	The shrinkage limit is represented by the term _____
Option A:	IP
Option B:	w_s
Option C:	IC
Option D:	w_p
9.	Fine grained soil is sub divided in to _____
Option A:	Silt and clay
Option B:	Sand and clay
Option C:	Organic and silt
Option D:	Gravel and peat
10.	Fine particles are those particles with size less than _____ mm diameter.
Option A:	0.023
Option B:	0.09
Option C:	0.075
Option D:	4.75
11.	Water content is given by:
Option A:	Weight of water/mass of soil
Option B:	Mass of water/mass of solid
Option C:	Mass of water/mass of soil
Option D:	Mass of water/weight of solid
12.	Activity of a clay is given by Activity = N/clay formation(%), here N stands for
Option A:	liquidity index
Option B:	plasticity index
Option C:	flow index
Option D:	compression index
13.	The depth of the groove cut by casagrande tool for determining the liquid limit is _____
Option A:	10 mm
Option B:	11.0 mm
Option C:	2 mm
Option D:	8 mm
14.	The mass density of water at 4^oC is:
Option A:	1g/cc
Option B:	1kg/m3
Option C:	1000Mg/m3
Option D:	1kg/cc
15.	The initial percentage of water content taken for coarse-grained soil in proctor test

	is _____
Option A:	4
Option B:	10
Option C:	25
Option D:	50
16.	A flow line in seepage through a soil medium is defined as the
Option A:	Path of particles of water through a saturated soil mass
Option B:	Line connecting points of equal head of water
Option C:	Flow of movement of fine particles of soil
Option D:	Direction of the flow particle
17.	Effective stress on soil
Option A:	Increases voids ratio and decreases permeability
Option B:	Increases both voids ratio and permeability
Option C:	Decreases both voids ratio and permeability
Option D:	Decreases voids ratio and increases permeability
18.	Which of the following does not happen when compaction is done?
Option A:	Permeability decreases
Option B:	Water content increases
Option C:	Shear strength decreases
Option D:	Compressibility decreases
19.	With increase in compaction energy in compaction test
Option A:	MDD and OMC both increases
Option B:	MDD increase and OMC decrease
Option C:	MDD and OMC increase initially, then start decreasing
Option D:	MDD and OMC remains constant
20.	Porosity and void ratio are related by:
Option A:	$e = n/(1-n)$
Option B:	$n = e/(1-e)$
Option C:	$1-e = n$
Option D:	$(1+n)/n = e-1$

Q2. A	Solve any Two	5 marks each
i.	Define void rate, porosity, degree of saturation, air content, and percentage of air voids.	
ii.	Write the short note on Atterbergs limit & show their variation with respect to volume of soil.	
iii.	Write a short note on Activity of clays.	
Q2.B	Solve any One	10 marks each
i.	A sand stratum is 12m thick. The water table is 4m below level. The unit weight of sand layer above and below water table is 17.5kN/m3 and 21kN/m3 respectively. The capillary rise above water table is 2m. Draw the total stress, neutral stress and effective stress.	
ii.	The plastic limit of a soil is 25% & its plasticity index is 8%. When the soil is dried from its state at plastic limit, the volume change is 25 % of its volume at plastic state. Similarly, the corresponding volume change from the liquid limit to dry state is 34% of its volume at liquid limit. Determine the shrinkage limit & shrinkage ratio.	
Q3.A	Solve any Two	5 marks each
i.	What are the factors that influence permeability of soil.	
ii.	Explain the effect of compaction on soil properties	
iii.	Derive the relationship between bulk unit weight , specific gravity, void ratio, degree of saturation	
Q3.B	Solve any One	10 marks each
i.	In a falling head permeability test the length and area of cross section of soil specimen are 0.17m & 21.8×10^{-4} m^2 respectively. Calculate the time required for head to drop from 0.25m to 0.10m respectively. The area of cross section of stand pipe is 0.0002m^2. The sample has three layers with permeability 0.00003 m/sec for first 0.06m, 0.00004m/sec for second 0.06m & 0.00006m/sec for third 0.05m thickness. Assume the flow is takes place perpendicular to bedding plan.	
ii.	A natural soil deposit has a bulk unit weight of 18.44 kN/m3 & water content of 5 percent. Calculate the amount of water required to be added to 1 cubic meter of soil to 15 percent. Assume the void ratio to remain constant. What will then be the degree of saturation? Assume G=2.67.	

University of Mumbai
Examination 2021 under cluster __ (Lead College: _KJSIEIT_____)
Program: **Civil Engineering**
Curriculum Scheme: Rev 2016
Examination: TE Semester V
Course Code: CEC503 and Course Name: Applied Hydraulics

Time: 2-hour   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	Jet propulsion works on the principle of_____
Option A:	Newton's second law
Option B:	Newton's third law
Option C:	Newton's first law
Option D:	Thermodynamic properties
2	In a 45-degree bend pipe on horizontal plane a circular air duct of 2.1 m^2 cross sectional area is gradually reduced to 1.5 m^2 area. Find the pressure in N/cm^2 at 1.5 m^2 cross sectional area, if the velocity of flow at the 2.1 m^2 section is 8.0 m/s and pressure is 2.945 N/cm^2. Take density of air is 1.18 kg/m^3.
Option A:	2.941
Option B:	3.845
Option C:	1.178
Option D:	1.946
3	Which among the following is a fundamental dimension?
Option A:	Area
Option B:	Velocity
Option C:	Time
Option D:	Force
4	When the casing in a centrifugal pump decelerates the flow, what increases?
Option A:	Pressure
Option B:	Temperature
Option C:	Volume
Option D:	Flow rate
5	Similitude is a concept applicable to the testing of _____
Option A:	Engineering models
Option B:	Mathematical models
Option C:	Physical models
Option D:	Chemical models
6	The force (Fx) exerted by a jet of water on a moving inclined plate in the direction of the motion of the plate: where, V = Velocity of the jet, θ = Angle between the jet and the plate for inclined plate, ρ = density of water and a = cross sectional area of nozzle.
Option A:	$F_x = \rho\, a\, \{(V - u)^2\}\, \{Cos^2(\theta)\}$

Option B:	$F_x = \rho\, a\, \{(V + u)^2\}\, \{\sin^2(\theta)\}$
Option C:	$F_x = \rho\, a\, \{(V + u)^2\}\, \{\cos^2(\theta)\}$
Option D:	$F_x = \rho\, a\, \{(V - u)^2\}\, \{\sin^2(\theta)\}$
7	The specific energy in m kg/kg for the flow expressed by V=2.22 m/sec and height of water 1 m is
Option A:	4.25
Option B:	2.25
Option C:	3.25
Option D:	1.25
8	Head under which Kaplan turbine is operated_____
Option A:	70 -100 meters
Option B:	10-70 meters
Option C:	100-200 meters
Option D:	Above 200 meters
9	_____ is defined as ratio between power delivered to runner and power supplied at inlet of turbine.
Option A:	Mechanical efficiency
Option B:	Volumetric efficiency
Option C:	Hydraulic efficiency
Option D:	Overall efficiency
10	Centrifugal pumps transport fluids by converting _____
Option A:	Hydrodynamic energy to kinetic energy
Option B:	Mechanical energy to kinetic energy
Option C:	Mechanical energy to Hydrodynamic energy
Option D:	Kinetic energy to hydrodynamic energy
11	What is the relationship developed between specific energy minimum (E_min) and critical depth (h_c)?
Option A:	$E_{min} = 1.5\ h_c$
Option B:	$E_{min} = h_c$
Option C:	$E_{min} = 3\ h_c$
Option D:	$E_{min} = 2\ h_c$
12	Buckets and blades used in a turbine are used to:
Option A:	Switch off the turbine
Option B:	To regulate the wind speed
Option C:	Alter the direction of water
Option D:	To regenerate the power
13	The overall efficiency of a reaction turbine is the ratio of
Option A:	Work done on the wheel to the energy (or head of water) actually supplied to the turbine
Option B:	Power produced by the turbine to the energy actually supplied by the turbine
Option C:	Actual work available at the wheel to energy imparted to the turbine
Option D:	Actual work available at the turbine to the energy imparted to the wheel

14	If the conjugate depth before and after the jump are 0.5 m and 2.5 m respectively, then the loss of energy in the hydraulic jump will be
Option A:	0.8 m
Option B:	1.6 m
Option C:	6.4 m
Option D:	3.2 m
15	The force (Fx) exerted by a jet of water on a stationary curved plate in the direction of jet impinges centrally is equal to: V = Velocity of the jet, θ = angle made by the jet with the horizontal, ρ = density of water and a = cross sectional area of nozzle.
Option A:	$Fx = \rho a (V^2) (1 + \cos \theta)$
Option B:	$Fx = \rho a (V^2)$
Option C:	$Fx = \rho a (V^2) (1 + \sin \theta)$
Option D:	$Fx = \rho (a^2) V (1 + \sin \theta)$
16	Find the rate of flow (in m^3/s) for a rectangular channel 8.64 m wide for uniform flow at depth of 3.57 m. The channel is having bed slope 1 in 6000. Take Chezy's constant C=48.
Option A:	37.642
Option B:	18.697
Option C:	26.723
Option D:	45.371
17	When the flow output is higher, impellers are connected in_____
Option A:	Series
Option B:	Parallel
Option C:	Equilibrium
Option D:	Series and parallel
18	If depth of flow changes abruptly over a comparatively small length of channel.
Option A:	Laminar Flow (LF)
Option B:	Uniform Flow (UF)
Option C:	Gradually Varied flow (GVF)
Option D:	Rapidly Varied Flow (RVF)
19	A jet of water issues from a nozzle with a velocity of 20 m/s and it impinges normally on a flat plate moving away from it at 10 m/s. If the cross-sectional area of the jet is 0.02 m^2 and the density of water is taken as 1000 kg/m^3, then the force developed on the plate will be
Option A:	100 N
Option B:	1000 N
Option C:	2000 N
Option D:	10 N
20	Which kind of turbine is a Pelton Wheel turbine?
Option A:	Tangential flow turbine
Option B:	Radial flow turbine
Option C:	Outward flow turbine
Option D:	Inward flow turbine

Q2	Solve any four out of six	5 marks each
A	What is priming and why it is necessary	
B	Obtain an expression for the force exerted by a jet of water on a flat vertical plate moving in the direction of flow.	
C	Write a short note on specific speed of turbine	
D	Define moment of momentum equation	
E	Explain distorted and undistorted model	
F	Derive the condition for the best side slope of the most economical trapezoidal channel.	

Q3	Solve any two questions out of three	10 marks each
A	What is specific energy curve? Draw specific energy curve and then derive expression for critical depth and critical velocity.	
B	The impeller of a centrifugal pump having external and internal diameters 500 mm and 250 mm respectively, width at outlet 50 mm and running at 1000 r.p.m. works against a head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at angle of 40°at outlet. Determine: (i) Inlet vane angle, (ii) Work done by the impeller on water per second, and (iii) Manometric efficiency.	
C	A Pelton wheel running at 480 r.p.m. and operating under an available head of 420 m is required to develop 4800 kW. There are two equal jets and the bucket deflection angle is 165°. The overall efficiency is 85 percent when the water is discharged from the wheel in a direction parallel to the axis of rotation. The co-efficient of velocity of nozzle = 0·97 and blade speed ratio = 0·46. The relative velocity of water at exit from the bucket is 0·86 times the relative velocity at inlet. Calculate the following: (i) Cross-sectional area of each jet, (ii) Bucket pitch circle diameter, and (iii) Hydraulic efficiency of the turbine.	

University of Mumbai
Examination 2021 under cluster __ (Lead College: ___KJSIEIT___)
Program: **Civil Engineering**
Curriculum Scheme: **Rev-2016**
Examination: **TE** Semester: **Vth**
Course Code: **CE-C504** Course Name: **Environmental Engineering- I**

Time: **2 hour** Max. Marks: **80**

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	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which coagulant is about 1.5 times costlier than alum, so generally it is avoided for treating ordinary public water supply?
Option A:	Sodium Aluminate
Option B:	Copperas
Option C:	Lime
Option D:	Chlorinated Copperas
2.	What should be the minimum available water pressure at fire hydrant?
Option A:	10 kN/m^2 to 15 kN/m^2
Option B:	100 kN/m^2 to 150 kN/m^2
Option C:	30 kN/m^2 to 50 kN/m^2
Option D:	250 kN/m^2 to 300 kN/m^2
3.	Which of the following pair of air pollutant is formed due to photochemical reaction?
Option A:	Ozone and PAN
Option B:	CO and CO_2
Option C:	PAN and Ammonia
Option D:	CO and Ammonia
4.	What is the faintest sound audible to normal human ear?
Option A:	500 Hz
Option B:	1 Hz
Option C:	100 Hz
Option D:	10 Hz
5.	Which water distribution network requires lesser number of cut-off valves?
Option A:	Ring system
Option B:	Reticulation system
Option C:	Tree system
Option D:	Radial system
6.	If the total hardness of water sample is 500 mg/lit as $CaCO_3$ (calcium carbonate) and the total alkalinity of same sample is 270 mg/lit as $CaCO_3$ (calcium carbonate) then what will be the temporary hardness of water sample?
Option A:	270 mg/lit as $CaCO_3$
Option B:	500 mg/lit as $CaCO_3$
Option C:	230 mg/lit as $CaCO_3$

Option D:	770 mg/lit as $CaCO_3$
7.	Which scale is used to measure the color of water sample?
Option A:	Threshold scale
Option B:	pH scale
Option C:	Platinum-cobalt scale
Option D:	Calcium-carbonate scale
8.	The major source of 'Carbon monoxide' in the urban air pollution is due to_____
Option A:	Incomplete combustion of fuel
Option B:	Chemical reaction between O_3 and VOC
Option C:	Decomposition of organic matters and Hydrocarbon
Option D:	Chemical reaction between VOC and Nitrogen dioxides
9.	Carbon dioxide gas dissolves easily in water and forms _____.
Option A:	Carbonic acid
Option B:	Calcium carbonates
Option C:	Calcium bicarbonates
Option D:	Hydrogen sulfide
10.	What is the range of detention time for plain sedimentation?
Option A:	36 hours – 72 hours
Option B:	1 hours – 2 hours
Option C:	12 hours – 24 hours
Option D:	4 hours – 8 hours
11.	What is the diameter of central manifold pipe in RSF under-drainage system?
Option A:	About 80 cm
Option B:	About 40 cm
Option C:	About 20 cm
Option D:	About 100 cm
12.	What is the normal range of chlorine dioxide dose to disinfect the water and to remove phenolic compounds from water?
Option A:	0.5 mg/lit – 1.5 mg/lit
Option B:	2.5 mg/lit – 4.5 mg/lit
Option C:	5 mg/lit – 10 mg/lit
Option D:	20 mg/lit – 25 mg/lit
13.	Determine the quantity of alum required per day in order to treat 16 MLD water, where optimum doses of alum decided by WTP is 10 ppm.
Option A:	1652 kg/day
Option B:	16.52 kg/day
Option C:	1600 kg/day
Option D:	160 kg/day
14.	In the design of under-drainage system for rapid gravity filter, 2 filter units are adopted each of dimension (5.2 m X 3.4 m). If total area of the perforations in all

	laterals is 0.2 % of each filter unit area, then what will be the total area of the perforations in all laterals?
Option A:	0.055 m^2
Option B:	0.035 m^2
Option C:	0.085 m^2
Option D:	0.015 m^2
15.	At what inclination inclined tube settlers are placed to improve the performance of settling?
Option A:	30 degree to horizontal
Option B:	20 degree to horizontal
Option C:	60 degree to horizontal
Option D:	40 degree to horizontal
16.	In water softening process which ions of the Zeolite get replaced by Ca and Mg ions?
Option A:	Bicarbonates
Option B:	Carbonates
Option C:	Sodium
Option D:	Hydrogen
17.	At what pressure reverse osmosis does not work?
Option A:	Below 600 kg/cm^2
Option B:	600-800 kg/cm^2
Option C:	900-1000 kg/cm^2
Option D:	1000-1200 kg/cm^2
18.	In which type of settling all settling particles settle down individually without any interaction with neighbouring particles?
Option A:	Type- IV settling
Option B:	Type- II settling
Option C:	Type- III settling
Option D:	Type- I settling
19.	Which material is used for ferrule in water service connection?
Option A:	Copper
Option B:	Lead
Option C:	Brass
Option D:	Iron
20.	Calculate annual rain water harvesting potential from a house of 150 sq. m. roof catchment area and 60 cm average annual rainfall. Take 0.8 run off coefficient.
Option A:	72 liters
Option B:	72000 liters
Option C:	720 liters
Option D:	900 liters

Q2	
A)	**Solve any TWO** **5 marks each**
i.	Differentiate between dead end system and grid iron system of water distribution.
ii.	Explain in detail about forms of nitrogen content in water.
iii.	Draw typical layout of water treatment plant and write functions of each unit briefly.
B)	**Solve any ONE** **10 marks each**
i.	Explain the reaction of chlorine in disinfection process depending upon pH value of water. Also explain break point chlorination.

ii.	2 MLD water is passing through a sedimentation tank which is 6m wide, 15m long and having water depth of 3m.
	    (a) Find the detention time for the tank.
	    (b) Calculate the average flow velocity through the tank.
	    (c) Compute overflow rate.
	    (d) Which factors affect the sedimentation process?

Q3	
A)	**Solve any TWO** **5 marks each**
i.	Write short note on Roof-Top rainwater harvesting.
ii.	What is the impact of air pollution on environment?
iii.	Explain service connection from main water supply with neat sketch.
B)	**Solve any ONE** **10 marks each**
i.	Design the dimensions of a set of rapid gravity filter for treating water required for population of 50000 with 180 lit/day/person rate of supply. Rate of filtration for filter is 5000 lit/hr/sq.m and length of each filter unit is 1.5 times of width. Also design under-drainage system of rapid gravity filter.
ii.	Explain lime-soda and base exchange methods for removal of permanent hardness.

University of Mumbai
Examination 2021 under cluster __(Lead College: ___KJSIEIT_____)
Examinations Commencing from 15th June 2021
Program: **Civil Engineering**
Curriculum Scheme: Rev2016
Examination: TE Semester V
Course Code: CEC505 and Course Name: Transportation Engineering I

Time: 2 hour   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.	Nagpur road plan has recommended the use of road pattern type of
Option A:	Star and circular pattern
Option B:	Star and bock pattern
Option C:	Star and rigid pattern
Option D:	Star and hexagonal pattern
2.	As per IRC lateral friction coefficient is
Option A:	0.15
Option B:	0.35
Option C:	0.4
Option D:	0.8
3.	"Right of way" is the width in which includes
Option A:	Carriage way + shoulder
Option B:	Carriage way + shoulder + road margins
Option C:	Carriage way
Option D:	In between building lines
4.	At sharp horizontal curves of highways of radius 'R' (in m), the percentage reduction in gradient provided to compensate the loss of traction force due to curvature is
Option A:	50/R
Option B:	100/R
Option C:	75/R
Option D:	125/R
5.	Super elevation is given to a road surface so as
Option A:	To prevent sudden occurrence of centrifugal force
Option B:	To counter act the centrifugal force developed on curves
Option C:	To facilitate the introduction of a transition curve
Option D:	To limit the rate of change of radial acceleration to the desired values
6.	The ideal form of the curve for the Summit curve is
Option A:	Lemniscates
Option B:	Spiral

Option C:	Circular
Option D:	Parabolic
7.	The design criteria for a valley curve does not include the following
Option A:	Head light distance
Option B:	Overtaking sight distance
Option C:	Comfort condition
Option D:	Drainage
8.	Bitumen emulsion consists of
Option A:	Bitumen, water, emulsifying agent
Option B:	Bitumen, oil, cutback
Option C:	Bitumen, water only
Option D:	Bitumen, water, tar
9.	The consistency and flow resistance of bitumen can be determined from the
Option A:	Ductility test
Option B:	Penetration test
Option C:	Softening point test
Option D:	Viscosity test
10.	The main cause of rattling below the flexible pavement is
Option A:	Vehicular traffic
Option B:	Absence of surface drainage
Option C:	Improper mix of pavement
Option D:	Consolidation of one or more layers of pavements
11.	The safe speed on highway is
Option A:	50th percentile speed
Option B:	75th percentile speed
Option C:	85th percentile speed
Option D:	98th percentile speed
12.	Which among the following is the fundamental equation of traffic flow
Option A:	Q=kv
Option B:	Q=k/v
Option C:	V=qk
Option D:	$Q=k^{2}v$
13.	PCU equivalent for a cycle is
Option A:	0.5
Option B:	1
Option C:	2.25
Option D:	6.0
14.	The traffic conflicts that may occur in a rotary intersection are
Option A:	Merging and diverging
Option B:	Crossing and merging
Option C:	Crossing and diverging
Option D:	Crossing, merging and diverging

15.	The highest point provided on the pavement is
Option A:	Cross slope
Option B:	Crown
Option C:	Camber
Option D:	Drainage
16.	The removal of surface water from the roadway is called
Option A:	Cross slope
Option B:	Camber
Option C:	Surface drainage
Option D:	Sub surface drainage
17.	Tar is a by-product of
Option A:	Wood
Option B:	Petroleum
Option C:	Kerosene
Option D:	Coal
18.	Space mean speed is
Option A:	the harmonic mean of spot speeds
Option B:	The sum of spot speeds
Option C:	The arithmetic mean of spot speeds
Option D:	the sum of journey speed
19.	The Nagpur plan classified the roads based on
Option A:	Annual daily traffic
Option B:	Location
Option C:	Function
Option D:	Location and function
20.	The soil not preferred in bituminous mix is
Option A:	Sand
Option B:	Clay
Option C:	Gravel
Option D:	Granite

Q2 (20 marks)	Solve any Two Questions out of Three (10 marks each)
A	What is Lane distribution factor? Give its value. Also determine Million Standard Axle for divided road having 3 lanes with initial traffic 600 cvpd during start of construction. Rate of growth is 7.5%, VDF is 2.5, CBR is 4%, construction period is 2 years & design life is l5 years.
B	Explain about Highway Drainage in detail with a neat sketch.
C	Write a short note on Rotary Island and Bitumen stabilization.

Q3 (20 Marks)	
A	**Solve any Two (5 marks each)**
i.	What is Overlay? Discuss on its types.
ii.	Write a short note on O&D survey.
iii.	Draw the traffic signs for: i) Stop ii) steep slope ahead iii) Pune 120 km iv) Overtaking prohibited v) Give way
B	**Solve any One (10 marks each)**
i.	Derive the equation for overtaking Sight Distance. Also draw sketch of overtaking zone, if the speed of vehicle is 65kmph.
ii.	Design Super-elevation for a curve having radius 500 m & speed is 100 kmph. Also find the amount of super-elevation to be given if it is a 2-lane road.

Program: T.E (Civil) Rev 2016 (Choice Based)
Curriculum Scheme: Rev 2016
Examination: TE Semester: V

Course Code: CE-DLO 5062   Course Name: Advanced Concrete Technology
Time: 2 hour   Max. Marks: 80

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	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	In Slurry infiltrated mat concrete (SIMCON) aspect ratio more than _____ can be used.
Option A:	5
Option B:	10
Option C:	100
Option D:	500
2.	For concrete exposed to a very aggressive environment the w/c should be lower than _____
Option A:	0.40
Option B:	0.5
Option C:	0.8
Option D:	1
3.	Concrete is not recommended to be placed at a temperature below _____^{o}C.
Option A:	5
Option B:	20
Option C:	10
Option D:	2
4.	IS: 7861 part-1 deals with _____
Option A:	Hot weathering concreting
Option B:	Cold weathering concreting
Option C:	Air entertained concreting
Option D:	OPC
5.	_____ required less Fibre volume than that required for_____, but same flexural strength and energy absorption.
Option A:	SIMCON, SIFCON
Option B:	SIFCON, SIMCON
Option C:	Ferro cement, SIMCON
Option D:	SIFCON, Ferro cement
6.	In UPV test, higher velocities indicate _____
Option A:	Bad quality and continuity of the material
Option B:	Good quality and continuity of the material
Option C:	Concrete with many cracks

Option D:	Concrete with many voids
7.	CSH gel present in cement has permeability of the order of _____ x 10^{-16} m/s.
Option A:	7.5
Option B:	98
Option C:	100
Option D:	750
8.	Concrete containing fly ash quantity 35 % of cement has been found to be ___ less permeable than manufactured with OPC.
Option A:	100
Option B:	20 to 50 times
Option C:	1 to 2 times
Option D:	2 to 5 times
9.	Addition of Fibers in concrete increases its compressive strength marginally and it ranges from _____
Option A:	10% to 200%
Option B:	1% to 20%.
Option C:	1% to 2%
Option D:	100% to 200%
10.	The cement concrete, from which entrained air and excess water are removed after placing it in position, is called _____
Option A:	Prestressed concrete
Option B:	Light weight Concrete
Option C:	Vacuum concrete
Option D:	Sawdust concrete
11.	As per clause 6.2.1.1 of IS 456, For concrete of grade _____and above. The rate of increase of compressive strength with age shall be based on actual investigations.
Option A:	M 60
Option B:	M 30
Option C:	M 80
Option D:	M 50
12.	In the 'very low' category of workability where strict control is necessary, for example pavement quality concrete, measurement of workability determination of compacting factor will be more appropriate than slump (as IS 1199) and a value of compacting factor of _____is suggested.
Option A:	1.75 to 1.80
Option B:	1.75 to 2.80
Option C:	0.75 to 0.80
Option D:	1 to 3
13.	_____is superior to rebound hammer and Windsor probe test because of greater depth of concrete volume tested.
Option A:	Pull out Test
Option B:	Maturity Test

Option C:	Ground Penetration Radar Test
Option D:	Core Test
14.	_____ test is used to determine Depth of carbonation of concrete, Chemical analysis, Water/gas permeability, Petrographic analysis, ASHTO Chloride permeability test.
Option A:	Pull out Test
Option B:	Maturity Test
Option C:	Ground Penetration Radar Test
Option D:	Core Test
15.	_____is a real-time NDT instrument that employs high-frequency radio waves to study the underground obstructions.
Option A:	Infrared Thermography
Option B:	Ground Penetration Radar Test
Option C:	Stress wave propagation method
Option D:	Nuclear methods
16.	In bulking of aggregates volume _____ with increase in moisture.
Option A:	Increase
Option B:	Decrease
Option C:	First increases then decreases
Option D:	First decreases then incre ases
17.	As per IS 456 (2000), Which of the following is not the factors influencing durability
Option A:	Environment
Option B:	Cover to embedded steel
Option C:	Cement content and water/cement ratio of the concrete
Option D:	Modulus of Elasticity of aggregate
18.	_____ has designated the concrete mixes into a number of grades as M10, M15.
Option A:	IS 456-2000
Option B:	IS 456-2010
Option C:	IS 513-1999
Option D:	IS 465-2000
19.	Workability of concrete can be improved by the addition of _____
Option A:	Iron
Option B:	Sodium
Option C:	Zinc
Option D:	Sulphur
20.	As per IS 456:2000 Young's modulus of concrete is _____
Option A:	1000 f_{ck}
Option B:	5000 $f_{ck}^{1/2}$
Option C:	5700 f_{ck}
Option D:	150 f_{ck}

Q2	Solve any two (10 marks each)
A	Define Hot weather concrete. What are the effects of hot weather on concrete? What are the precaution to be taken during hot weather concreting?
B	Explain cracking mechanism in FRC member subjected to flexure with neat sketch.
C	Design a concrete mix by ACI Method for the following data: i) Fck = M20 ii) Standard deviation = 4.0 iii) Nominal Maximum size of aggregate = 20 mm iv) Type of cement = Type I v) Shape of C.A. = Crushed angular vi) Type of Exposure = Mild vii) Degree of workability at site = 100 mm slump viii) Dry rodded density of C.A. = 1640kg/mm^3 ix) Specific gravity of cement = 3.15 x) Specific gravity of C.A. = 2.78 xi) Specific gravity of F.A. = 2.72 xii) Degree of supervision = Good xiii) Maximum water cement ratio = 0.5 xiv) Fineness modulus = 2.8 xv) Aggregates are assumed to be in saturated surface dry condition

Q3	Solve any four (5 marks each)
A	Comment in short, the acceptance criteria for concrete.
B	Explain any one NDT in detail with neat sketch.
C	State the physical and mechanical properties of jute, sisal and coconut fibers.
D	Explain durability of concrete structure. Enlist the factors affecting the durability of concrete.
E	Write a short note on waste material-based concrete.

University of Mumbai
Examination 2021 under cluster __ (Lead College: __KJSIEIT_____)
Examinations Commencing from 15th June 2021
Program: Civil Engineering
Curriculum Scheme: Rev2016
Examination: TE Semester V
Course Code: CE-DLO5063 and Course Name: Building Services and Repairs

Time: 2 hour   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.	Erosion of concrete caused due to
Option A:	CO2
Option B:	Corrosion
Option C:	Flow of water
Option D:	Load
2.	Which of the following is not a safety device on an elevator?
Option A:	Limit switch
Option B:	Call button
Option C:	Over governor speed
Option D:	Door lock
3.	What principle do lifts work on?
Option A:	Pressure
Option B:	Friction
Option C:	Traction
Option D:	Pulley system
4.	Which of the following lift type is suitable for car wash ?
Option A:	Traction lift
Option B:	Hydraulic lift
Option C:	Escalator
Option D:	Vacuum Elevator.
5.	Which of following is not a component of an AC generator
Option A:	Field
Option B:	Armature
Option C:	Shaft
Option D:	Starter
6.	Which test is used for fire damage assessment
Option A:	X-ray diffraction
Option B:	Profometer
Option C:	Half cell potential test
Option D:	Carbonation

7.	A fire detector cannot detect
Option A:	Light
Option B:	Heat
Option C:	Fire
Option D:	Smoke
8.	When must a smoke alarm be replaced?
Option A:	Every 5 years
Option B:	Every 10 years
Option C:	Every 20 years
Option D:	Every 35 years
9.	Quality of concrete with pulse velocity 2 km/s is
Option A:	Very good
Option B:	Satisfactory
Option C:	Good
Option D:	Poor
10.	The most common type of AC motor is
Option A:	Single-phase induction motor
Option B:	Two-phase induction motor
Option C:	Three-phase induction motor
Option D:	Two-phase squirrel-cage motor
11.	Earthing Charcoal & Salt are used in earthing to
Option A:	Maintain low resistance
Option B:	Maintain high resistance
Option C:	Make earth neutral
Option D:	Increase resistance
12.	Which of the following machine/instrument is used to regulate alternating current ?
Option A:	Transformer
Option B:	Electric motor
Option C:	Conductor
Option D:	Register
13.	Utilization factor is ratio of
Option A:	Lumens emitted by the lamp/Lumens received on the working plane
Option B:	Luminous intensity/Luminous flux
Option C:	Luminous flux /Luminous intensity
Option D:	Lumens received on the working plane/Lumens emitted by the lamp
14.	If the crack width is less than 0.1 mm then they are called
Option A:	Fine
Option B:	Wide
Option C:	Medium
Option D:	Thin
15.	Temperature differential may be considerable in

Option A:	In thin section
Option B:	In thick section
Option C:	In section with rich mix
Option D:	In thick section with rich mixes
16.	One of the ill effect of exposure of reinforcement
Option A:	Increase in tensile strength
Option B:	Increase in compressive strength
Option C:	Improvement in bond strength
Option D:	Gradual reduction in section
17.	Carbonation of concrete causes
Option A:	Increase in rate of corrosion
Option B:	decrease in rate of corrosion
Option C:	Increase in bond strength
Option D:	no bad effect on concrete
18.	Which test suggest concrete quality and durability ?
Option A:	Pull out
Option B:	Resistivity
Option C:	Surface hardness
Option D:	Load test
19.	Quality of concrete with rebound number 35 is
Option A:	Fair
Option B:	Good
Option C:	Very good
Option D:	Poor
20.	High ph values greater than 11.5 and very low chloride content indicates
Option A:	Corrosion prone
Option B:	No corrosion
Option C:	Increase risk of corrosion
Option D:	High rate of corrosion.

Q2 (20 Marks Each)	Solve any Four out of Six	5 marks each
A	Write a short on Carbonation.	
B	What is mean by traps? Explain its types	
C	Write a difference between lift and escalators.	
D	Explain the working of DC motors.	
E	Define: Luminous flux, Luminance, Glare, Illuminance	
F	Explain Petrography in detail.	

Q3. (20 Marks Each)	Solve any Two Questions out of Three	10 marks each
A	Explain in detail causes of deterioration.	
B	What are the different crack measurement techniques.	
C	Explain types of plumbing systems.	