ANJUMAN-I-ISLAM'S

AKTC KALSEKAR TECHNICAL CAMPUS
INNOVATIVE TEACHING · EXUBERANT LEARNING

Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2021-22/   Date: 02/08/2022

School: <u>SoET-REV. C-SCHEME</u>   Branch: **CIVIL ENGG.**   SEM: ____IV____

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following **Semester/Unit Test-I/Unit Test-II (Reg./ATKT)** question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format SC	Format HC	No. of Copies
1	Applied Mathematics- IV	CE-C401	✓		
2	Structural Analysis	CE-C402		✓	
3	Surveying	CE-C403		✓	
4	Building Materials & Concrete Technology	CE-C404		✓	
5	Fluid Mechanics-II	CE-C405	✓		

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

CE & ME R-19 'C'
Evening 17/5/2022

Course Code: PEC401   Course Name : Engineering Mathematics-4
Time: 2 hour 30 minutes   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Find the angle between the normals to the surface $xy = z^2$ at the points $(1,4,2)$ and $(-3,-3,3)$.
Option A:	$sec^{-1}(\frac{1}{\sqrt{22}})$
Option B:	$cos^{-1}(\frac{1}{\sqrt{22}})$
Option C:	$sec^{-1}(\frac{1}{\sqrt{2}})$
Option D:	$cos^{-1}(\frac{1}{\sqrt{2}})$
2.	Using Stoke's theorem, $\int_C \bar{F}.\overline{dr}$ where $\bar{F} = yzi + xzj + xyk$ and C is the boundary of the circle $x^2 + y^2 + z^2 = 1, z = 0$ is
Option A:	-13
Option B:	33
Option C:	13
Option D:	0
3.	If correlation coefficient, $r = 0.6$ then $b_{yx} = 1.2$ then b_{xy}=?
Option A:	0.45
Option B:	0.2
Option C:	0.72
Option D:	0.3
4.	If two variables oppose each other then the correlation will be
Option A:	Positive correlation
Option B:	Negative correlation
Option C:	Perfect correlation
Option D:	No correlation
5.	In a Poisson distribution if $P(X = 2) = P(X = 3)$ then $P(X = 5)$ is
Option A:	0.84125
Option B:	0.084125

| Option C: | 0.37256 |
| Option D: | 0.037256 |

6.	For a probability density function of a continuous random variable, the probability of a single point is
Option A:	1
Option B:	2
Option C:	0
Option D:	constant

7.	Which of the following tests would be used to test the mean of a continuous random variable to a population mean?
Option A:	One-sample t-test
Option B:	Independent-samples t-test
Option C:	Chi-squared t-test
Option D:	Dependent-samples t-test

8.	Which of the following is not true for a normal distribution?
Option A:	It is a symmetrical distribution.
Option B:	The mean is always zero.
Option C:	The mean, median, mode are always equal.
Option D:	It is a bell-shaped distribution.

9.	The value of $\int_c \frac{\sin z \, dz}{z^6}$, where c is the circle $	z	= 1$ is
Option A:	$\frac{2\pi i}{25}$
Option B:	$\frac{\pi i}{60}$
Option C:	$\frac{3\pi i}{20}$
Option D:	$\frac{5\pi i}{12}$

10.	The value of integral $\oint_c \frac{1}{z-1} \, dz$, where c is $	z - 1	= 2$ is
Option A:	0
Option B:	1
Option C:	$-2\pi i$
Option D:	$2\pi i$

| Q2 | Solve any Four out of Six | 5 marks each |
| A | Obtain Laurent's expansion of $f(z) = \frac{z-1}{z^2-2z-3}$ in (i) $1 < |z| < 3$ (ii) |

	$\|z\| > 3$
B	The following results of ranks of were recorded for 11 students. Find Spearman's rank correlation coefficient between the ranks obtained.

Pre-module	Post-module
18	22
21	25
16	17
22	24
19	16
24	29
17	20
21	23
23	19
18	20
14	15

C	A person draws 3 balls from a bag containing 7 blue, 5 yellow, 3 purple balls. He is offered Rs. 7, Rs. 5, Rs. 3 if he draws 3 balls of same colour, 2 balls of same colour, 1 ball of each colour respectively. Find his expectation.
D	A brochure inviting subscriptions for a new diet program states that the participants are expected to lose on an average 22 pounds in five weeks. Suppose that, from the data of the five-week weight losses of 26 participants, the sample mean and sample standard deviation are found to be 23.5 and 10.2, respectively. Could the statement in the brochure be substantiated based on these findings? Test at the $\alpha = 0.05$ level of significance.
E	Evaluate using Green's theorem $\int_c (x^2y\,dx + y^3\,dy)$ where c is the boundary of the region bounded by $y = x^2$ and $y = x$ from $(0,0)$ to $(1,1)$ then to $(0,0)$ traversed in positive sense
F	Show that the vector, $\bar{F} = (x^2 - yz)i + (y^2 - xz)j + (z^2 - xy)k$ is irrotational and hence, find $\emptyset$ such that $\bar{F} = \nabla\emptyset$.
Q3	**Solve any Four out of Six** **5 marks each**
A	The IQs of individuals admitted to a state school for the mentally retarded are approximately normally distributed with a mean of 60 and a standard deviation of 10. (a) What is the probability that an individual picked at random will have an IQ between 55 and 75? (b) what is the lowest IQ of top 30% individuals?
B	If the mean age at death of 64 men engaged in an occupation is 52·4 years with standard deviation of 10·2 years, what are the 98% confidence limits for the mean age of all men in that population? Also determine can it be safely assume at 5% level of significance that that mean age of death of population is 56?
C	If the directional derivative of $\emptyset = ax^2 + by + 2z$ at $(1,1,1)$ is maximum in the direction of $i + j + k$, find a and b.
D	Evaluate $\int_c \frac{(12z-7)\,dz}{(z-1)^2(2z+3)}$, where c is the circle (i) $\|z + i\| = \sqrt{3}$

E	Use Stokes' theorem to evaluate $\int_c \bar{F}.d\bar{r}$ where $\bar{F} = (x^2 - y^2)i + 2xyj$ and c is the boundary of region bounded by $y = 0, x = 2, y = x$ in the xy plane.
F	For given the table of points <table><tr><td>X</td><td>0</td><td>2</td><td>4</td><td>6</td><td>8</td><td>12</td><td>20</td></tr><tr><td>Y</td><td>10</td><td>12</td><td>18</td><td>22</td><td>20</td><td>30</td><td>30</td></tr></table>Use normal equations, fit the straight line $y = ax + b$ to the data and find the value of $y(22)$.
Q4	**Solve any Four out of Six** **5 marks each**
A	In a study of the effectiveness of an insecticide against a certain insect, a large area of land was sprayed. Later the area was examined for live insects by randomly selecting squares and counting the number of live insects per square. Past experience has shown the average number of live insects per square after spraying to be 0.5. If the number of live insects per square follows a Poisson distribution, find the probability that a selected square will contain: (a) One or more live insects (b) Two live insects
B	On an average 20% of population in an area, suffer from T.B. What is the probability that out of 6 persons chosen at random from this area (a) at least 2, (b) none suffer from T.B.?
C	Evaluate $\int_c \bar{F}.d\bar{r}$ where $\bar{F}=yzi + (xz + 1)j + xyk$ along the line joining A (1,0,0) to B (2,1,4).
D	The following figures show the distribution of the digits in numbers chosen at random chosen from a telephone directory. Test at 5% level whether the digits may be taken to occur equally frequently in the directory. <table><tr><td>Digits</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>Frequ.</td><td>1026</td><td>1107</td><td>997</td><td>966</td><td>1075</td><td>933</td><td>1107</td><td>972</td><td>964</td><td>853</td></tr></table>
E	Show that $\bar{F}= (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$ is both irrotational and solenoidal.
F	Use divergence theorem to show that $\iint_s \bar{N}.\nabla r^2 \, ds = 6V$ where S is any enclosed surface enclosing volume V.

University of Mumbai
Examinations Summer 2022
Program: Civil Engineering
Curriculum Scheme: Rev – 2019, C Scheme
Examination: SE Semester IV
### Course Code: CEC 402 and Course Name: Structural Analysis

Time: 2 hour 30 minutes   Max. Marks: 80

20/5/2022

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Force in member BC=
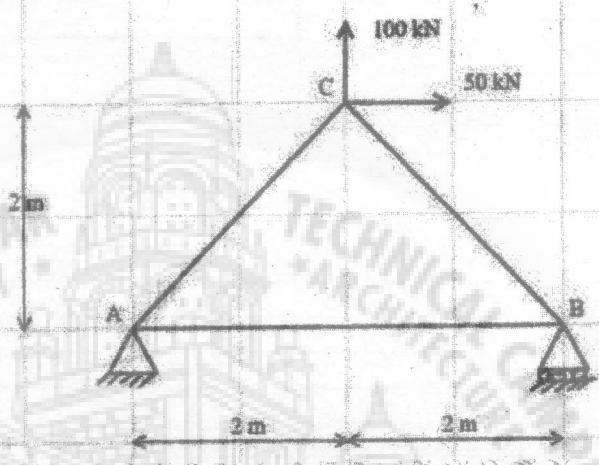
Option A:	35.35 kN (C)
Option B:	35.35 kN (T)
Option C:	17.68 kN (C)
Option D:	17.68 kN (T)

2.	A 3-hinged symmetrical parabolic arch is subjected to a UDL of (w/unit run) over the entire span. The bending moment at quarter span is
Option A:	$wl^2/8$
Option B:	$wl^2/12$
Option C:	Zero
Option D:	$wl^2/24$

3.	Shape factor for the triangular cross section of beam of base 'b' and height 'h' is
Option A:	3.34
Option B:	2.34
Option C:	1.69
Option D:	3.69

4.	The ratio of stiffness of any member to that of total stiffness of all members meeting at a joint is called
Option A:	stiffness factor
Option B:	distribution factor
Option C:	rotation factor
Option D:	carry over factor

5.	What is B.M. diagram Area for Simply supported beam of span 5m and carrying UDL 12KN/m?
Option A:	125
Option B:	37.5
Option C:	150

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Option D: 50

6. Choose the correct option ILD for SF at C
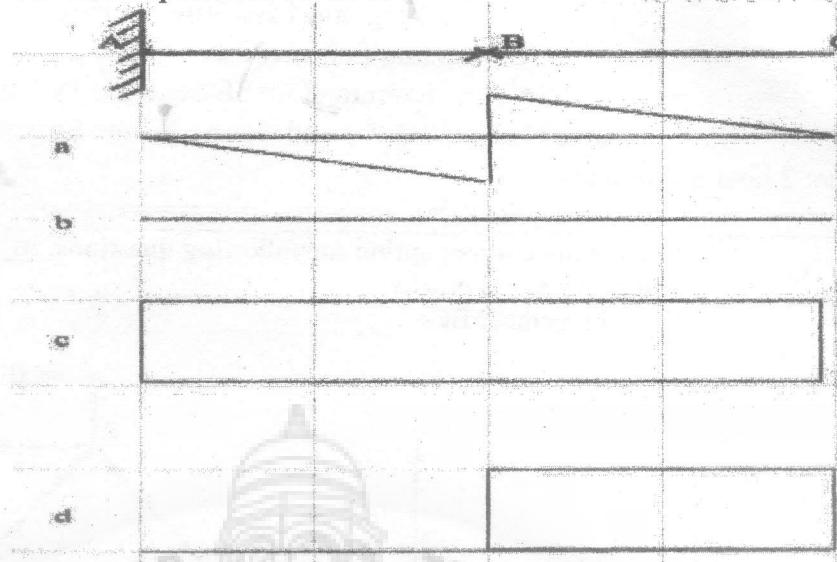
Option A:	a
Option B:	b
Option C:	c
Option D:	d

7. For a propped cantilever beam with udl over entire span plastic moment capacity will be

Option A:	$\dfrac{wL^2}{8}$
Option B:	$\dfrac{wL^2}{11.656}$
Option C:	$\dfrac{wL^2}{12}$
Option D:	$\dfrac{wL^2}{16}$

8. Static and Kinematic indeterminacy for the structure given below
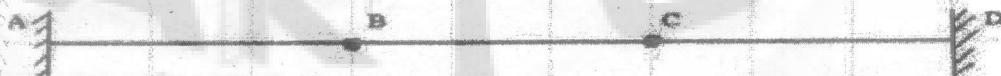
Option A:	0 & 6
Option B:	1 & 5
Option C:	2 & 4
Option D:	1 & 5

9. Static and Kinematic indeterminacy for the structure given below

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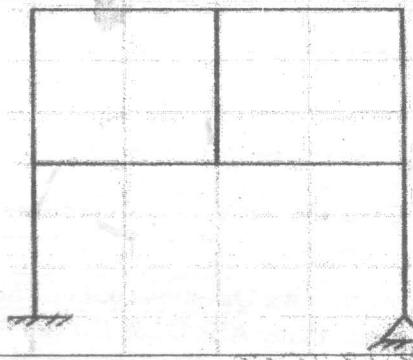
Option A:	08 & 10
Option B:	09 & 09
Option C:	10 & 08
Option D:	09 & 10

10.	Any member of a pin jointed plane truss is subjected to
Option A:	shear force only
Option B:	bending moment only
Option C:	shear force and bending moment only
Option D:	axial force only

Q2.	**Solve any Two Questions out of Three** **10 marks each**
A	Determine the forces in all members for a fig shown below
B	A 3-hinged symmetrical parabolic arch ACB has a span of 40 m. It has a central rise of 6 m. Two hinges are at the left support A & right support B. At crown C, there is an internal hinge. Left part AC carries a UDL of 10 kN/m. At crown C, there is a downward point load of 20 kN. Calculate radial shear, normal thrust & bending moment at 3 m from the left hinge A.
C	A simply supported girder AB of span 30 m is traversed by a system of wheel load in figure given below. Calculate i. Maximum BM at section "C" 10 m away from the left support ii. Location and magnitude of absolute maximum BM
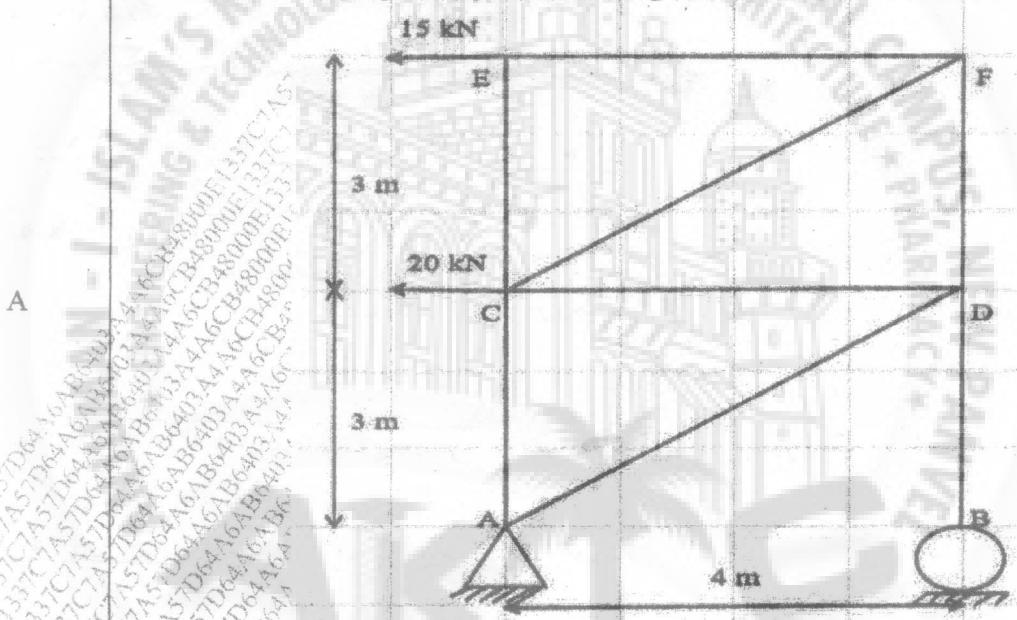
3 | Page

| Q3	Solve any Two Questions out of Three	10 marks each
A	A portal frame ABCD has left end A hinged & right end D roller-supported. The height of the frame is 6 m. The left vertical column AB carries a point load of 20 kN(from left to right) at mid-point E. Beam BC of length 5 m. carries a UDL of 10 kN/m on its entire length. All the members have uniform flexural rigidity. Using Unit Load Method (Virtual Work Method), calculate the horizontal deflection of roller support D.	
B	Find Plastic Moment carrying capacity "Mp" for a continuous beam shown in fig below	
C	Analyze continuous beam by using three moment theorem.	

Q4	Solve any Two Questions out of Three	10 marks each
A	i. Draw stress diagram of elastic state, elastoplastic state and fully plastic state for a beam of rectangular cross section. ii. Find the shape factor and plastic moment for the I- Section having flange 200 mm x 20 mm. and web 400 mm x 10 mm, if the permissible yield stress in tension and compression is 250 MPa.	
B	Analyze the frame given below by using Flexibility method and draw BMD	

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Analyze two span continuous beam as shown in fig. by stiffness method.

C

15 kN/m
20 kN

A
B
D
C

10 m
5m
5m

I
3I

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Q.P. Code :- 93582

23/05/2022
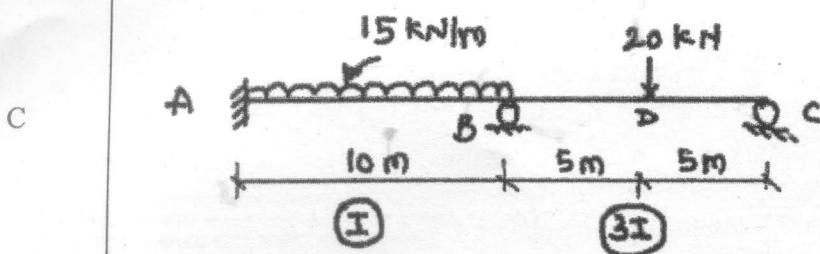
University of Mumbai
Examination First Half 2022

Examinations Commencing from 17th May 2022 to 30th May 2022
Program: Civil Engineering
Curriculum Scheme: R-2019 'C' Scheme
Examination: SE   Semester: IV
Course Code: CEC403 and Course Name: Surveying

Time: 2hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	A survey is treated as plain survey when the area under consideration is
Option A:	Less than 260 sq. km
Option B:	More than 260 sq. km
Option C:	Less than 300 sq. km
Option D:	More than 300 sq.km
2.	The Dip of the needle is .... angle.
Option A:	Horizontal
Option B:	Vertical
Option C:	Neutral
Option D:	Azimuth
3.	The vertical distance between any two consecutive contours is called
Option A:	contour gradient
Option B:	contour interval
Option C:	inverted counter
Option D:	contour dimension
4.	If the coordinates of P are 200N and 100E and those of Q are 200S and 100E, then the length PQ is
Option A:	100m
Option B:	200m
Option C:	300m
Option D:	400m
5.	The principle of plane tabling is ....
Option A:	Triangulation
Option B:	Traversing
Option C:	Swinging
Option D:	Parallelism
6.	When the first reading taken on a staff on a BM of RL 103.45m, is 2.875m. The height of instrument is ......
Option A:	106.325 m.
Option B:	2.875 m.
Option C:	100.575 m.
Option D:	103.45 m.

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7.	The chord of a curve less than peg interval, is known as
Option A:	Normal chord
Option B:	Sub chord
Option C:	Small chord
Option D:	Short chord

8.	The working principle of tacheometry is based on
Option A:	Right angle triangle
Option B:	Isosceles tringles
Option C:	Rectangle
Option D:	Square

9.	The Simpson's rule of computing area is applicable only when number of ordinates is ……….
Option A:	EVEN
Option B:	ZERO
Option C:	INFINITE
Option D:	ODD

10.	For a horizontal line of sight, horizontal distance in tacheometry is given by
Option A:	$(f*s) + (f+d)$
Option B:	$(f/s)*i + (f-d)$
Option C:	sf/fd
Option D:	$(f/i)*s + (f+d)$

Q2	Solve any Two Questions	10 marks each
	Following Bearing were observed in the field where local attraction was suspected.	

	LINE	FB	BB
A	AB	66°15'	244°00'
	BC	129°45'	313°00'
	CD	218°30'	37°30'
	DA	306°45'	126°45'

Find the Correct Magnetic Bearings and True Bearings if Magnetic Declination is 1°40'E.

B	The following consecutive readings were taken at 30m interval on a continuously sloping ground with a level and 4m levelling staff. 0.680 (on A), 1.455, 1.855, 2.330, 2.885, 3.380, 1.055, 1.860, 2.265, 3.540, 0.835, 0.945, 1.530 and 2.250 (on B). The RL of the point A was 80.750m. Find the gradient of line AB.
C	Explain in detail the road project executed in survey camp and state the utility of the same for a civil engineer.

Q3	Solve any Two Questions	10 marks each

A In a closed traverse PQRSTP, the following lengths and bearing of the sides were observed

LINE	Length (m)	Bearing
PQ	725	120°15'
QR	?	?
RS	1250	322°24'
ST	945	235°18'
TP	577.20	182°40'

Compute the length and bearing of side QR?

B A fixed hair tacheometer fitted with an anallatic lens and having its constant 100, was set up at station C and the following observations were taken on vertically held staff:

Station sighted	Bearing	Stadia reading		Axial hair reading	Vertical angles
		Bottom	Top		
A	320°40'	0.915	2.585	1.750	+10°36'
B	50°40'	0.765	3.655	2.210	+8°54'

Calculate the gradient from point A to point B

C Write notes on
i) Total Station
ii) Radial Contouring

Q4	Solve any Two Questions out of Three	10 marks each

A Compute the following area enclosed between the chain line, irregular boundary line and end offsets by
   i) Simpson's Rule
   ii) Trapezoidal Rule

CH (m)	0	20	40	60	80	95	110	140	170	200
Offsets (m)	6.7	5.8	10.3	12.8	9.7	8.8	6.9	8.2	6.5	5.8

B Tabulate the necessary data to set out a right-handed simple circular curve of 600 m radius to connect two straights intersecting at a chainage of 3605 m by deflection angle method, the angle of intersection being 155° and peg interval 30 m.

C Explain with suitable diagrams (Any Two)
   i) Characteristics of Contours
   ii) Methods of PTS
   iii) GPS
   iv) Reciprocal Ranging

University of Mumbai

Examinations Summer 2022
Program: **Civil Engineering**
Curriculum Scheme: Rev-2019 'C' Scheme
Examination: SE Semester: IV
Course Code: **CEC404**
Course Name: **Building Materials and Concrete Technology**

QPcode: 93501

26/05/2022

Max. Marks: 80

Note: Assume suitable data wherever necessary

Q1 (20 Marks)	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	An ultrasonic pulse velocity test is an _____
Option A:	Ex-situ, nondestructive test
Option B:	In-situ, nondestructive test
Option C:	Ex-situ, destructive test
Option D:	In-situ, destructive test
2.	The commonly used raw material in the manufacture of cement, is
Option A:	slate
Option B:	sand stone
Option C:	lime stone
Option D:	basalt
3.	Knots in timber are
Option A:	Defects caused by crushing fibres
Option B:	Splits radiating from the Centre
Option C:	Speckled strains
Option D:	Signs of branches cut off
4.	One of the main demerits in using the lime mortar is that it
Option A:	is not durable
Option B:	does not set quickly
Option C:	swells
Option D:	is plastic
5.	Due to _____ the dampness finds its way to the floors through the substructure.
Option A:	Action of rain
Option B:	Exposed tops of walls
Option C:	Raising of moisture from ground
Option D:	Condensation
6.	Flaky particles have
Option A:	Small thickness
Option B:	Elongated sides
Option C:	Sharp edges
Option D:	Rounded edges
7.	Initial setting of cement is caused due to

Option A:	Tri-calcium silicate
Option B:	Di-calcium silicate
Option C:	Tri-calcium aluminate
Option D:	Tetra calcium alumino ferrite

8.	Fine aggregates are the aggregates having the size less than:
Option A:	5 mm
Option B:	4.75 mm
Option C:	10 mm
Option D:	2 mm

9.	Bulking of sand is due to
Option A:	water films
Option B:	swelling of sand
Option C:	added mass of water
Option D:	Presence of air

10.	In India, concrete mix design for RCC is carried out using IS _____ code.
Option A:	10262
Option B:	10500
Option C:	800
Option D:	383

Q2(20 Marks)	Solve any Four out of Six	5 marks each
A	Classify the building materials and discuss the role of materials in construction.	
B	Explain different types of mortars.	
C	Discuss the methods of determining compressive Strength of accelerated-cured concrete test specimens	
D	Discuss the defects in the timber with neat sketches.	
E	Write short note on Autoclaved Aerated Concrete (AAC) blocks	
F	What are retarders and accelerators? Explain their uses.	

Q3 (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Explain the dry process of manufacture of cement.	
B	Design the concrete mix a) Grade designation : M35 b) Type of cement : PPC c) Maximum nominal size of aggregate : 20 mm d) Minimum cement content: 320 kg/m^3 and maximum water-cement ratio 0.45 to be adopted and/or : Severe (for reinforced concrete) e) Workability : 75 mm (slump) f) Method of concrete placing : Non pumpable g) Degree of site control : Good h) Type of aggregate : Crushed angular aggregate j) Maximum cement content not including fly ash : 450 kg/m3	

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	k) Specific gravity of
	1) Specific gravity of cement : 2.6
	2) Coarse aggregate [at saturated surface dry : 2.6 (SSD) Condition]
	3) Fine aggregate [at saturated surface dry : 2.7 (SSD) Condition]
	4) Chemical admixture (Superplasticizer) : 1.2
	l) Water absorption
	1) Coarse aggregate : 0.5 percent
	2) Fine aggregate : 1.0 percent
	m) Moisture content of aggregate
	1) Coarse aggregate : Nil
	2) Fine aggregate : Nil
	n) Fine aggregate : Conforming to grading Zone II of Table 9 of IS 383
	o) Standard Deviation:5 N/mm^2
	Refer tables given at the end of the paper.
C	Explain following nondestructive testing methods : a) Rebound Hammer Test b) Ultrasonic Pulse Velocity Test

Q4 (20 Marks)		
A	Solve any Two	5 marks each
i.	Explain defects in painting.	
ii.	Define durability and explain factors affects durability.	
iii.	Explain demerits of distemper as compared to paints.	
B	Solve any One	10 marks each
i.	What is the RMC? Explain its advantages, components and Layout of RMC with neat sketches.	
ii.	Explain Laboratory tests on durability of concrete a) Permeability test, b) Rapid chloride penetration test (RCPT)	

Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Aggregate

(Clause 5.3)

Sl No. (1)	Nominal Maximum Size of Aggregate mm (2)	Water Content[1] kg (3)
i)	10	208
ii)	20	186
iii)	40	165

[1] Water content corresponding to saturated surface dry aggregate.

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Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50

(Clause 5.5)

Sl No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.54	0.52	0.50	0.48
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.73	0.72	0.71	0.69

Q.P. Code:-93803

30/05/2022

University of Mumbai

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

Examinations Commencing from 17th May 2022 to 17th June 2022
Program: Civil Engineering
Curriculum Scheme: Rev2019
Examination: SE Semester IV
Course Code and Course Name: Fluid Mechanics-II

Time: 2 hour 30 minutes   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The value of bulk modulus of a fluid is required to determine
Option A:	Reynold's number
Option B:	Froude's number
Option C:	Mach number
Option D:	Euler's number
2.	For a laminar flow through pipe, the shear stress over the cross section
Option A:	Varies inversely as the distance from the center of pipe
Option B:	Varies directly as the distance from the surface of the pipe
Option C:	Varies directly as the distance from the center of the pipe
Option D:	Remains constant over the cross section
3.	A flow in which _____ force is dominating over the viscosity is called turbulent flow
Option A:	Elastic
Option B:	Surface Tension
Option C:	Viscous
Option D:	Inertia
4.	When the fluid is called laminar?
Option A:	Low viscosity
Option B:	The density of the fluid is high
Option C:	Reynolds number is greater than 2000
Option D:	Reynolds number is less than 2000
5.	Power transmitted by the nozzle will be maximum when head lost due to friction is equal to _____ of total head at inlet of the pipe.
Option A:	One-fifth
Option B:	Half
Option C:	One-third
Option D:	One-fourth
6.	In Total Head or Energy formula what does "Z" stands for TE = p/w + Z + v2/2g
Option A:	Datum Head
Option B:	Velocity Head
Option C:	Pressure Head
Option D:	Total Head

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7.	Force can be written as _____	
Option A:	$[M][L][T]^{-2}$	
Option B:	$[M][L][T]^{2}$	
Option C:	$[M][L][T]$	
Option D:	$[M][L][T]^{3}$	
8.	Boundary layer thickness is the distance from the surface of the solid body in the direction perpendicular to flow, where the velocity of fluid is equal to	
Option A:	Free stream velocity	
Option B:	0.9 times the free stream velocity	
Option C:	0.99 times the free stream velocity	
Option D:	0.5 times the free stream velocity	
9.	For gradual closure of valve, time of closure	
Option A:	T > (2L/C)	
Option B:	T < (2L/C)	
Option C:	T > (L/2C)	
Option D:	T < (L/2C)	
10.	Which property of the fluid accounts for the major losses in pipes?	
Option A:	Density	
Option B:	Specific Gravity	
Option C:	Compressibility	
Option D:	Viscosity	

Q2.	Solve any Four out of Six	5 marks each
A	Explain Prandlt's mixing length theory.	
B	Explain different steps in solving distribution network by Hardy Cross method	
C	Define Mach number and state its significance in compressible fluid flow	
D	Explain Hydraulic Gradient Line and Total Energy Line	
E	Explain Hydro dynamically smooth and rough boundaries	
F	Explain Water hammer with its control measures	

Q3.	Solve any Two Questions out of Three	10 marks each
A	Explain & derive the expression for Momentum Thickness & Energy Thickness	
B	Three pipes joined in series release water from 75-meter level to 35-meter level. The details of piping system are given in the table	

Pipe	Length	Diameter (mm)	Friction factor
1	1200	150	0.015
2	800	75	0.025

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	3	1100	100	0.020
	Considering minor and major losses in pipes determine discharge, velocity and head loss in each pipe			
C	Two reservoirs are connected by a pipeline consisting of two pipes, one of 15 cm diameter and length 6m and the other of diameter 22.5 cm and 16 m length. If the difference of water level in the two reservoirs is 6m, calculate the discharge and draw the HGL & TEL. Take f= 0.04.			

Q.4	Solve any Two Questions out of Three	10 marks each
A	For a laminar flow through circular pipe, prove that the ratio of maximum velocity to the average velocity is equal to 2.	
B	Derive an expression for velocity distribution of turbulent flow in smooth and rough pipe	
C	Calculate the discharge in each pipe of the network shown in figure below by Hardy-Cross method. Take n = 2.0	