University of Mumbai

Examination 2020 under cluster KJSIEIT

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **Civil Engineering**

Curriculum Scheme: **Rev2019 (C Scheme)**

Examination: **SE** Semester **III**

Course Code: CEC 301 and Course Name: Engineering Mathematics III

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.	$L[e^{-3t}\sin 2t] =$
Option A:	$\dfrac{s}{(s+3)^2+4}$
Option B:	$\dfrac{2}{(s-3)^2+4}$
Option C:	$\dfrac{2}{(s+3)^2+4}$
Option D:	$\dfrac{2}{(s+3)^2-4}$
2.	$L[t\,e^{2t}]$
Option A:	$1/(S-2)^2$
Option B:	$1/(S+2)^2$
Option C:	$1/(S-3)^2$
Option D:	$1/(S-2)^3$
3.	$L[f(t)/t]$
Option A:	$\int_0^\infty \emptyset(t)ds$
Option B:	$\int_s^\infty \emptyset(s)ds$
Option C:	$\int_s^a \emptyset(s)ds$
Option D:	$\int_0^\infty \emptyset(s)ds$
4.	$L^{-1}[1/(S+2)^4]$
Option A:	$e^{-2t}.t^3/3$

Option B:	$e^{-2t} .t^4 /6$
Option C:	$e^{-3t} .t^3 /6$
Option D:	$e^{-2t} .t^3 /6$
5.	The inverse Laplace transform of $\frac{s}{s^2+5s+6}$
Option A:	$3 e^{-3t} -2 e^{-2t}$
Option B:	$3 e^{-3t} +2 e^{-2t}$
Option C:	$3 e^{-3t} -2 e^{-t}$
Option D:	$3 e^{-t} -2 e^{-2t}$
6.	The inverse Laplace transform of log $(\frac{s-5}{s-7})$
Option A:	$(e^{7t} + e^{5t}) / t$
Option B:	$(e^{-7t} – e^{-5t}) / t$
Option C:	$(e^{5t} – e^{7t}) / t$
Option D:	$(e^{7t} – e^{5t}) / t$
7.	$L^{-1}[\cot^{-1}3s]$
Option A:	[cos(t/3)] /t
Option B:	[sin(t/3)] /t
Option C:	[sin(t/2)] /t
Option D:	[sin(t/3)] .t
8.	Find analytic function where $u = x^2 + y^2 – 5x + y + 2$
Option A:	$z^2 – 5z – i z + c$
Option B:	$z^2 – 5z + i z + c$
Option C:	$z^2 + 5z – i z + c$
Option D:	$z^2 + 5z + i z + c$
9.	Which of following function is harmonic
Option A:	$u= e^x \cos y - x^3$
Option B:	u= sinx. cosy
Option C:	u= cosx. coshy
Option D:	u = sinhx. sinhy
10.	Which of following function is analytic
Option A:	$e^x(\cos y – i \sin y)$
Option B:	$z^2 - \bar{z}$
Option C:	$e^{-x} (\cos y – i \sin y)$
Option D:	$2x + ixy^2$
11.	For the Fourier Series $\frac{a_0}{2} + \sum a_n \cos nx + \sum b_n \sin nx$ of the function $f(x) = x\sin x, 0 \le x \le 2\pi$, the value of a_0 is ________
Option A:	-2
Option B:	2
Option C:	1
Option D:	-3
12.	For the Fourier Series $\frac{a_0}{2} + \sum a_n \cos nx + \sum b_n \sin nx$ of the function $f(x) = 4 - x^2, 0 \le x \le 2$, the value of a_n is ________

Option A:	$-4/n^2\pi^2$
Option B:	$4/n^2\pi^2$
Option C:	$-8/n^2\pi^2$
Option D:	$8/n^2\pi^2$
13.	If f(x) is periodic function with period 2L defined in the interval C to C+2L then Fourier coefficient b_n is
Option A:	$\int_C^{C+2L} f(x) sin\frac{n\pi x}{L}\, dx$
Option B:	$\frac{1}{L}\int_C^{C+2L} f(x) sin\frac{n\pi x}{L}\, dx$
Option C:	$\frac{1}{L}\int_C^{C+2L} sin\frac{n\pi x}{L}\, dx$
Option D:	$\frac{1}{L}\int_C^{C+2L} f(x) cos\frac{n\pi x}{L}\, dx$
14.	Half Range Fourier sine Series of $f(x) = cosx,\ 0 \le x \le \pi$ is $\sum b_n\, sinnx$. What is the value of b_1?
Option A:	$1/\pi$
Option B:	$2/\pi$
Option C:	0
Option D:	$-2/\pi$
15.	The general solution of wave equation $\frac{\partial^2 u}{\partial t^2} - \alpha^2\frac{\partial^2 u}{\partial x^2} = 0$ is
Option A:	$u = a\cos m\,x + b\sin m\,x$ where a,b are constants
Option B:	$u = (a\cos m\,x + b\sin m\,x)c\cos m\alpha t$ where a,b,c are constants
Option C:	$u = (a\cos m\,x + b\sin m\,x)(c\cos m\alpha t + d\sin m\,\alpha t)$ where a,b,c,d are constants
Option D:	$u = (a\cos m\,\alpha x + b\sin m\,\alpha x)(c\cos m\alpha t + d\sin m\,\alpha t)$ where a,b,c,d are constants
16.	Using method of separation of variable, solve $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$,given $u(x,0) = 4e^{-x}$
Option A:	$u = e^{-(2x-3y)/2}$
Option B:	$u = 4e^{(2x-3y)/2}$
Option C:	$u = 3e^{-(2x-3y)/2}$
Option D:	$u = 4e^{-(2x-3y)/2}$
17.	Consider the one-dimensional heat equation: $\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 0$ By using Crank-Nicholson formula, taking $h = \frac{1}{4}$ (the step size of x) we get k(step size of t)to be equal to
Option A:	1/16
Option B:	1/8
Option C:	1
Option D:	1/4

18.	If characteristic equation of matrix A of order 3×3 is $\lambda^3 - 3\lambda^2 + 3\lambda - 1 = 0$. Then by Cayley Hamilton theorem A^{-1} is equal to
Option A:	$A^3 - 3A^2 + 3A - I$
Option B:	$A^2 - 3A - 3I$
Option C:	$3A^2 - 3A - I$
Option D:	$A^2 - 3A + 3I$
19.	$A = \begin{bmatrix} 2 & 3 \\ -3 & -4 \end{bmatrix}$ then the value of A^{50}
Option A:	$\begin{bmatrix} 149 & -150 \\ 150 & 151 \end{bmatrix}$
Option B:	$\begin{bmatrix} -149 & -150 \\ 150 & 151 \end{bmatrix}$
Option C:	$\begin{bmatrix} -149 & 150 \\ 150 & 151 \end{bmatrix}$
Option D:	$\begin{bmatrix} -149 & -150 \\ 150 & -151 \end{bmatrix}$
20.	$A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$ The eigen vector corresponding to eigen value λ=-1is
Option A:	$\begin{bmatrix} 6 \\ -2 \\ 7 \end{bmatrix}$
Option B:	$\begin{bmatrix} -3 \\ -2 \\ 7 \end{bmatrix}$
Option C:	$\begin{bmatrix} -6 \\ -2 \\ 7 \end{bmatrix}$
Option D:	$\begin{bmatrix} -6 \\ -2 \\ 8 \end{bmatrix}$

Option 1

Q2 . **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	Evaluate $\int_0^\infty \frac{\cos 6t - \cos 4t}{t} dt$
B	Find Inverse Laplace transform by convolution theorem $\frac{1}{(s^2+9)(s^2+4)}$
C	Show that $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ is diagonalizable. Determine transforming and diagonal matrix.
D	Find Fourier series of $f(x) = x^2$ in the interval $(-\pi, \pi)$. Hence prove that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} \ldots\ldots = \frac{\pi^2}{6}$

E	Solve by Crank-Nicholson simplified formula $\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 0, 0 \le x \le 1$ subject to the condition $u(0,t) = 0, u(1,t) = 100,$ $u(x,0)$ =100 (x- x^2)h=0.25 for one time step.
F	Show that u = e^x (x cos y - y sin y) is harmonic Determine harmonic conjugate and find analytic function

Q3. **(20 Marks Each)**	**Solve any Four out of Six** **5 marks each**
A	Find the orthogonal trajectories of the curve is e^x cos y – xy =c
B	Find half range sine series of $f(x) = lx - x^2; o < x < l$ hence show that $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} \ldots\ldots = \frac{\pi^3}{32}$
C	Solve $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial t} = 0$ by Bender-Schmidt method, given $u(0,t) = 0, u(5,t) = 0, u(x,0) =$ x^2 (25 - x^2) Assume h=1 & find the values of u upto t=3
D	If $A = \begin{bmatrix} 3 & 1 \\ 1 & 3 \end{bmatrix}$ Calculate e^A and 5^A
E	Using partial fractions find the inverse Laplace transforms of $$\frac{5s+3}{(s-1)(s^2+2s+5)}$$
F	Evaluate $\int_0^\infty e^t \sin 2t \cos 3t \; dt$

University of Mumbai
Examination 2020 under cluster KJSIEIT

Program: **Civil Engineering**
Curriculum Scheme: **Revised 2019**
Examination: **SE** Semester: **III**

Course Code: **CE-C 302** Course Name: **Mechanics of Solids**
Time: **2 hours** Max. Marks: **80**

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Q1.	**Choose the correct option for the following questions. All the Questions are compulsory and carry 2 marks each.**
1.	A circular rod of diameter 20 mm and length 2 m. is subjected to an axial tensile load of 50 kN. The Young's modulus of the material is 200000 MPa. The increase in the length of rod is
Option A:	4.59 mm
Option B:	3.59 mm
Option C:	2.59 mm
Option D:	1.59 mm
2.	With (1/m) as Poisson's ratio, relation between Young's modulus (E) and bulk modulus (K) is
Option A:	E = K {1- (2/m)}
Option B:	E = 2K {1- (2/m)}
Option C:	E = 3K {1- (2/m)}
Option D:	E = 4K {1- (2/m)}
3.	For a composite column section of concrete and steel, area of concrete is 152146.02 mm^2 and area of steel is 7853.98 mm^2. Column carries a compressive load of 400 kN. The stress in steel is 15 times the stress in concrete. The stresses in concrete and steel, respectively, are
Option A:	1.48 MPa and 22.2 MPa
Option B:	1.48 MPa and 32.2 MPa
Option C:	2.14 MPa and 32.2 MPa
Option D:	2 MPa and 30 MPa
4.	A steel rod 14 m. long is at a temperature of 20 degree centigrade. Coefficient of thermal expansion of steel is (12 X 10^{-6} per degree centigrade). The free expansion of the rod when the temperature is raised to 70 degree centigrade is
Option A:	6.4 mm
Option B:	7.4 mm
Option C:	8.4 mm
Option D:	9.4 mm
5.	A shell can be called as thin when the ratio of its wall thickness (t) to its internal diameter (d) is
Option A:	1/5
Option B:	1/10
Option C:	1/15
Option D:	1/20

6.	A cantilever beam of length 4 m carries a UDL of 10 kN/m throughout its length and a point load of 10 kN at the free end. The maximum bending moment is
Option A:	100 kNm
Option B:	110 kNm
Option C:	120 kNm
Option D:	130 kNm
7.	For a simply supported beam carrying a UDL of 10 kN/m throughout its length and a point load of 20 kN at the centre, the maximum shear force is 35 kN. The length of the beam is
Option A:	5 m.
Option B:	6 m.
Option C:	7 m.
Option D:	8 m.
8.	A portal frame ABCD of height 5 m. is hinged at left support A as well as right support D. Left column AB carries a UDL of 8 kN/m throughout its length. At C, there is an internal hinge. Beam BC of length 4 m. carries a point load of 10 kN at its centre. The horizontal reaction at support D is
Option A:	Zero
Option B:	40 kN from right to left
Option C:	40 kN from left to right
Option D:	20 kN from right to left
9.	For a solid circular section, which of the following relations is correct?
Option A:	Maximum shear stress is 2 times the average shear stress
Option B:	Maximum shear stress is 3 times the average shear stress
Option C:	Maximum shear stress is 1.25 times the average shear stress
Option D:	Maximum shear stress is 1.33 times the average shear stress
10.	A square beam section with side (x) is subjected to a shear force (S). The magnitude of the shear stress at the top edge of the square section is
Option A:	Zero
Option B:	S/x^2
Option C:	$2S/x^2$
Option D:	$3S/x^2$
11.	A rectangular section has a width of 300 mm and a depth of 600 mm. Neutral axis is perpendicular to the depth. It is subjected to a bending moment of 20 kNm. The bending stress at a distance of 100 mm from the neutral axis is
Option A:	0.27 MPa
Option B:	0.37 MPa
Option C:	0.47 MPa
Option D:	0.57 MPa
12.	The section modulus of a solid circular section of diameter (d) is
Option A:	$\pi d^2/16$

Option B:	$\pi d^3/16$
Option C:	$\pi d^3/32$
Option D:	$\pi d^4/64$
13.	A 70 mm diameter solid shaft is subjected to a torque of 5 kNm. The maximum shear stress induced in the shaft is
Option A:	74.24 MPa
Option B:	84.24 MPa
Option C:	94.24 MPa
Option D:	104.24 MPa
14.	The maximum shear stress produced in a shaft is 8 MPa. The shaft is of 50 mm diameter. The twisting moment is
Option A:	0.1563 kNm
Option B:	0.1963 kNm
Option C:	0.2363 kNm
Option D:	0.3363 KNm
15.	The diameter of core or kernel of a hollow circular section with external diameter (D) and internal diameter (d) is
Option A:	(D + d) / D
Option B:	$(D^2 + d^2) / D$
Option C:	$(D^2 + d^2) / 2D$
Option D:	$(D^2 + d^2) / 4D$
16.	The radius of gyration of a solid circular column of diameter (d) is
Option A:	d / 8
Option B:	d / 4
Option C:	$d^2 / 8$
Option D:	$d^2 / 16$
17.	If an element is subjected to pure shearing stress (q) then the maximum principal stress is equal to
Option A:	4q
Option B:	3q
Option C:	2q
Option D:	q
18.	Strain energy stored in an element is equal to
Option A:	0.5 X stress
Option B:	0.5 X stress X strain
Option C:	0.5 X strain
Option D:	0.5 X stress X strain X volume
19.	For a cantilever of length (l) carrying a UDL of (w/unit run) on its entire length, the slope at the free end is
Option A:	$wl^3 / 8 EI$
Option B:	$wl^3 / 6 EI$

Option C:	$wl^2 / 8\ EI$
Option D:	$wl^2 / 6\ EI$
20.	A cantilever beam of length (l) is subjected to a point load (W) at the free end. The beam has constant flexural rigidity. The strain energy stored in beam due to bending is
Option A:	$Wl / 3\ EI$
Option B:	$W^2l^3 / 6\ EI$
Option C:	$W^2l^2 /\ EI$
Option D:	$W^2l^3 / 16\ EI$

Q. 2	Solve ***Any Two Questions*** out of the Three.	**10 marks each**
A	For a material, Young's modulus is 110000 MPa and shear modulus is 42000 MPa. Find the bulk modulus and lateral contraction of a round bar of 40 mm diameter and 2.5 m length when it is stretched by 3 mm.	
B	A simply supported beam ABCD of length 10 m has hinged support at left hinge A and roller support at right end D. Part AB of length 5 m carries a UDL of 15 kN/m. There is a point load of 20 kN at C. Length of BC is 3 m and length of CD is 2 m. Draw Shear Force Diagram and Bending Moment Diagram.	
C	A rectangular beam (160 mm wide X 260 mm deep) is subjected to a maximum bending moment of 760 kNm. Determine the maximum bending stress. If the Young's modulus of the beam material is 200000 MPa, find the radius of curvature of the beam at the section where bending is maximum.	

Q. 3	**Solve both questions (A) and (B)**	**Total 20 Marks**
A	**Solve *Any Two*.**	**5 marks each**
i.	A timber beam is (160 mm wide X 270 mm deep). It is subjected to a maximum shear force of 15 kN. Draw the shear stress distribution diagram.	
ii.	A solid circular shaft transmits 80 kW power at 210 RPM. Calculate the shaft diameter if the twist in the shaft is not to exceed 1 degree in 2 m. length of shaft. Take modulus of rigidity as 100000 MPa.	
iii.	A solid circular column 80 mm in diameter and 2.6 m long has one end fixed and the other end hinged. Young's modulus of material is 200000 MPa. Adopting a factor of safety of 2.5, find the safe axial compressive load on the column by Euler's theory.	
B	Solve ***Any One.***	**10 marks each**
i.	The principal stresses at a point across two perpendicular planes are 85 MPa horizontal (Tensile) and 45 MPa vertical (Tensile). Find the normal stress, tangential stress and resultant stress and its obliquity on a plane at 25 degrees with the major principal plane.	
ii.	A cantilever beam ABC of length 7 m. is fixed at left end A and is free at right end C. Part AB of length 4 m carries a UDL of 10 kN/m. Part BC has a length of 3 m. At C, there is a point load of 15 kN. The beam has uniform flexural rigidity. Using Macaulay's method, determine the slope and deflection at free end.	

University of Mumbai
Examination 2020 under cluster KJSIEIT

Program: Civil Engineering
Curriculum Scheme: Rev 2019
Examination: SE Semester III
Course Code: CEC303 Course Name: Engineering Geology

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.	In the internal structure of the earth Mohorovicic Discontinuity is the boundary between Crust and Mantle which is demarcated on the basis of -
Option A:	Increase in seismic wave velocity at this depth
Option B:	Decrease in seismic wave velocity at this depth
Option C:	No change in seismic wave velocity throughout this boundary
Option D:	Absence of S-wave at this depth
2.	Which among the following is a product of Mechanical Weathering?
Option A:	Limonite
Option B:	Laterite
Option C:	Bauxite
Option D:	Scree deposits
3.	Which among the following landforms is a depositional feature?
Option A:	Hanging valley
Option B:	Pedestal Rock
Option C:	Alluvial Fan
Option D:	Canyon
4.	V-shaped valleys a characteristic landform of river, develop at which stage of river?
Option A:	Middle Stage
Option B:	Youthful stage
Option C:	Old stage
Option D:	Both middle and old stage.
5.	Around 90% of the world's earthquake and volcanoes are concentrated along-
Option A:	Transform plate boundaries
Option B:	Mid Atlantic Ridge
Option C:	Pacific Ring of fire
Option D:	Japan
6.	Origin of Himalaya mountain is an outcome of -
Option A:	Convergence of Europe and Asian tectonic plate
Option B:	Convergence of Australian and Asian tectonic plate
Option C:	Divergence of Europe and Asian tectonic plate
Option D:	Transform plate motion along the Europe and Asian tectonic plate

7.	Which one of the following is an acidic Igneous rock?
Option A:	Gabbro
Option B:	Basalt
Option C:	Granite
Option D:	Diorite
8.	Which of the following texture of Igneous rocks indicate cooling of magma in two stages?
Option A:	Directive texture
Option B:	Intergrowth texture
Option C:	Equigranular texture
Option D:	Porphyritic Texture
9.	Which of the following process is not involved in the formation of sedimentary rock?
Option A:	Compaction
Option B:	Transportation
Option C:	Deposition
Option D:	Metasomatism
10.	Dynamothermal Metamorphism is associated with-
Option A:	Transform Plate boundaries
Option B:	Divergent Plate boundaries
Option C:	Convergent plate boundaries
Option D:	No relation of metamorphism with plate boundaries
11.	What is the correct sequence of rocks arranged in increasing grade of metamorphism?
Option A:	Shale- Gneiss-Schist-Slate
Option B:	Gneiss-Schist-Slate -Shale
Option C:	Shale-Slate -Schist-Gneiss
Option D:	Slate-Shale-Gneiss-Schist
12.	A line formed by intersection of bedding plane and horizontal plane is known as-
Option A:	Streak
Option B:	Strike
Option C:	Stratification
Option D:	Slickensides
13.	A depression formed by downward movement of the hanging wall blocks in areas of oppositely dipping normal faults is known as-
Option A:	Horst
Option B:	Basin
Option C:	Graben
Option D:	Fault scarp

14.	Which of the following fault develop due to tensional forces?
Option A:	Reverse Fault
Option B:	Thrust Fault
Option C:	Strike slip fault
Option D:	Normal Fault
15.	Which of the following is used for classification of folds?
Option A:	Axial Plane
Option B:	Hinge
Option C:	Limbs
Option D:	Hinge Line
16.	Which of the following unconformity is characterized by Igneous or Metamorphic rocks below the unconformity surface?
Option A:	Angular unconformity
Option B:	Disconformity
Option C:	Both disconformity and Non conformity
Option D:	Nonconformity
17.	The statement that "**In an undisturbed sedimentary sequence, the layer which is on the top is the youngest**" is explained by which of the law of stratigraphy-
Option A:	Law of Uniformitarianism
Option B:	Law of order of superposition
Option C:	Law of faunal succession
Option D:	Law of cross-cutting relationship
18.	Calculate the core recovery when the total core obtained after drilling is 182 cm and total run is 2m-
Option A:	91%
Option B:	96%
Option C:	92%
Option D:	95%
19.	A downward movement of wet soil along the slope under the influence of gravity is known as-
Option A:	Creep
Option B:	Debri flow
Option C:	Lahar
Option D:	Solifluction
20.	The top of the body of the groundwater separated from the main water table beneath it by a zone that is not saturated is known as-
Option A:	Water table
Option B:	Unconfined aquifer
Option C:	Perched Water table
Option D:	Pearched aquifer

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Subjective/Descriptive questions

Q2 **(20 Marks)**	**Solve any Four** **5 marks each**
A	A pyrite ore body is exposed on horizontal ground. It dips westward. The width of the outcrop is 330 m. A borehole sunk from the upper bedding plane touches the lower bedding plane at a depth of 170m. Determine its True Thickness and amount of inclination
B	What is texture? Describe the inequigranular texture of igneous rock in detail.
C	How do pedestal rock form, explain with diagram.
D	Explain the merits and demerits of the following condition at a dam site- i) Dam on horizontal strata ii) Dam on strata dipping downstream side
E	Explain the water bearing properties of rocks.
F	Differentiate between central eruption and fissure eruption with examples.

Q3 **(20 Marks)**	**Solve any Four** **5 marks each**
A	Calculate the RQD from the given data and evaluate the rock on the basis of obtained result. Total run 2m.

Sample No.	Length of the core in cms	Nature of the lower end of the core sample		Sample No.	Length of the core in cms	Nature of the lower end of the core sample
a	12	N		i	28	N
b	8	N		j	19	N
c	15	N		k	8	M
d	22	N		l	16	N
e	07	M		m	05	M
f	08	N		n	05	N
g	19	N		o	03	M
h	12	M		p	06	N

B	Describe any two structures of sedimentary rocks.
C	Explain Convergent Plate Boundaries and features associated with them.
D	Explain the merits and demerits of the following condition of tunneling- Tunnel axis parallel to the dip of the strata
E	What is confined aquifer?What are the requirements for the formation of confined aquifer?
F	Name the various types of volcanic eruptions and describe the products of volcano?

University of Mumbai
Examination 2020 under cluster KJSIEIT

Program: **Civil Engineering**

Curriculum Scheme: Rev-2019

Examination: SE_ Semester_III

Course Code: CEC304 & Course Name: APDB (Architectural Planning & Design of Buildings)

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.	With respect to Wind direction &Sun-Lighting, the position of the PLAN of the Residential building is placed is known as --------
Option A:	ASPECT
Option B:	PROSPECT
Option C:	GROUPING
Option D:	ORIENTATION
2.	For a Floor to Floor height of 3.6 m.(Residential), how many TREADS will be there in each flight for a Dog-Legged Staircase, if the RISE is assumed to be as 0.15 m.?
Option A:	10
Option B:	11
Option C:	12
Option D:	13
3.	If the Rise is 0.15 m., Tread is 0.3 m., Width of Landing is 1.2 m., for a School Building having Floor to Floor height as 3.9 m., (Dog-Legged Staircase), the over all length of Staircase in PLAN is -----
Option A:	3.6 m.
Option B:	4.5 m.
Option C:	4.8 m.
Option D:	5.0 m.
4.	When the F.S.I is 1.5 and Built-up area of the building is 300 Sq.m.,the PLOT AREA will be ----
Option A:	450 Sq.m.
Option B:	200 Sq.m.
Option C:	300 Sq.m.
Option D:	400 Sq.m.
5.	The minimum size of VENTILATOR is Toilet blocks, among the following will be generally
Option A:	0.1 m x 0.15 m
Option B:	0.15 m x 1.15 m
Option C:	1.0 m x 0.15 m
Option D:	0.3 mx0.6 m

6.	King Post Roof Truss is used for a Clear Span of -----
Option A:	15.25 m.
Option B:	12.5 m.
Option C:	6.5 m.
Option D:	3.25 m.
7.	Following are the part of Green Building feautures
Option A:	Green Color, Solar Power
Option B:	Green Color, Rain Water Harvesting
Option C:	Solar Power, Green Trees
Option D:	Solar Power, Rain Water Harvesting
8.	I.C.U is provided in -----
Option A:	HOSTEL
Option B:	HOTEL(Lodging & Boarding)
Option C:	HOSPITAL
Option D:	CLINIC
9.	In a Multi-Specialty Hospital, I.P.D consists of -------
Option A:	Reception, Office, Medical Shop
Option B:	X-Ray & Pathology Lab
Option C:	Consultancy Rooms
Option D:	Wards
10.	1-Point Perspective will have
Option A:	2 S.P, 2 P.P, 1 V.P
Option B:	2 S.P, 1 P.P, 1 V.P
Option C:	1 S.P, 1 P.P, 1 V.P
Option D:	1 S.P, 2 P.P, 1 V.P
11.	In a Residential building, ASPECT for a Bed Room is in ------
Option A:	S/S.E
Option B:	W/S.W
Option C:	N/N.E
Option D:	E/N.E
12.	In a 2-Point Perspective, the POINTS & Lines (of PLAN)touching the P.P, will have
Option A:	2 times Height in Perspective View
Option B:	3 times Height in Perspective View
Option C:	Half the Height in Perspective View
Option D:	Actual Heights in Perspective View
13.	In the Sectional Elevation of a building, the S.L(Sill Level) is the distance --
Option A:	From Floor Level to Starting point of Door height
Option B:	From Floor Level to Starting point of Window height
Option C:	From Foundation Level to Starting point of Door height
Option D:	From Foundation Level to Starting point of Window height

14.	Housing & Road Systems are the concept of --------
Option A:	Principles of Residential Buildings
Option B:	Principles of Town Planning
Option C:	Zoning Regulations
Option D:	Green Building Concept
15.	When drawing a Plan for a scale of 1:50, the 12m.becomes -------
Option A:	6 cm.
Option B:	12 cm.
Option C:	24 cm.
Option D:	60 cm.
16.	To obtain Parallel lines, Curves, Concentric Circes, the following function is used in CAD drawing
Option A:	ARRAY
Option B:	OFFSET
Option C:	FILLET
Option D:	COPY
17.	In a High School building, the minimum Carpet area per Student in a Laboratory is ----
Option A:	1-2 Sq.m.
Option B:	2-3 Sq.m.
Option C:	3-4 Sq.m.
Option D:	4-5 Sq.m.
18.	The Floor-Floor height of 3.0 m. in a Residential building(Ground Floor structure) is measured ---
Option A:	From Ground level to Foundation level
Option B:	From Ground level to Plinth level
Option C:	Plinth level to Slab level
Option D:	Slab level to Parapet wall level
19.	Which mode allows the user to draw 90 degrees straight lines in CAD ?
Option A:	Osnap
Option B:	Ortho
Option C:	Linear
Option D:	Polar tracking
20.	Which command is used to divide an object into segments, having predefined length in CAD?
Option A:	Divide
Option B:	Chamfer
Option C:	Trim
Option D:	Measure

Q2	Solve any one question (A/B) (20 Marks)
A	**Draw Ground Floor Plan of a Residential Bungalow, as RCC Framed structure with following facilities. Floor to Floor height is 3.0 m.** **(i) Living-cum-Dining = 24 Sq.m.** **(ii) Master's Bedroom (with A.T) = 20 Sq.m.** **(iii)Bed Room = 15 Sq.m.** **(iv)Kitchen = 12 Sq.m.** **(v) Pooja Room = 10 Sq.m.** **Provide Toilets, Passages as per Bye-laws.** **Show position of <u>Columns, Doors, Windows & Ventilators</u> in the proposed PLAN.** **Draw** **GROUND FLOOR PLAN (with wall thickness)**
B	**Draw the LINE Plans of a Residential Bungalow, as (G+1) storied RCC Framed structure with following facilities.** **(i) Living Room = 20 Sq.m.** **(ii) Master's Bedroom (with A.T) = 20 Sq.m.** **(iii)Bed Room = 15 Sq.m.** **(iv)Guest Room = 15 Sq.m.** **(v) Kitchen = 12 Sq.m.** **(vi)Store Room = 12 Sq.m.** **(vii)Drawing Room = 15 Sq.m.** **Provide Toilets, Passages as per Bye-laws. Assume Floor to Floor height as 3.3 m.** **Show position of <u>Columns, Doors, Windows & Ventilators</u> in the proposed PLANS.** **Draw** **(i) Ground Floor LINE PLAN** **(ii) First Floor LINE PLAN**
Q3	**Solve any 4 questions out of 6 questions . (4x5=20 Marks)**
A	Write on "Principles of Planning for Residential Buildings"
B	**Write about "Principles of Town Planning"**
C	Write on " Building Bye-laws & Regulations"
D	Discuss about GREEN Buildings & concepts
E	Discuss about "Slum Clearance & Redevelopment of Buildings"
F	Differentiate between One-Point & Two-Point Perspective drawings for Rules & Procedure.

University of Mumbai
Examination 2020 under cluster KJSIEIT

Program: Civil Engineering
Curriculum Scheme: Rev2019
Examination: SE Semester III
Course Code: CEC305 Course Name: Fluid Mechanics 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.	For the fluid, the shear stress was found to be directly proportional to the rate of angular deformation. The fluid is classified as
Option A:	Non Newtonian fluid
Option B:	Ideal fluid
Option C:	Newtonian fluid
Option D:	Thyrotrophic fluid
2.	N.s /m^2 is the unit of
Option A:	Mass density
Option B:	Kinematic viscosity
Option C:	Dynamic Viscosity
Option D:	Velocity gradient
3.	The characteristic of an ideal fluid is
Option A:	Whose satisfied continuity equation
Option B:	One which flows with least friction
Option C:	One which obey newtons low of viscosity
Option D:	Friction less and incompressible.
4.	The pressure of liquid on a surface will always act --- to the surface
Option A:	parallel
Option B:	normal
Option C:	45 degree
Option D:	60 degree
5.	When a body is immersed in a fluid either wholly or partially , it is buoyed or lifted up by a force which is equal to weight of fluid displaced by body , this principal was enunciated by
Option A:	Archimedes
Option B:	Newton
Option C:	Pascal
Option D:	Kirchhoff
6.	Floating body is in stable equilibrium when
Option A:	The metacenter is below its center of gravity

Option B:	The metacenter is above its center of gravity
Option C:	The metacentric height is zero
Option D:	Its center of gravity is below the centre of buoyancy.
7.	The flow in a pipe whose valve is being opened or closed gradually is an example of
Option A:	Steady flow
Option B:	Unsteady flow
Option C:	Rotational flow
Option D:	Compressible flow
8.	Flow in a pipe where average flow parameters are considered for analysis is an example of
Option A:	Incompressible flow
Option B:	One dimensional flow
Option C:	Two – dimensional flow
Option D:	Three – dimensional flow
9.	A process during which no heat is transferred to or from the gas is called an
Option A:	Isochoric process
Option B:	Isobaric process
Option C:	Adiabatic process
Option D:	Isothermal process
10.	An error of 1 % in measuring H will produce ---- error in discharge over a rectangular notch or weir
Option A:	1 %
Option B:	1.5 %
Option C:	2 %
Option D:	2.5 %
11.	The error in discharge due to the error in the measurement of head over a triangular notch or weir is given by
Option A:	$dQ/Q = \frac{1}{2} dH/H$
Option B:	$dQ/Q = dH/H$
Option C:	$dQ/Q = 3/2\ dH/H$
Option D:	$dQ/Q = 5/2\ dH/H$
12.	Which of the following may be used for measuring the rate of flow of water in rivers or stream
Option A:	Notches
Option B:	orifices
Option C:	weir
Option D:	Mouthpiece
13.	Which of the following expression does not represents the speed of sound in a

	medium
Option A:	√K/Þ
Option B:	$\sqrt{RT_\gamma}$
Option C:	√k p/Þ
Option D:	√dp/dÞ
14.	A shock wave which occurs in a supersonic flow represents a region in which
Option A:	A zone of silence exits
Option B:	There is no change in pressure , temperature and density
Option C:	There is sudden change in pressure , temperature and density
Option D:	Velocity is zero.
15.	The Bernoulli's equation written in the conventional form p/w + v^2/2g+z= constant represents total energy is per unit of certain quantity. Identify this quantity from the choices given below
Option A:	Energy per unit mass
Option B:	Energy per unit weight
Option C:	Energy per unit volume
Option D:	Energy per unit specific weight
16.	Discharge through an internal mouthpiece running free is given by
Option A:	0.5 X a X √2gH
Option B:	0.4 X a^2X √2gH
Option C:	0.707 X a X √2gH
Option D:	0.3 Xa ^2 X √2gH
17.	The discharge through a large rectangular orifice is given by
Option A:	$1/3\ C_d\ b \sqrt{2g}\ (\sqrt{H_2} - \sqrt{H_1})$
Option B:	$2/3\ C_d\ b\ 2g\ (\sqrt{H_2} - \sqrt{H_1})$
Option C:	$2/3\ C_d\ b \sqrt{2g}\ (H_2^{3/2} - H_1^{3/2})$
Option D:	$2/3\ C_d \sqrt{b}\ 2g\ (\sqrt{H_2} - \sqrt{H_1})$
18.	At vena – contract a jet has the minimum area of cross section and so the velocity of the liquid jet this section will be
Option A:	minimum
Option B:	maximum
Option C:	Average
Option D:	zero
19.	Which of the following fluid can be classified as non-Newtonian
Option A:	Kerosene oil
Option B:	Diesel oil
Option C:	Human blood
Option D:	water
20.	Mercury is used in barometers because

Option A:	It is perfect fluid
Option B:	Its volume changes with temperature
Option C:	It is a liquid metal
Option D:	It gives less height of column for high pressure

Q2	
A	**Solve any Two** **5 marks each**
i.	The dynamic viscosity of an oil, use for lubrication between a shaft and sleeve is 6 Ns/m^2. The shaft is of diameter 0.4 m and rotates at 190 rpm. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm
ii.	Too large plane surfaces are 2.4 cm a part. The space between the surfaces is filled with glycerin. What force is required to drag a very thin plate of surface area 0.5 m^2 between the two large plane surfaces at speed of 0.6 m/s , if a) The thin plate is in the middle of the two plane surfaces , and b) The thin plate is at a distance of 0.8 cm from one of the plane surfaces ? Take dynamic viscosity of glycerin = 0.81 Ns/m^2
iii.	A tank has to identical orifices on one of its vertical sides. The upper orifice is 3 m below water surface and lower one is 5 m below the water surface. If the value of C_v for each orifice is 0.96, Find the point of intersection of the two jets.
B	**Solve any One each** **10 marks**
i.	Find the total pressure and position of centre of pressure on a triangular plate of base 2 m and height 3 m which immerse in water in such a way that the plane of the plate makes an angle of 60^0 with the free surface of the water. The base of the plate is parallel to water surface and at a depth of 4m from water surface when a) Apex is below base b) Apex is above base.
ii.	A solid cylinder of 10 cm diameter and 40 cm long, consist of two parts made of different materials. The first part at the base is 1 cm long and of a specific gravity = 6. The other part of the cylinder is made of the material having specific gravity 0.6. State, if it can float vertically in water.

Q3.	
A	**Solve any Two 5 marks each**
i.	A cylindrical tank is having a hemispherical base. The height of cylindrical portion is 5 m and diameter is 4 m. At the bottom of this tank and orifice of diameter 200 mm is fitted. Find the time required to completely empting the tank. Take $C_{d} = 0.6$.
ii.	A weir 36 m long is divided into 12 equal bays by vertical posts, each 60 cm wide. Determine the discharge over the weir if the head over the crest is 1.2 m and velocity of approach is 2 m /s.
iii.	Calculate the stagnation pressure, temperature and density at the stagnation point on the nose of a plane, which is flying at 800 km/hr through steel air having a pressure 8N/cm^2 (abs.) and temperature - 10^0 C. Take R = 287 J/kg K and k = 1.4.
B	**Solve any One** **10 marks each**
i.	Find discharge of water flowing through a pipe 30 cm diameter placed in an inclined position where venturimeter is inserted, having a throat diameter of 15 cm. The difference of pressure main and throat is measured by liquid of specific gravity 0.6 in an inverted U tube differential manometer which gives the reading of 30 cm. A loss of head between the main and the throat is 0.2 times the kinetic head of the pipe.
ii.	In two dimensional compressible flow field, the velocity component expressed as $u = 2x – x^2 y + y^3/3$ and $v = x y^2 – 2y – x^3/3$. a) Determine the velocity and acceleration at point L (x=1 m, y= 3m). b) Is the flow possible? If so, obtain an expression for the steam function. c) what is the discharge between steam lines passing through (1, 3) And (2, 3)? d) Is the flow irrotational? if so , determine the corresponding velocity Potential. e) Show that each of the stream and potential functions satisfy Laplace Equation.

University of Mumbai

Examination 2021 under cluster KJSIEIT

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **Civil Engineering**

Curriculum Scheme: **Rev2019**

Examination: **SE** Semester **III**

Course Code: **CEC301** and Course Name: **Engineering Mathematics-III**

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.	$L[e^{2t} \sin 2t] =$
Option A:	$\dfrac{s}{(s-2)^2+4}$
Option B:	$\dfrac{2}{(s-2)^2+4}$
Option C:	$\dfrac{1}{(s-2)^2+4}$
Option D:	$\dfrac{2}{(s+2)^2-4}$
2.	$L[t\, e^{-3t}]$
Option A:	$1/(S-3)^2$
Option B:	$2/(S+3)^2$
Option C:	$1/(S+3)^2$
Option D:	$1/(S-3)^3$
3.	If L{f(t)} = F(s), then L{t f (t)} equals
Option A:	$sF(s)$
Option B:	$-F'(s)$
Option C:	$F'(s)$
Option D:	$-sF(s)$
4.	$L^{-1}[1/4s+5]$
Option A:	$\dfrac{e^{\frac{-5t}{4}}}{4}$

Option B:	$\frac{e^{\frac{5t}{4}}}{4}$
Option C:	$\frac{e^{\frac{-3t}{4}}}{4}$
Option D:	$\frac{e^{\frac{-5t}{4}}}{3}$
5.	The inverse Laplace transform of $\frac{3s+7}{s^2-2s-3}$
Option A:	$e^{3t} - e^{-t}$
Option B:	$4\, e^{3t} + e^{-t}$
Option C:	$4\, e^{3t} - e^{t}$
Option D:	$4\, e^{3t} - e^{-t}$
6.	The inverse Laplace transform of $\tan^{-1}(1/s)$
Option A:	$\frac{cost}{t}$
Option B:	$\frac{sin2t}{t}$
Option C:	$\frac{sint}{t}$
Option D:	$\frac{-sint}{t}$
7.	If $L^{-1}\{F(s)\} = f(t)$ and $L^{-1}\{G(s)\} = g(t)$ then $L^{-1}\{F(s)G(s)\}$ equals
Option A:	$\int_0^\infty f(u)g(u)du$
Option B:	$\int_{-\infty}^\infty f(t)g(t-u)du$
Option C:	$\int_0^t f(t)g(t-u)du$
Option D:	$\int_0^t f(u)g(t-u)du$
8.	Find the analytic function whose real part is $x^2 - y^2 + 3y - 2x + 3$.
Option A:	$f(z) = z^2 + 2z + 3zi + c$
Option B:	$f(z) = z^2 - 2z - 3zi + c$
Option C:	$f(z) = z^2 + 3z - 2zi + c$
Option D:	$f(z) = z^2 - 3z - 3zi + 4$
9.	Which of following function is harmonic
Option A:	$v = e^{-x}\, sinhy$

Option B:	$v = e^x\, siny$
Option C:	$v = e^x\, coshy$
Option D:	$v = e^{-2x}\, sin3y$
10.	If f(z) = u + iv is analytic function then $f'(z)$ = ?
Option A:	$\frac{\partial u}{\partial x} + i\frac{\partial v}{\partial x}$
Option B:	$\frac{\partial u}{\partial x} - i\frac{\partial v}{\partial x}$
Option C:	$\frac{\partial u}{\partial x} + i\frac{\partial v}{\partial y}$
Option D:	$\frac{\partial u}{\partial x} - i\frac{\partial v}{\partial y}$
11.	Half Range Fourier Cosine Series of $f(x) = sinx,\ 0 \le x \le \pi$ is $\frac{a_0}{2} + \sum a_n\, cosnx$. What is the value of a_0?
Option A:	2
Option B:	4
Option C:	$\frac{2}{\pi}$
Option D:	$\frac{4}{\pi}$
12.	If $f(x) = x^2\ in\ (-\pi, \pi)$ has Fourier series,$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n cos\ nx + \sum_{n=1}^{\infty} b_n sin\ nx$ then then $a_0\ and\ b_n$ are equal to
Option A:	π/3 ,0
Option B:	4π/3 ,0
Option C:	$2\pi^2$/3 ,0
Option D:	2/3 , π
13.	If f(x) is periodic function with period 2L defined in the interval C to C+2L then Fourier coefficient b_n is
Option A:	$\int_C^{C+2L} f(x) sin\frac{n\pi x}{L}\, dx$
Option B:	$\frac{1}{L}\int_C^{C+2L} f(x) sin\frac{n\pi x}{L}\, dx$
Option C:	$\frac{1}{L}\int_C^{C+2L} sin\frac{n\pi x}{L}\, dx$
Option D:	$\frac{1}{L}\int_C^{C+2L} f(x) cos\frac{n\pi x}{L}\, dx$
14.	Calculate the value of a_n in half range sine series of f(x)=1 in $(0, \pi)$

Option A:	0
Option B:	1/2
Option C:	5/9
Option D:	1
15.	Which of the following is wave equation $\frac{\partial^2 u}{\partial t^2} - \alpha^2 \frac{\partial^2 u}{\partial x^2} = 0$ is
Option A:	$\frac{\partial^2 u}{\partial t^2} - \alpha^2 \frac{\partial^2 u}{\partial x^2} = 0$
Option B:	$\frac{\partial^2 u}{\partial t^2} + \alpha^2 \frac{\partial^2 u}{\partial x^2} = 0$
Option C:	$\frac{\partial u}{\partial t} - \alpha^2 \frac{\partial^2 u}{\partial x^2} = 0$
Option D:	$\frac{\partial^2 u}{\partial t^2} - \alpha^2 \frac{\partial u}{\partial x} = 0$
16.	Solve by method of separation of variable $\frac{\partial u}{\partial x} + 4\frac{\partial u}{\partial y} = 0$ given $u(0, y) = 8e^{-3y}$
Option A:	$u = e^{-12x-3y}$
Option B:	$u = 4e^{12x-3y}$
Option C:	$u = 8e^{12x-3y}$
Option D:	$u = 8e^{-12x+3y}$
17.	Find values of p, q if following is solution of $\frac{\partial^2 u}{\partial x^2} - 200\frac{\partial u}{\partial t} = 0, h = 0.1, k = 1.$ using Bender-Schmidt method.

t \ x	0	0.1	0.2	0.3	0.4	0.5
1	0	0.09	0.16	0.21	0.24	0
2	0	p	0.15	0.20	q	0

Option A:	$p = 0.08,\ q = 0.25$
Option B:	$p = 0.15,\ q = 0.23$
Option C:	$p = 0.23,\ q = 0.105$
Option D:	$p = 0.08,\ q = 0.105$
18.	Using Cayley Hamilton theorem A^3 for the matrix $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ is calculated from
Option A:	$4A^2 + 5A$
Option B:	$5A - 4A^2$
Option C:	$-4A^2 - 5A$
Option D:	$4A^2 - 5A$

19.	The sum and product of eigen value of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$
Option A:	7 and 7
Option B:	7 and 5
Option C:	5 and 6
Option D:	5 and 8
20.	$If A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ diagonalizable then Diagonal matrix is
Option A:	$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$
Option B:	$\begin{bmatrix} -1 & 0 & 0 \\ 0 & -3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$
Option C:	$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & -4 \end{bmatrix}$
Option D:	$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

Option 1

Q2 . (20 Marks Each)	**Solve any Four out of Six 5 marks each**
A	Evaluate $\int_0^\infty e^{-3t} \frac{\cos 4t - \cos 2t}{t} dt$
B	Find Inverse Laplace transform by convolution theorem $\frac{s}{(s^2+4)^2}$
C	Show that $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ is diagonalizable. Determine modal and diagonal matrix.
D	Find Fourier series of $f(x) = x^2$ in the interval $(-\pi, \pi)$.
E	Solve by Crank-Nicholson simplified formula $\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 0$

	$0 \le x \le 5$ subject to the condition $u(0,t) = 0, u(5,t) = 100$, $u(x,0)$ =20x, h=1 for one time step.
F	Determine the constant a, b, c, d if $f(z) = x^2 + 2axy + by^2 + i\,(cx^2 + 2dxy + y^2)$ is analytic.

Q3. (20 Marks Each)	**Solve any Four out of Six 5 marks each**
A	If $v = 3x^2y + 6xy - y^3$. Show that v is harmonic and find the corresponding analytic function.
B	Find half range sine series of $f(x) = lx - x^2; o < x < l$
C	Solve $\frac{\partial^2 u}{\partial x^2} - 32\frac{\partial u}{\partial t} = 0$ by Bender-Schmidt method, given $u(0,t) = 0\,, u(1,t) = t, u(x,0) = 0$ Assume h=0.25, $0 \le x \le 1$ & find the values of u up to t=5
D	If A=$\begin{bmatrix} 2 & 3 \\ -3 & -4 \end{bmatrix}$ Find A^{100}
E	Using partial fractions find the inverse Laplace transforms of $\frac{s}{(s-1)(s-2)(s-3)}$
F	Evaluate $L[t \sin^2 t]$

University of Mumbai

Examination 2020 under cluster KJSIEIT

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **SE (Civil) (REV-2019 ‘C’ Scheme) (Choice Based)**

Curriculum Scheme: Rev2019

Examination: SE Semester III (DSE)

Course Code: CEC302 and Course Name: Mechanics of Solids

Time: 2 hour Max. Marks: 80

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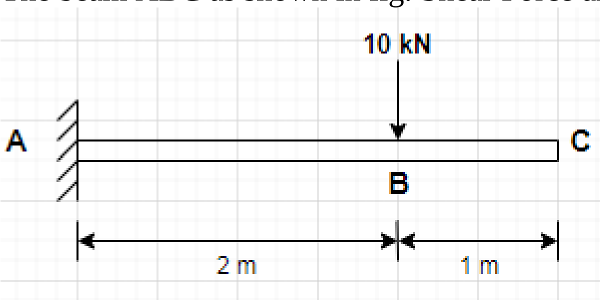
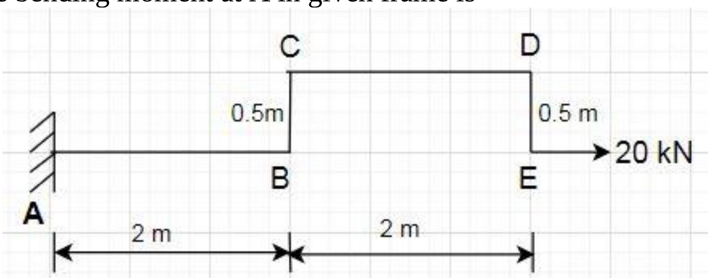
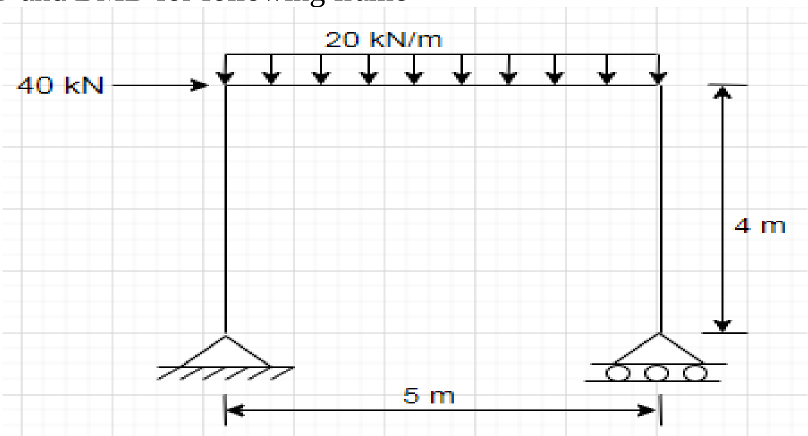
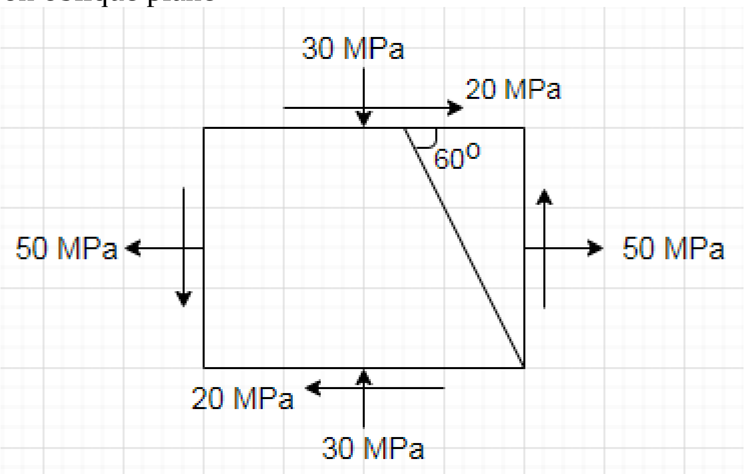
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	A thin cylindrical shell having diameter ‘d’, internal pressure ‘p’ and shell thickness ‘t’, the Longitudinal stress is given as
Option A:	pd/8t
Option B:	pd/4t
Option C:	pd/2t
Option D:	pd/t
2.	A cylinder is said to be thin if the ratio of its thickness to diameter is less than
Option A:	1/25
Option B:	1/20
Option C:	1/15
Option D:	1/10
3.	The beam ABC as shown in fig. Shear Force and Bending moment at **B** is 
Option A:	SF= 10 kN and BM = 20 kN-m
Option B:	SF= 10 kN and BM = Zero
Option C:	SF= Zero and BM = Zero
Option D:	SF = Zero and BM = 20 kN-m
4.	The bending moment at A in given frame is 

Option A:	80 kNm
Option B:	100 kNm
Option C:	10 kNm
Option D:	Zero
5.	A diagram which shows the variation of the axial load for all sections of the length of beam is called as
Option A:	Bending moment diagram
Option B:	Shear force diagram
Option C:	Thrust diagram
Option D:	Stress diagram
6.	A cantilever beam of length 4 carries clockwise couple of 20 kN-m. at free end, the shearing force at mid length is ----
Option A:	80 Kn
Option B:	40 Kn
Option C:	20 kN
Option D:	Zero
7.	The point of contra-flexure is indicate the location of
Option A:	Maximum Bending moment
Option B:	Maximum shear force
Option C:	Bending moment changes sign
Option D:	Shear force changes sign
8.	A portal frame ABCD, AB and CD vertical each 4 m. and BC horizontal 6 m. Support A is Hinged and support D is roller with roller base horizontal. At C, 10 kN Force acting vertically downward, the vertical reaction at support A is -----
Option A:	Zero
Option B:	10 Kn
Option C:	40 Kn
Option D:	60 kN
9.	The radius of Mohr's circle for two equals unlike principal stresses of magnitude p is
Option A:	P
Option B:	0.5 p
Option C:	Zero
Option D:	1.5 p
10.	If an element is subjected to pure shearing stress ‘τ’ then the maximum principle stress is equal to
Option A:	4 τ
Option B:	3 τ
Option C:	2 τ
Option D:	T
11.	Maximum shear stress occur on plane which makes an angle of ______ with plane of major principle stress
Option A:	30 degree

Option B:	45 degree
Option C:	90 degree
Option D:	180 degree
12.	For a circular shaft of diameter d subjected to torque T, the maximum value of the shear stress is
Option A:	$(64T) / (\pi d^3)$
Option B:	$(32T) / (\pi d^3)$
Option C:	$(16T) / (\pi d^3)$
Option D:	$(8T) / (\pi d^3)$
13.	The following assumption is not true in the theory of pure torsion
Option A:	The twist along the shaft is uniform
Option B:	The shaft is of uniform circular section throughout.
Option C:	Cross section of shaft, which is plane before twist remain plane4 after twist
Option D:	All the radii get twisted due to torsion.
14.	The maximum twisting moment a shaft can resist, is product of permissible shear stress and
Option A:	Moment of inertia
Option B:	Polar moment of inertia
Option C:	Polar modulus
Option D:	Modulus of rigidity
15.	The ratio of the moment of resistance of a solid circular shaft of diameter 'D' and hollow shaft having external diameter 'D' and internal diameter 'd' is
Option A:	$D^4/(D^4 - d^4)$
Option B:	$D^3/(D^3 - d^3)$
Option C:	$(D^4 - d^4) / D^4$
Option D:	$(D^3 - d^3) / D^3$
16.	Strain energy stored per unit volume of the materials when it is stressed to the proportional limit is called as ---
Option A:	Modulus of resilience
Option B:	Resilience
Option C:	Modulus of toughness
Option D:	Modulus of rupture
17.	If 'τ' is shear stress and C modulus of rigidity, then Strain Energy due to torsion in solid shaft is _________
Option A:	$U = (\tau^3/4C)X$ Volume
Option B:	$U = (\tau^2/4C)X$ Volume
Option C:	$U = (\tau^3/8C)X$ Volume
Option D:	$U = (\tau^3/4C)X$ Volume
18.	The strain energy stored due bending is expressed as
Option A:	$U = \int_0^L \frac{MXM}{2EI} dx$
Option B:	$U = \int_0^L \frac{MXM}{EI} dx$

Option C:	U = $\int_0^L \frac{2M}{EI} dx$
Option D:	U =$\int_0^L \frac{M}{EI} dx$
19.	In a linearly elastic structures, partial derivatives of the strain energy with respect to a load is equal to the deflection of the point where load is acting, the deflection being measured in the direction of load . this is known as
Option A:	Castigliano's theorem
Option B:	Bernauli's theorem
Option C:	Work Energy Principle
Option D:	Unit Load method
20.	"A displacement at point A due to load at point B is same as displacement of B due to the same load acting at point A", the displacement being measured in the directions of loads
Option A:	Mecaulay's Theorem
Option B:	Castigliano's Theorem
Option C:	Maxwell's Theorem
Option D:	Bernauli's theorem

Q2	**Solve any Four out of Six** **5 marks each**
A	A thin cylindrical shell 1.00 m diameter and 3 m in length has metal thickness of 8 mm. if it is subjected to internal pressure 2.5 MPa, determine change in length. Take E = 200 GPa and Poisson's ratio 0.3
B	Derive the relation between shear force, bending moment and rate of loading
C	In a strained body, Normal stresses are 100 Mpa and 50 MPa (both tensile) acted on two mutually perpendicular planes accompanied with shear stress of 20 MPa. Determine the Principle stresses using Mohr's circle method
D	Calculate the instantaneous stress produced in a bar of 15 cm^2 in area and 4 m long by suddenly application of tensile load of unknown magnitude, if the extension of bar due to suddenly applied load is 2 mm. also determine the suddenly applied load. Take E= $2x10^5$ N/mm^2.
E	Find maximum shear stress induced in a solid circular shaft of diameter 150 mm, when it transmits 120 kW power at 200 rpm.
F	A square steel bar of side 4 cm and length 3 m. is subjected to an axial pull of 128 kN, if E = 200 GN/m^2 Calculate energy stored in the bar.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Draw AFD, SFD and BMD for following frame 
B	In a strained material stresses are as shown. Find resultant stress in magnitude and direction on oblique plane 
C	A hollow shaft 1.6 m long has an outer diameter of 42 mm and is subjected to a tourque of 900 Nm,. If the permissible shear stress is 75 N/mm^2 and angle of twist shall not exceed 4 degree, find largest internal diameter take C = 77 GPa

University of Mumbai
Examination 2020 under cluster KJSIEIT

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **S.E. (Civil) (Rev-2019 'C' Scheme) (Choice Based)**

Curriculum Scheme: Rev-2019

Examination: SE Semester III (DSE)

Course Code: _CEC303_and Course Name: Engineering Geology

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.	The discontinuity between mantle and core is known as-----
Option A:	Gutenberg discontinuity
Option B:	Mohorovicic discontinuity
Option C:	Core mantle discontinuity
Option D:	Lehman discontinuity
2.	The midoceanic ridges have been formed due to the movement of …..
Option A:	Convergent plates
Option B:	Divergent plates
Option C:	Transform plates
Option D:	Destructive plates
3.	Frost action is the effect of-----
Option A:	Physical weathering
Option B:	Chemical weathering
Option C:	Biological weathering
Option D:	River weathering
4.	A mineral is a …………substance which has definite chemical composition, definite atomic structure and formed by …………processes of nature.
Option A:	Homogenous, organic
Option B:	Heterogenous,organic
Option C:	Homogenous ,inorganic
Option D:	Natural, organic
5.	In basalt, the grains are fine in size due to…
Option A:	Slow rate of cooling of magma
Option B:	Medium rate of cooling of magma
Option C:	Moderate rate of cooling of magma
Option D:	High rate of cooling of magma
6.	The secondary minerals like…… , ….are filled in the openings of basalt is called………
Option A:	Calcite,zeolite,amygdaloidal basalt
Option B:	Quartz,calcite,vesicular basalt
Option C:	Quartz,zeolite,compact basalt

Option D:	Serpentine,calcite,hydrothermally altered basalt
7.	Deposition of sediments into layers or beds is called………The planes dividing different beds are called …………
Option A:	The lamination, axial planes
Option B:	The lineation, strike lines
Option C:	The stratification, bedding planes
Option D:	The foliation, cleavages
8.	Contact metamorphism comes under…
Option A:	Thermal metamorphism
Option B:	Cataclastic metamorphism
Option C:	Regional metamorphism
Option D:	Plutonic metamorphism
9.	The parallel arrangement of platy or flaky minerals are found in …
Option A:	Marblem
Option B:	Gneiss
Option C:	Schist
Option D:	Quartzite
10.	By metamorphism, limestone converts into…
Option A:	Sandstone
Option B:	Marble
Option C:	Granite
Option D:	Conglomerate
11.	The strike is defined as the direction of a line formed by the intersection of a…
Option A:	Inclined Bedding plane and axial plane
Option B:	Inclined Bedding plane and vertical plane
Option C:	Inclined Bedding plane and fault plane
Option D:	Inclined Bedding plane and horizontal plane
12.	In isoclinal folds, the axial planes are-----------to each other.
Option A:	Parallel
Option B:	Horizontal
Option C:	Inclined
Option D:	Gently inclined
13.	Which mineral is formed due to evaporation process ?
Option A:	Halite
Option B:	Talc
Option C:	Quartz
Option D:	Serpentine
14.	The horizontal component of the fault is called…
Option A:	Net slip
Option B:	Heave
Option C:	Throw
Option D:	Strike slip

15.	In nonconformity, the older series is made up of --------
Option A:	Metamorphic rock
Option B:	Schist
Option C:	Primary rock
Option D:	Secondary rock
16.	Solifluction is downward movement of ----------
Option A:	Wet soil in the permafrost area
Option B:	Mud flow in the mountaineous area
Option C:	Debris flow along the river valley
Option D:	Rock fall along the weakness planes.
17.	Which is transverse wave ?
Option A:	P wave
Option B:	S wave
Option C:	Love wave
Option D:	Rayleigh wave
18.	The rock formation is porous but very difficult to drain out water from it.
Option A:	Sandstone
Option B:	Breccia
Option C:	Clay
Option D:	Gravel
19.	…………is the law of stratigraphy.
Option A:	Order of superposition
Option B:	Geological time scale
Option C:	Archean era
Option D:	Deccan trap
20.	When the peizometric surface is found above the ground surface, then………. is formed.
Option A:	Artesian well
Option B:	Non artesian well
Option C:	Flowing artesian well
Option D:	Nonflowing artesian well

Q2. **(20 Marks Each)**	
A	**Solve any Two (5 marks each)**
i.	Explain interior of the earth with labeled diagram.
ii.	Explain any two structures of sedimentary rock with diagrams.
iii.	A vertical borehole sunk from the upper bedding plane of a shale bed reaches the lower bedding plane at a depth of 150 m.It dips 35^0 westwards. Determine its true thickness and width of the outcrop on the level ground. (Scale : 1cm = 50m. Draw the bed by using given scale.)

B	**Solve any One** **(10 marks each)**
i.	Describe terminology of fold with diagram. Explain any two types of fold with diagram.
ii.	Describe the classification of igneous rock based on silica percent. Explain: Angular unconformity and Disconformity.
Q3. **(20 Marks Each)**	
A	**Solve any Two (5 marks each)**
i.	What are the zones of groundwater ? How is perched water table formed?
ii.	What are the precautionary measures for landslide ?
iii.	What are volcanic products ?
	.
B	**Solve any One** **(10 marks each)**
i.	Explain suitable and unsuitable geological structures for the construction of dam.
ii.	What is Run, core recovery and RQD? Calculate the value of Core Recovery and RQD from the following data. Mention your opinion.

Total Run =1.5 m.

Sr.No.	Length of core sample (in cm)	Nature of joints at lower end of core sample
1	10	N
2	6	N
3	12	N
4	13	N
5	6	N
6	2	M
7	5	M
8	5	M
9	3	N
10	17	M
11	16	N
12	3	M
13	2	M
14	4	N
15	40	N

University of Mumbai
Examination 2020 under cluster KJSIEIT
Examinations Commencing from 10th April 2021 to 17th April 2021
Program: **CIVIL ENGINEERING**
Curriculum Scheme: **Rev 2019**
Examination: **SE** Semester **III**
Course Code: **CE-C304** and Course Name: **Architectural Planning and Design of Buildings**
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.	Line up to which the plinth of a building adjoining a street may be law-fully extended is called?
Option A:	Building line
Option B:	Building boundary
Option C:	Building extend
Option D:	Building plan
2.	_______________ used to mean the regulation of admitting more or less sunshine in the room.
Option A:	Elegance
Option B:	Roominess
Option C:	Circulation
Option D:	Aspect
3.	The term ______________ is used to mean the link or access or movement between the various rooms and floors of building.
Option A:	Flexibility
Option B:	Prospect
Option C:	Circulation
Option D:	Elegance
4.	A ________________ is a set of rules that specify the standards for constructed objects such as buildings and non-building structures.
Option A:	Building code
Option B:	Building bye-laws
Option C:	IS code
Option D:	Procedure
5.	In the classroom minimum window area required is
Option A:	10% of floor area
Option B:	15% of floor area
Option C:	20 % of floor area
Option D:	25% of floor area
6.	In a school, no.of drinking water foundations required are
Option A:	1 per 30
Option B:	1 per 40

Option C:	1 per 50
Option D:	1 per 60
7.	In hospital ward minimum ventilation area required is
Option A:	10% of floor area
Option B:	20% of floor area
Option C:	25% of floor area
Option D:	30% of floor area
8.	As per National building code, the minimum width of staircase in public building is
Option A:	1.0 m
Option B:	1.2 m
Option C:	1.5 m
Option D:	1.8 m
9.	The perspectives of all horizontal lines inclined at 45 degrees to the picture plane converge to a distance points on the ________________
Option A:	ground line
Option B:	perpendicular axis
Option C:	horizon line
Option D:	center of vision
10.	When an object has its two faces inclined to the picture plane, its perspective is called __________ perspective also called two point perspectives.
Option A:	Parallel
Option B:	Oblique
Option C:	Angular
Option D:	Vanishing
11.	Recreational zone is creating for
Option A:	Professional Meeting
Option B:	Industrial Manufacturing
Option C:	Entertainment activity
Option D:	Business activity
12.	___________ means demolishing old structure and replacing same with new structure with new dimension and space
Option A:	Development
Option B:	Planning
Option C:	Demolization
Option D:	Redevelopment
13.	For a gold LEED certification, how many points are required?
Option A:	40-49
Option B:	60-79
Option C:	50-59
Option D:	80-110
14.	GRIHA means

Option A:	Green Rating for Integrated Habitat Assessment
Option B:	Green Rating for Integrated Habitat Aspect
Option C:	Green Research for Integrated Habitat Aspect
Option D:	Green Research for Integrated Habitat Assessment
15.	The part of the building above the ground level and up to the floor level immediately above the ground is known as ___________
Option A:	Plinth area
Option B:	Lintel level
Option C:	Ground level
Option D:	Plinth
16.	The height of the Plinth should not be less than ___________
Option A:	45 cm
Option B:	1.2 m
Option C:	1.5 m
Option D:	50 cm
17.	The minimum distance between school building and a source of continuous noise is
Option A:	100m
Option B:	200m
Option C:	300m
Option D:	500m
18.	For primary school, the class room is designed at the rate of
Option A:	0.5 m^2/pupil
Option B:	0.9 m^2/pupil
Option C:	1.2 m^2/pupil
Option D:	1.5 m^2/pupil
19.	In the classroom minimum window area required is
Option A:	10% of floor area
Option B:	15% of floor area
Option C:	20 % of floor area
Option D:	25% of floor area
20.	In public buildings, the tread of a stair may vary between
Option A:	100 mm to 150 mm
Option B:	150 mm to 200 mm
Option C:	200 mm to 250 mm
Option D:	250 mm to 300 mm

Q2	**Solve any One** **20 marks**
A	It is proposed to construct a **high school** building in a district place as (G+1) R.C.C. Framed structure with the following facilities (a) No. of Class rooms =10 no.(each having 75 sq.m. carpet area)

	(b)No. of Labs =4 no. (75sq.m. each) (c)No. of Drawing rooms =3 no. (60 sq.m. each) (d)Computer room =60 sq.m. (e)Principal's room =45 sq.m. (f) Office =75 sq.m. (g)Library –cum-reading Room =75sq.m. (h)Gymkhana =100 sq.m. (i) Canteen =60 sq.m. (j) Indoor games =100 sq.m. (k)Assume floor to floor height as 3.5m provide adequate passages, Staircases, Toilet/sanitary units as per the bye-laws. Draw the following according to some suitable scale. GROUND FLOOR PLAN (double line plan) 15 marks FIRST FLOOR PLAN (single line plan) 05 marks
B	Type of Building-**Hospital** For G+1 framed structure. The requirement are as follows A)waiting hall -24 sq.m B) Consulting room (2 nos.) -12 sq.m C)General ward - 50 sq.m D)Store room -24 sq.m E)Office- 22 sq.m F)medical Store -14 sq.m G)nurse room -20sq.m H)operation theatre -50 sq.m 3 nos.of toilet for each gents and ladies Provide adequate passage, stairs,entrance etc. GROUND FLOOR PLAN (double line plan) 15 marks FIRST FLOOR PLAN (single line plan) 05 marks

Q3	**Solve any one** **20 marks**
A	Write short notes on the following (Five marks each)
	(a) Green Building
	(b) Master plan
	(c) uses of computers in building drawing
	(d) Green belt
B	Draw the Two-point perspective with the following data Size of Dining hall=20m x 12 m. Plinth height=0.6 m Floor to floor height =4.0m parapet wall=1m Assume the eye level at 2.5 m. from Ground level

University of Mumbai
Examination 2020 under cluster KJSIEIT
Examinations Commencing from 10 April 2021 to 17 April 2021
Program: Civil Engineering
Curriculum Scheme: Rev2019
Examination: SE Semester: III
Course Code: CEC305 and Course Name: Fluid Mechanics -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.	Which of the following is a shear-thinning fluid?
Option A:	Bingham plastic
Option B:	Rheopectic
Option C:	Dilatant
Option D:	Pseudoplastic
2.	During a fluid flow, the temperature is developed due to
Option A:	Increase in density
Option B:	Change in pressure
Option C:	Translational Kinetic Energy
Option D:	Fluid level
3.	The line of action of buoyant force acts through the …
Option A:	Centroid of the displaced volume of fluid
Option B:	Centre of the volume of the floating body
Option C:	Centre of gravity of any submerged body
Option D:	Centre of the volume of fluid vertically above the body
4.	The principle of floatation of bodies is based on
Option A:	Newtons first law
Option B:	Newtons law of viscosity
Option C:	None of the mentioned
Option D:	Metacenter
5.	In unstable equilibrium what is the relation between forces?
Option A:	Buoyancy force < Weight of body
Option B:	Buoyancy force > Weight of body
Option C:	Buoyancy force= Weight of body
Option D:	Gravity force = Buoyancy force
6.	The velocity of a point in a flow is
Option A:	along the streamline
Option B:	along the path line
Option C:	tangent to the path line
Option D:	tangent to the streamline

7.	The observer remains stationary and observes changes in the fluid parameters at a particular point only, this situation happens in which method
Option A:	Lagrange method
Option B:	Eulerian method
Option C:	Stationary method
Option D:	All of the above
8.	Navier- Stokes equation describes the motion of ___________
Option A:	Solid substance
Option B:	Non-viscous fluid
Option C:	Viscous fluid
Option D:	Gas
9.	The Bernoulli’s equation in fluid dynamics is valid for
Option A:	Compressible flows
Option B:	Transient flows
Option C:	Continuous flows
Option D:	Viscous flows
10.	The large orifice is identified by condition when
Option A:	If the head of liquid is less than 5 times the depth of orifice
Option B:	If the head of liquid is less than 2.5 times the depth of orifice
Option C:	If the head of liquid is less Hence, 4 times the depth of orifice
Option D:	If the head of liquid is less than 1.5 times the depth of orifice
11.	For measuring flow by a venturi meter, it should be installed in
Option A:	vertical line
Option B:	horizontal line
Option C:	Inclined line with upward flow
Option D:	In any direction and at any location
12.	Euler's equation of motion for liquids is based on the assumption that the
Option A:	flow is streamline
Option B:	flow takes place continuously
Option C:	flow is homogeneous and incompressible
Option D:	flow is irrotational
13.	The lower end of the pitot tube is bet at an angle of
Option A:	90 degrees
Option B:	360 degrees
Option C:	120 degrees
Option D:	45 degrees
14.	The discharge through an orifice fitted in a tank can be increased by
Option A:	fitting a short length of pipe to the outside
Option B:	sharpening the edges of the orifice
Option C:	fitting a long length of pipe to the outside
Option D:	all of the above

15.	. What happens to the buoyant force acting on the airship as it rises in the air?
Option A:	Buoyant force increases
Option B:	Buoyant force decreases
Option C:	Buoyant force remains constant
Option D:	Buoyant force first increases then shows decrease
16.	A fluid flow in which the quantity of liquid flowing per second is constant is called as
Option A:	Steady flow
Option B:	Streamline flow
Option C:	Turbulent flow
Option D:	Unsteady flow
17.	The sound wave is transmitted through liquids as_
Option A:	Longitudinal waves
Option B:	Transverse waves
Option C:	Elongated waves
Option D:	Refracted waves
18.	Which among the following is an assumption of the compressible flow?
Option A:	Resistance to flow of object
Option B:	No-slip condition
Option C:	Known mass flow rate
Option D:	Resistance to flow of heat
19.	What is Mach number?
Option A:	Speed of object * speed of sound
Option B:	Speed of object /speed of sound
Option C:	Speed of object + speed of sound
Option D:	Speed of object- speed of sound
20.	Which of the following law is employed in the derivation of stagnation point.
Option A:	Hooke’s law
Option B:	Poisson’s law
Option C:	Second law of thermodynamics
Option D:	First law of thermodynamics

Q2	**Solve any Four out of Six** **05 marks each**
A	Define Metacenter and derive expression for metacentric height by analytical method.
B	The velocity potential function (ϕ) is given by an expression $\phi = \frac{-xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$ Find the velocity components in x and y direction
C	Explain different types of fluid flow.
D	Water is flowing through a pipe having diameters 300mm and 200mm at the bottom and top respectively. The intensity of pressure at the bottom end is 35 N/cm2 and pressure at the upper end is 12 N/cm2. Determine the difference in datum head if the rate of flow is 60 lit/sec.
E	State Bernoulli's theorem for steady flow of an incompressible fluid and derive expression for Bernoulli's equation from first principle.
F	Define Mach no and also explain subsonic, sonic and supersonic flows.

Q3.	**Solve any Four out of Six** **05 marks each**
A	Describe the term stability of floating and submerged body.
B	The velocity vector in a fluid flow is given by, $V = 4x^3 i - 10x^2 yj + 2tk$ Find the velocity and acceleration of a fluid particle at (2, 1, 3) at time t = 1.
C	Explain the term stream line, equipotential line and flow net.
D	A horizontal venturi meter with inlet and throat diameters 30cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20cm of mercury. Determine the rate of flow. Take Cd = 0.98
E	Derive Euler's equation of motion.
F	Draw diagram showing the propagation of pressure waves during the motion of a projectile with steady velocity when a) Mach no. is less than 1 b) When Mach no. is equal to 1