

**University of Mumbai**  
**Examination 2020 under cluster : KJSIEIT**

Program: BE CIVIL ENGINEERING

Curriculum Scheme: Rev2016

Examination: SE Semester IV

Course Code: CEC405 and Course Name: Building Materials & Construction Technology  
Time: 2 hour Max. Marks: 80

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<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	Due to attack of dry rot, the timber
Option A:	Cracks
Option B:	Shrinks
Option C:	Reduces to powder
Option D:	Bulges
2.	Which of the following is correct for Low heat cement
Option A:	Suitable for use in cold weather areas
Option B:	Heat of hydration is reduced by tri calcium aluminate content
Option C:	This cement requires longer period of curing
Option D:	This cement contains high aluminate percentage usually between 35-55%
3.	Which IS code is used for the Rebound Hammer test?
Option A:	IS: 13311(2)-1992
Option B:	IS: 13311(1)-1992
Option C:	IS: 456-2000
Option D:	IS: 1341-1980
4.	What should be placed at the beginning of every header course in English bond to avoid vertical joint?
Option A:	Queen closer
Option B:	Half bat
Option C:	Three fourth bat
Option D:	King closer
5.	The process in which grinding is done to the finished stones to make it smooth and good looking is called as
Option A:	Polishing
Option B:	Finishing
Option C:	Planning
Option D:	Sizing
6.	Which type of pointing is kept vertical and it is placed inside the wall surface.
Option A:	Weathered
Option B:	Tuck
Option C:	Vee pointing

Option D:	Recessed
7.	The horizontal course provided at suitable levels between the plinth and the cornice is termed as
Option A:	Sill
Option B:	Corbel
Option C:	String Course
Option D:	Cornice
8.	What is the approx. mix proportion for M10?
Option A:	1:3:6
Option B:	1:2:4
Option C:	1:1.5:3
Option D:	1:1:2
9.	After how many days is the strength of cement is tested and graded according to the result?
Option A:	7 days
Option B:	28 days
Option C:	14 days
Option D:	1 day
10.	Removing the stones from bed surface is called as
Option A:	Dressing
Option B:	Mining
Option C:	Quarrying
Option D:	Blasting
11.	In manufacturing of bricks, at what temperature are bricks heated for getting good strength and stability?
Option A:	200-400 degree Celsius
Option B:	600-750 degree Celsius
Option C:	400-500 degree Celsius
Option D:	800-1100 degree Celsius
12.	Which of the following is used to transport the concrete from manufacturing place to site at RMC plant?
Option A:	Crane
Option B:	Transit Mixer
Option C:	Dumper
Option D:	Wheel Barrow
13.	Construction method in which concrete is poured into a continuously moving form is called as
Option A:	Cantilever Formwork
Option B:	Fly Formwork
Option C:	Slip Formwork
Option D:	Mivan Formwork
14.	The technique of repairing mortar joints between bricks or other masonry

	elements is called as
Option A:	Plastering
Option B:	Pointing
Option C:	Painting
Option D:	Concreting
15.	What is used in construction to provide a degree of thermal insulation, weather resistance, and to improve the appearance of buildings in exterior portion?
Option A:	Claddings
Option B:	Roof coverings
Option C:	Trusses
Option D:	Painting
16.	What is the standard size of concrete cube for testing as per IS standard?
Option A:	15 cm* 15 cm*19 cm
Option B:	150mm *150mm*150mm
Option C:	19cm* 15cm*15cm
Option D:	170mm*170mm*90mm
17.	Initial setting time of Ordinary Portland cement is nearly
Option A:	half a minute
Option B:	5 min
Option C:	45 min
Option D:	30 min
18.	Which of the below is added to make mortar fire proof?
Option A:	Gypsum
Option B:	Asbestos cement
Option C:	Aluminous cement
Option D:	Powdered glass
19.	What should be the frequency range of transduce in UPV testing?
Option A:	20 KHz to 150 KHz
Option B:	20 Hz to 150 Hz
Option C:	250 KHz to 350 KHz
Option D:	250 Hz to 350 Hz
20.	Which vibrator is attached to the form work and the external centring of walls, column, etc.
Option A:	Immersion vibrators
Option B:	Surface vibrators
Option C:	Internal vibrators
Option D:	Shutter vibrators

<b>Q2</b> (20 Marks )	<b>Solve any Four out of Six</b>	<b>5 marks each</b>
A	Explain the properties of materials used for building construction.	
B	State the types of concrete mix and explain any one of them.	
C	State the types of glass and its Applications.	
D	Explain Terrazzo flooring.	
E	Write short note on grade of concrete.	
F	Explain the preservative treatments for stones.	

<b>Q3</b> (20 Marks )	<b>Solve any Four out of Six</b>	<b>5 marks each</b>
A	Write a note on recycled construction material.	
B	Explain quarrying of stones.	
C	Write a short note on “Trail Mixes” in mix design.	
D	Demerits of distemper as compared to paints.	
E	State and explain properties of fresh concrete.	
F	Compare natural seasoning and kiln seasoning of timber.	

**University of Mumbai**  
**Examination 2020 under cluster KJSIET**

Program: CIVIL Engineering  
Curriculum Scheme: Rev2016  
Examination: Second Year Semester IV  
Course Code: CE-C406 and Course Name: FM-II

Time: 2 hours

Max. Marks: 80

For the students:- All the Questions are compulsory and carry equal marks .

Q1.	A liquid flows through pipes 1 and 2 with the same flow velocity. If the ratio of their pipe diameters $d_1 : d_2$ be 3:2, what will be the ratio of the head loss in the two pipes?
Option A:	3:2
Option B:	9:4
Option C:	2:3
Option D:	4:9
Q2.	Coefficient of friction of a laminar flow is _____
Option A:	$R_e/16$
Option B:	$R_e/64$
Option C:	$16/R_e$
Option D:	$64/R_e$
Q3.	The stagnation state is obtained after a _____ to zero velocity.
Option A:	Accelerating
Option B:	Decelerating
Option C:	Equilibrium
Option D:	Exponential increase
Q4.	The vertical intercept between EGL and HGL is equal to
Option A:	Pressure head
Option B:	Potential head
Option C:	Kinetic head
Option D:	Piezometric head
Q5.	A liquid flows through two similar pipes 1 and 2. If the ratio of their flow velocities $v_1 : v_2$ be 2:3, what will be the ratio of the head loss in the two pipes?
Option A:	3:2
Option B:	9:4
Option C:	2:3
Option D:	4:9
Q6.	What is the total loss developed in a series of pipes?
Option A:	Sum of losses in each pipe only
Option B:	Sum of local losses plus the losses in each pipe
Option C:	Sum of local losses only
Option D:	Zero

**University of Mumbai**  
**Examination 2020 under cluster KJSIET**

Q7.	For a nozzle, the vertical intercept between Energy Gradient Line and Hydraulic Gradient Line
Option A:	increases
Option B:	remains constant
Option C:	decreases
Option D:	initially increases then stagnant
Q8.	What is the function of a surge tank?
Option A:	It causes water hammer
Option B:	Produces surge in the pipeline
Option C:	Relieves water hammer
Option D:	Supplies water at constant pressure
Q9.	For a 2-D flow, what is the mixing length of the mixing layer turbulence model?
Option A:	0.1 of layer width
Option B:	0.07 of layer width
Option C:	0.08 of layer width
Option D:	0.09 of layer width
Q10.	The Reynolds number is found out for a flow in a circular pipe. This circular pipe is moulded into a square pipe, keeping length of the pipe same. Ignore the thickness of the pipe. The Reynolds number changes by _____
Option A:	57% increase
Option B:	57% decrease
Option C:	43% decrease
Option D:	43% increase
Q11.	Local skin friction coefficient is given by
Option A:	$0.646 / (\text{Re})^{1/2}$
Option B:	$1.646 / (\text{Re})^{1/2}$
Option C:	$2.646 / (\text{Re})^{1/2}$
Option D:	$3.646 / (\text{Re})^{1/2}$
Q12.	The Prandtl Number approximates _____
Option A:	Thermal diffusivity to momentum diffusivity
Option B:	Shear stress to thermal diffusivity
Option C:	Thermal diffusivity to kinematic viscosity
Option D:	Momentum diffusivity to thermal diffusivity
Q13.	Change in momentum is
Option A:	the result of powers acting on the surface of the control volume
Option B:	the result of works acting on the surface of the control volume
Option C:	the result of forces acting on the surface of the control volume
Option D:	the result of stresses acting on the surface of the control volume
Q14.	Velocity defect in boundary layer theory is defined as
Option A:	The error in the measurement of velocity at any point in the boundary layer

**University of Mumbai**  
**Examination 2020 under cluster KJSIET**

Option B:	The difference between the velocity at a point within the boundary layer and the free stream velocity
Option C:	The difference between the velocity at any point within the boundary layer and the velocity near the boundary
Option D:	The ratio between the velocity at a point in the boundary layer and the free stream velocity
Q15.	The drag coefficient is directly proportional to the _____
Option A:	Area
Option B:	Mass density
Option C:	Drag force
Option D:	Flow speed
Q16.	Bodies with a larger cross section will have _____
Option A:	Lower drag
Option B:	Higher drag
Option C:	Same drag
Option D:	No drag
Q17.	When a bullet hits a solid block and gets embedded into it. What is conserved?
Option A:	Momentum only
Option B:	Kinetic energy only
Option C:	Momentum and kinetic energy
Option D:	Mass
Q18.	Speed of sound in an ideal gas depends on _____
Option A:	Temperature and pressure
Option B:	Surface area and volume
Option C:	Temperature and composition
Option D:	Composition and surface area
Q19.	What happens to velocity in the converging duct of nozzle?
Option A:	Increases
Option B:	Decreases
Option C:	Same
Option D:	Independent
Q20.	How do we calculate losses for a larger range of Reynolds number?
Option A:	Moody chart
Option B:	Bar chart
Option C:	Scatter chart
Option D:	Column histogram

**University of Mumbai**  
**Examination 2020 under cluster KJSIET**

<b>Q2</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	<p>The rate of flow of water through a horizontal pipe is <math>0.25\text{m}^3/\text{s}</math>. The diameter of the pipe which is 200mm is suddenly enlarged to 400mm. The pressure intensity in the smaller pipe is <math>11.772\text{N/cm}^2</math>. Determine:</p> <ol style="list-style-type: none"> <li>i. Loss of head due to sudden enlargement</li> <li>ii. Pressure intensity in the large pipe</li> <li>iii. Power lost due to enlargement</li> </ol>	
B	Derive Von Karman momentum integral equation for boundary layer flows.	
C	<p>Calculate :</p> <ol style="list-style-type: none"> <li>i. The pressure gradient along flow,</li> <li>ii. The average velocity, and</li> <li>iii. The discharge for an oil of viscosity <math>0.02\text{Ns/m}^2</math> flowing between two stationary parallel plates 1m wide maintained 10mm apart. The velocity midway between the plates is 2m/s.</li> </ol>	

<b>Q3.</b>	Solve the following:	
A	<b>Solve any Two</b>	<b>5 marks each</b>
i.	Three pipes of length 800m, 500m and 400m and of diameters 500mm, 400mm and 300mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700m. Find the diameter of the single pipe.	
ii.	Find the maximum power transmitted by a jet of water discharging freely out of nozzle fitted to a pipe = 300m long and 100mm diameter with coefficient of friction as 0.01. The available head at the nozzle is 90m.	
iii.	An airplane is flying at a height of 15km where the temperature is $-50^\circ\text{C}$ . The speed of the plane is corresponding to $M=2.0$ . Assuming $k=1.4$ and $R=287\text{ J/kg}^\circ\text{K}$ , find the speed of the plane.	
B	<b>Solve any One</b>	<b>10 marks each</b>
i.	A syphon of diameter 200mm connects two reservoir having a difference in elevation of 15m. The total length of syphon is 600m and the summit is 4m above the water level in the upper reservoir. If the separation takes place at 2.8m of water absolute, find the maximum length of syphon from upper reservoir to the summit. Take $f=0.004$ and atmospheric pressure = 10.3m of water.	
ii.	Explain Prandtl mixing length theory for turbulent shear stress and Karman-Prandtl velocity distribution in turbulent flow in pipes.	



# University of Mumbai

## Examination 2020

Examinations Commencing from 23<sup>rd</sup> December 2020 to 6<sup>th</sup> January 2021 and from 7<sup>th</sup> January 2021 to 20<sup>th</sup> January 2021

Program: S.E. (Civil)

Curriculum Scheme: Rev 2016

Examination: SE Semester IV

Course Code: CEC401 and Course Name: APPLIED MATHEMATICS-IV

Time: 2 hour

Max. Marks: 80

<b>Q1. (40 Marks)</b>	<b>All the Questions are compulsory and carry 2 marks each.</b>
1.	If $A = \begin{bmatrix} 2 & 3 \\ -3 & -4 \end{bmatrix}$ find $A^{50}$
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:	$\begin{bmatrix} 149 & -150 \\ -150 & 151 \end{bmatrix}$
2.	If $A = \begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$ find $2A^4 - 5A^3 - 7A + 6I$
Option A:	$\begin{bmatrix} 36 & -32 \\ -32 & -52 \end{bmatrix}$
Option B:	$\begin{bmatrix} 36 & 32 \\ 32 & 52 \end{bmatrix}$
Option C:	$\begin{bmatrix} 36 & 32 \\ -32 & -52 \end{bmatrix}$
Option D:	$\begin{bmatrix} 36 & 52 \\ 52 & 52 \end{bmatrix}$
3.	The mean weekly sales of powder in a super market is 146.3. After a special advertisement campaign, the mean weekly sales in 22 branches increases to 153.7 with a S.D of 17.2. Find the calculated value of 't' .
Option A:	4.22
Option B:	1.97
Option C:	9.88
Option D:	16
4.	A simple sample of 400 students is taken from a large population. The mean height of students in the sample is 171.38 cm , while the mean height in the population is 171.17 cm & S.D is 3.3 cm.Find the calculated value of 'z'
Option A:	1.27
Option B:	8.21
Option C:	3.98
Option D:	11.21

5.	In an experiment on pea – breeding Mendel obtained the following results. 315 round seeds of yellow colour, 101 wrinkled seeds of yellow colour, 108 round seeds of green colour, 32 wrinkled seeds of green colour. According to his theory of heredity, this no. should be in the proportion 9:3:3:1. Find the calculated value of chi – square.																		
Option A:	1.89																		
Option B:	7.82																		
Option C:	8.72																		
Option D:	0.47																		
6.	A random variable X has the following p.d.f <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>X = x</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> </tr> <tr> <td>P(X= x)</td> <td>0</td> <td>k</td> <td>2k</td> <td>2k</td> <td>3k</td> <td><math>k^2</math></td> <td><math>2k^2</math></td> <td><math>7k^2 + k</math></td> </tr> </tbody> </table>	X = x	0	1	2	3	4	5	6	7	P(X= x)	0	k	2k	2k	3k	$k^2$	$2k^2$	$7k^2 + k$
X = x	0	1	2	3	4	5	6	7											
P(X= x)	0	k	2k	2k	3k	$k^2$	$2k^2$	$7k^2 + k$											
Option A:	0.1																		
Option B:	0.5																		
Option C:	0.9																		
Option D:	1.5																		
7.	A continuous R.V X has a p.d.f given by $f(x) = \begin{cases} kx^2(2-x) & 0 \leq x \leq 2 \\ 0 & \text{o.w} \end{cases}$ Find k, mean & variance																		
Option A:	$\frac{3}{4}$ , 1.2, 0.16																		
Option B:	5, 3.7, 3.8																		
Option C:	$\frac{1}{2}$ , $\frac{1}{3}$ , 3																		
Option D:	$\frac{1}{2}$ , 3, $\frac{1}{3}$																		
8.	Out of 800 families with 4 children each, how many families would be expected to have at least 1 boy																		
Option A:	600																		
Option B:	100																		
Option C:	250																		
Option D:	750																		
9.	The average marks scored by 32 boys is 72, with a S.D of 8 while that for 36 girls is 70 with a S.D of 6. . find the calculated value of 'z'																		
Option A:	3.2																		
Option B:	5.5																		
Option C:	1.15																		
Option D:	6																		
10.	The mean height and S.D height of 8 randomly chosen sailors are 166.9 cm and 8.29 cm respectively. The corresponding values of 6 randomly chosen soldiers are 170.3 cm and 8.5 cm respectively. Based on these data find the calculated value of 't'.																		
Option A:	0.1																		
Option B:	0.7																		
Option C:	1.9																		
Option D:	3.6																		
11.	A skilled typist on routine work kept a record of mistakes made per																		

	day during 300 working days. If she made one mistake on 143 days & two mistakes on 110 days. Find the number of days on which on which she made 3 mistakes using Poisson's distribution?
Option A:	55
Option B:	68
Option C:	39
Option D:	93
12.	In a distribution exactly normal 7% of items are under 35 & 89% are under 63. Find the mean & S.D
Option A:	$m = 50.3, \sigma = 10.33$
Option B:	$m = 10.33, \sigma = 50.3$
Option C:	$m = 25.1, \sigma = 5.15$
Option D:	$m = 5.15, \sigma = 25.1$
13.	A continuous R.V X has the p.d.f defined by $f(x) = A + Bx$ $0 \leq x \leq 1$ 0 other wise If the mean of the distribution is 1/3. Find A & B.
Option A:	$A = 2, B = -2$
Option B:	$A = 2, B = 2$
Option C:	$A = -2, B = -2$
Option D:	$A = 3, B = -2$
14.	The standard deviations calculated from two random samples of sizes 9 & 13 are 1.99 & 1.9 respectively. Find the calculated value of 'F'
Option A:	1.139
Option B:	2.52
Option C:	6.61
Option D:	5.65
15.	If the random variable X takes the values 1,2, 3 & 4 such that $2P(X=1) = 3P(X=2) = P(X=3) = 5P(X=4)$ . Find $P(X=1)$ .
Option A:	15/61
Option B:	10/61
Option C:	30/61
Option D:	6/61
16.	Using Green's Theorem evaluate $\int (xy + y^2)dx + x^2dy$ over the curve C where C is the closed region bounded by $y = x$ & $y = x^2$
Option A:	$\frac{1}{20}$
Option B:	$\frac{19}{20}$
Option C:	$\frac{-19}{20}$
Option D:	$-\frac{1}{20}$
17.	Using Stoke's theorem evaluate $\int \vec{F} \cdot d\vec{r}$ where $\vec{F} = (2x - y)\vec{i} - yz^2\vec{j} - y^2z\vec{k}$ & S is the surface of the hemisphere $x^2 + y^2 + z^2 = a^2$ lying above the xy - plane
Option A:	$\pi a^2$

Option B:	$\pi a$
Option C:	$\frac{\pi a^2}{2}$
Option D:	$\frac{\pi a}{2}$
18.	Use Gauss – Divergence theorem to evaluate $\iint \bar{N} \cdot \bar{F} ds$ where $\bar{F} = 4x\bar{i} - 2y^2\bar{j} + z^2\bar{k}$ & S is the region bounded by $x^2 + y^2 = 4, z = 0$ & $z = 3$
Option A:	$7\pi$
Option B:	$12\pi$
Option C:	$28\pi$
Option D:	$84\pi$
19.	Minimize $Z = 2y_1 + 3y_2$ subject to $y_1 + y_2 \geq 5$ , $y_1 + 2y_2 \geq 6$ $y_1, y_2 \geq 0$
Option A:	$Z_{\min} = 13$
Option B:	$Z_{\min} = 15$
Option C:	$Z_{\min} = 11$
Option D:	$Z_{\min} = -11$
20.	Use Dual Simplex method to Maximize $Z = -3x_1 - 2x_2$ subject to $x_1 + x_2 \geq 1$ , $x_1 + x_2 \leq 7$ , $x_1 + 2x_2 \geq 10$ , $x_2 \leq 3$ $x_1, x_2 \geq 0$
Option A:	$Z_{\max} = 18$
Option B:	$Z_{\max} = -18$
Option C:	$Z_{\max} = 9$
Option D:	$Z_{\max} = -9$

<b>Q2</b> (20 Marks)	<b>Solve any Four out of Six, 5 marks each.</b>																		
A	Show that the matrix $\begin{bmatrix} 2 & -3 & 3 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$ is derogatory, hence find the minimal polynomial.																		
B	A total number of 3759 individuals were interviewed in a public opinion survey on a political proposal. Of them, 1872 were men & the rest women. A total of 2257 individuals were in favour of the proposal & 917 were opposed to it. A total of 243 men were undecided & 442 women were opposed to the proposal. Do you justify the hypothesis that there is no association between sex and attitude.																		
C	Solve by simplex method the following L.P.P Minimize $Z = x_1 - 3x_2 + 3x_3$ subject to $3x_1 - x_2 + 2x_3 \leq 7$ , $2x_1 + 4x_2 \geq -12$ , $-4x_1 + 3x_2 + 8x_3 \leq 10$ $x_1, x_2, x_3 \geq 0$																		
D	Two independent samples of sizes 8 & 7 contained the following values. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Sample1</td> <td>19</td> <td>17</td> <td>15</td> <td>21</td> <td>16</td> <td>18</td> <td>16</td> <td>14</td> </tr> <tr> <td>Sample2</td> <td>15</td> <td>14</td> <td>15</td> <td>19</td> <td>15</td> <td>18</td> <td>16</td> <td>---</td> </tr> </table> Is the difference between the sample means significant.	Sample1	19	17	15	21	16	18	16	14	Sample2	15	14	15	19	15	18	16	---
Sample1	19	17	15	21	16	18	16	14											
Sample2	15	14	15	19	15	18	16	---											

E	Let $X$ be a continuous random variable with p.d.f $f(x) = kx(1-x)$ $0 \leq x \leq 1$ Find $k$ and determine a number $b$ such that $P(X \leq b) = P(X \geq b)$ .
F	If the vector field $\vec{F}$ is irrotational find constants $a, b, c$ where $\vec{F}$ is given by $\vec{F} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2z)\vec{k}$ . Hence find the work done in moving a particle in this field from $(1, 2, -4)$ to $(3, 3, 2)$ along the straight line joining these points.

<b>Q3.</b> <b>(20 Marks)</b>	<b>Solve any Four Questions out of Six, 5 marks each.</b>														
A	Fit a Poisson distribution to the following data & test the goodness of fit. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>f</td> <td>142</td> <td>156</td> <td>69</td> <td>27</td> <td>5</td> <td>1</td> </tr> </table>	x	0	1	2	3	4	5	f	142	156	69	27	5	1
x	0	1	2	3	4	5									
f	142	156	69	27	5	1									
B	Show that the matrix $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ is diagonalisable														
C	Construct the dual of the problem and hence solve Maximize $Z = 2x_1 + x_2$ subject to $-x_1 + 2x_2 \leq 2, x_1 + x_2 \leq 4, x_1 \leq 3, x_1, x_2 \geq 0$														
D	Find the equations of lines of regression for the following data X: 2 4 6 7 8 10 12 Y: 1600 1500 1800 1900 1700 2100 2000														
E	if $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ , prove that $A^{50} - A^{49} = \begin{bmatrix} -4 & 4 \\ 2 & -2 \end{bmatrix}$ .														
F	Calculate the rank correlation coefficient from the following data Marks in paper I: 52, 63, 45, 36, 72, 65, 45, 25 Marks in paper II: 62, 53, 51, 25, 79, 43, 60, 33														

**University of Mumbai**

**Examination 2020 under cluster : KJSIEIT**

**Examinations Commencing from 23<sup>rd</sup> December 2020 to 6<sup>th</sup> January 2021 and from 7<sup>th</sup> January 2021 to 20<sup>th</sup> January 2021**

**Program: CIVIL ENGINEERING**

Curriculum Scheme: Rev 2016

Examination: SE Semester IV

Course Code:CEC402 and Course Name: SURVEYING-II

Time: 2 hour

Max. Marks: 80

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<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	Find the zenith distance at the upper culmination of the stars, declination of star $42^{\circ}15' N$ , latitude of observer $26^{\circ}40' N$
Option A:	$15^{\circ} 35'$
Option B:	$15^{\circ} 30'$
Option C:	$14^{\circ} 35'$
Option D:	$14^{\circ} 30'$
2.	Principle of radial line Resection & Intersection for preparing map from aerial photographs
Option A:	To fix main points on the map
Option B:	To transfer imaginary points on the map
Option C:	To locate the principal point of photographs on a map
Option D:	Marking actual points on the map
3.	Satellite for Earth Observation (SEO-I), now called
Option A:	Avsar-I
Option B:	Grah-I
Option C:	Avishkar-I
Option D:	Bhaskara-I
4.	Find the altitude at the upper culmination of the stars, zenith distance is $3^{\circ}20'$
Option A:	$86^{\circ} 41'$
Option B:	$86^{\circ} 40'$
Option C:	$86^{\circ} 39'$
Option D:	$86^{\circ} 38'$
5.	Which of the following provides the best case for setting the reverse curve?
Option A:	When straights are perpendicular
Option B:	When straights form arc
Option C:	When straights are parallel
Option D:	When straights form curves
6.	Which of the following cases is generally adopted in the reverse curve?
Option A:	$T_1 = T_2$

Option B:	$R1 = R2$
Option C:	$t1 = t2$
Option D:	Chainages are equal
7.	In case of parallel straights, the length of the curve is given as
Option A:	$L = (2(R1+R2)V)^{1/2}$
Option B:	$L = 2L(R1+R2) / V$
Option C:	$L = 2V(R1-R2) / R$
Option D:	$L = 2V(R1*R2) / R$
8.	The angle which is measured at the change of direction of two gradients is called
Option A:	Standard angle
Option B:	Subtended angle
Option C:	Deviation angle
Option D:	Setback angle
9.	Which of the following indicates the correct set of the combination of total station?
Option A:	Theodolite, compass
Option B:	Theodolite, EDM
Option C:	Electronic theodolite, EDM
Option D:	EDM, GPS
10.	Find the elevation of ground beneath the reflector, if the known elevation of instrument is 12.76m, slope distance = 3.76m, angle is about $3^{\circ}43'$ , instrument height = 2.93m, ground is at 0.987 m.
Option A:	18.54m
Option B:	81.45m
Option C:	18.45m
Option D:	18.97m
11.	Which of the following can be affected by atmospheric path disturbances?
Option A:	Modern GPS surveying
Option B:	Conventional GPS
Option C:	Absolute positioning
Option D:	Resection method
12.	Which of the following doesn't belong to the relative positioning techniques?
Option A:	Real-time kinematic technique
Option B:	Viscous GPS technique
Option C:	Kinematic GPS surveying technique
Option D:	Differential GPS technique
13.	Which of the following is not a principle of remote sensing?
Option A:	Interaction of energy with satellite
Option B:	Electromagnetic energy
Option C:	Electro-magnetic spectrum
Option D:	Interaction of energy with atmosphere
14.	Polar orbiting satellites are generally placed at an altitude range of

Option A:	7-15km
Option B:	7000-15000km
Option C:	700-1500km
Option D:	70-150km
15.	GIS uses the information from which of the following sources?
Option A:	Non- spatial information system
Option B:	Spatial information system
Option C:	Global information system
Option D:	Position information system
16.	Which of the following is not a type of shutter used in aerial photogrammetry?
Option A:	Between-the-lens shutter
Option B:	Louvre shutter
Option C:	Ideal shutter
Option D:	Focal plane shutter
17.	Flying height refers to
Option A:	Upper portion of the exposure station
Option B:	Bottom of the exposure station
Option C:	Depression of the exposure station
Option D:	Elevation of the exposure station
18.	A survey which deals with bodies of water for the purpose of navigation, water supply, harbor works or for the determination of mean sea level is
Option A:	Topographic surveying
Option B:	Hydrographic surveying
Option C:	Cadastral surveying
Option D:	City surveying
19.	Which of the following doesn't describe the use of hydrographic surveying
Option A:	Laying an Alignment
Option B:	Making underground investigations
Option C:	Nautical charts for navigation
Option D:	Establishing mean sea level
20.	Which of the following doesn't come under the category of shore line survey?
Option A:	Delineation of shore line
Option B:	Location of shore details
Option C:	Determination of the low and high water lines
Option D:	Sounding

### Subjective/Descriptive questions

<b>Q2</b>	<b>Solve any Four out of Six</b>	<b>5 marks each</b>
A	Draw the format of a 7/12 abstract and state the data mentioned in it.	
B	Explain the field procedure to set out a simple circular curve by Rankine's	



	method of deflection angles.
C	Explain the working of a handheld GPS receiver.
D	State the duties and responsibilities of a Tehshildar.
E	Explain the working principle of EDM.
F	Principle and use of aerial photogrammetry.

<b>Q3</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Two tangents intersect at chainage 1200m, the deflection angle being $40^\circ$ compute the data for setting out a 400 m radius curve by deflection angles and offsets. Take 30m chord lengths in the general reach.	
B	What is electro digital theodolite ? Explain all its field application	
C	Two straights AB & BC meet at an inaccessible point B and are to be connected by simple curve 600m radius. Two points P and Q were selected in AB and BC respectively and the following data were obtained: $\angle APQ=150^\circ$ , $\angle CQP=160^\circ$ ; $PQ=150.0$ m Make the necessary calculations for setting out the curve by the method of tangential angles, given that the chainage of P=1600.00m take unit chord of 30 m length.	

**University of Mumbai**  
**Examination 2020 under cluster : KJSIET**

**Program: Civil Engineering**

**Curriculum Scheme: Rev2016**

**Examination: SE Semester: IV**

**Course Code: CE-C403 and Course Name: Structural Analysis -1**

**Time: 2 hour**

**Max. Marks: 80**

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For the students: All the questions compulsory and carry equal marks.

<b>Q 1</b>	<b>Choose the correct option for following questions. All the questions are compulsory and carry equal marks.</b>
<b>1</b>	The parabolic three-hinged arch ACB having span 20m and rise 5m up to crown C which is hinged. The left half portion AC carries UDL of 1000N/m. Calculate the reaction at left support B.
<b>Option A:</b>	2500N
<b>Option B:</b>	3545N
<b>Option C:</b>	4545N
<b>Option D:</b>	5455N
<b>2</b>	The equivalent length is a column of length L having both the ends hinged, is
<b>Option A:</b>	2L
<b>Option B:</b>	L
<b>Option C:</b>	L/2
<b>Option D:</b>	$L/\sqrt{2}$
<b>3</b>	In the displacement method of structural analysis, the basic unknowns are

<b>Option A:</b>	displacement
<b>Option B:</b>	force
<b>Option C:</b>	displacement and force
<b>Option D:</b>	torsion
<b>4</b>	In conjugate beam method, shear force is represented by
<b>Option A:</b>	rotation at that section in original beam
<b>Option B:</b>	deflection at that section in original beam
<b>Option C:</b>	strain at that section in original beam
<b>Option D:</b>	stress at that section in original beam
<b>5</b>	A three-hinged parabolic arch having supports at different levels, the equation of parabola is used_____. where, a is constant.
<b>Option A:</b>	$x/y=a$
<b>Option B:</b>	$x/y=a^2$
<b>Option C:</b>	$2x/y=a^2$
<b>Option D:</b>	$x^2/y=a$
<b>6</b>	For simply supported beam, span is 'L' and udl 'w' per unit length acting over whole length of beam. The shear force at L/4 will be
<b>Option A:</b>	$5.5wL^3/192EI$
<b>Option B:</b>	$3.5w^3L/196EI$
<b>Option C:</b>	$6wL^2/120EI$
<b>Option D:</b>	$8wL/12EI$
<b>7</b>	A cantilever beam AB of length 'L', carries a point load 'P' at free end B. If the bending moment at a distance x from the free end is Px then the strain energy will

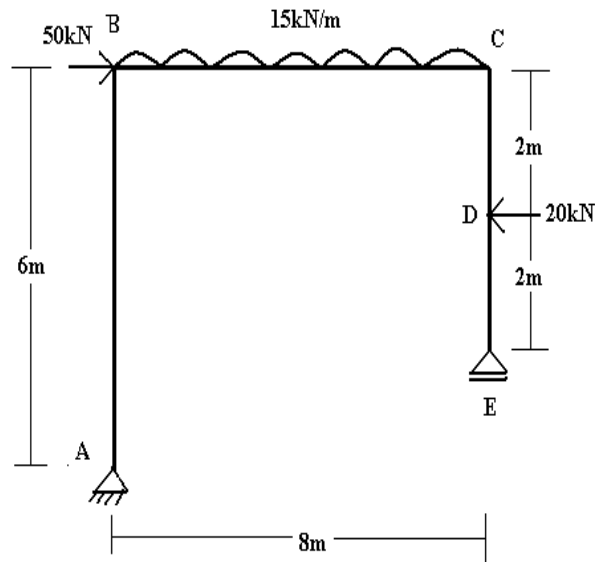
	be
<b>Option A:</b>	$P^3L/6EI$
<b>Option B:</b>	$P^3L^3/6EI$
<b>Option C:</b>	$PL/6EI$
<b>Option D:</b>	$PL^3/6EI$
<b>8</b>	In moment area method, slope at point is calculated as
<b>Option A:</b>	area of M/EI diagram
<b>Option B:</b>	moment of area of M/EI diagram
<b>Option C:</b>	area of EI/M diagram
<b>Option D:</b>	moment of area of EI/M diagram
<b>9</b>	For cantilever beam, at free end a point load 'W' is acting. At distance x from free end, what will be deflection
<b>Option A:</b>	$PL^3/3EI$
<b>Option B:</b>	$P^3L/3EI$
<b>Option C:</b>	$PL/EI$
<b>Option D:</b>	$P^2L^2/EI$
<b>10</b>	$P=\pi^2EI/4L^2$ is the equation for Euler's crippling load if
<b>Option A:</b>	both the ends are fixed
<b>Option B:</b>	both the ends are hinged
<b>Option C:</b>	one end is fixed and other end is free
<b>Option D:</b>	one end is fixed and other end is hinged
<b>11</b>	In cable-suspension bridge, the forces on anchor cable and towers depend upon

<b>Option A:</b>	suspenders provided
<b>Option B:</b>	type of support given to cable
<b>Option C:</b>	length of anchor cable
<b>Option D:</b>	size of tower
<b>12</b>	The length of a column, having a uniform circular cross-section of 7.5 cm diameter and whose ends are hinged, is 5 m. If the value of E for the material is 2100 kN/cm <sup>2</sup> , the permissible maximum crippling load will be
<b>Option A:</b>	1.288 kN
<b>Option B:</b>	12.88kN
<b>Option C:</b>	128.8kN
<b>Option D:</b>	288.0kN
<b>13</b>	For cable-suspension bridge, in guided pulley support, the tension in anchor cable and main cable is
<b>Option A:</b>	remains same in both cables
<b>Option B:</b>	more in anchor cable than main cable
<b>Option C:</b>	more in main cable than anchor cable
<b>Option D:</b>	zero in anchor cable
<b>14</b>	The materials which have the same elastic properties in all directions, are called
<b>Option A:</b>	homogeneous
<b>Option B:</b>	brittle
<b>Option C:</b>	isotropic
<b>Option D:</b>	hard
<b>15</b>	For suspension bridge girder with three-hinged stiffening girder, due to udl ( $w_e$ )

	per unit length by suspenders and span 'l', the bending moment at section x-x is
<b>Option A:</b>	$w_e x(l-x)/8$
<b>Option B:</b>	$8w_e x(l+x)$
<b>Option C:</b>	$w_e(l-x)/8x$
<b>Option D:</b>	$w_e(l^2-2x)/8x$
<b>16</b>	A simply supported beam AB of 8m carries 60kN point load at mid point C. The flexural rigidity (EI) of span AC and CB is EI and 2EI respectively. Calculate the slope at A.
<b>Option A:</b>	100/EI
<b>Option B:</b>	125/EI
<b>Option C:</b>	150/EI
<b>Option D:</b>	200/EI
<b>17</b>	A simply supported beam AB of 8m carries 60kN point load at mid point C. The flexural rigidity (EI) of span AC and CB is EI and 2EI respectively. Calculate the slope at B.
<b>Option A:</b>	140/EI radians
<b>Option B:</b>	160/EI radians
<b>Option C:</b>	180/EI radians
<b>Option D:</b>	150/EI radians
<b>18</b>	A simply supported beam AB of 8m carries 60kN point load at mid point C. The flexural rigidity (EI) of span AC and CB is EI and 2EI respectively. Calculate the deflection at C.
<b>Option A:</b>	469/EI
<b>Option B:</b>	480/EI
<b>Option C:</b>	491/EI

<b>Option D:</b>	499/EI
<b>19</b>	If area of M/EI diagram between points A and B is negative, then angle from tangent A to tangent B will be measured
<b>Option A:</b>	counterclockwise
<b>Option B:</b>	clockwise
<b>Option C:</b>	can be anything
<b>Option D:</b>	angle will be zero
<b>20</b>	The parabolic three-hinged arch ACB having span 20m and rise 5m up to crown C which is hinged. The left half portion AC carries UDL of 1000N/m. Calculate the reaction at left support A.
<b>Option A:</b>	6545N
<b>Option B:</b>	7500N
<b>Option C:</b>	8555N
<b>Option D:</b>	8745N

<b>Q 2</b>	<b>Solve any Two Questions out of Three</b>	<b>(10 marks each)</b>
<b>A</b>	A symmetrical three hinged parabolic arch of span 40m and central rise of 4m is carries UDL of intensity of 20kN/m over left half of the arch and central point load of 110 kN. Determine support reactions, NT and RS at left quarter point, maximum positive and negative BM. Also draw BMD.	
<b>B</b>	Draw AFD, SFD and BMD for following frame	



<b>C</b>	<p>A bridge cable suspended from towers 80m apart and carries a load of 30 kN/m on the entire span. If the maximum sag is 8m, calculate the maximum tension in the cable. If the cable is supported by saddles which are stated by wires inclined at <math>30^\circ</math> to the horizontal, determine the forces acting on the towers. If the same inclination of back stay passes over pulley, determine the forces on the towers.</p>
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<b>Q 3</b>	<p><b>Solve any Two Questions out of Three</b> <span style="float: right;"><b>(10 marks each)</b></span></p>
<b>A</b>	<p>Find the vertical deflection of steel truss shown in figure at the end C.          Cross sectional areas in <math>\text{mm}^2</math> of all the members are shown in the figure given below. Take <math>E = 200 \text{ kN/mm}^2</math>.</p>





## University of Mumbai

### Examination 2020 under cluster : KJSIEIT

Examinations Commencing from 23<sup>rd</sup> December 2020 to 6<sup>th</sup> January 2021 and from 7<sup>th</sup> January 2021 to 20<sup>th</sup> January 2021

Program: Civil Engineering

Curriculum Scheme: Rev 2016

Examination: SE Semester IV

Course Code: CE-C404 and Course Name: BUILDING DESIGN & DRAWING

Time: 2 hour

Max. Marks: 80

<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	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
2.	The height of the Plinth should not be less than _____
Option A:	45 cm
Option B:	450 cm
Option C:	1 m
Option D:	500 cm
3.	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
4.	For residential buildings window openings area should be minimum
Option A:	5% of floor area
Option B:	10% of floor area
Option C:	20% of floor area
Option D:	25% of floor area
5.	As per NBC - 2005, 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
6.	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
7.	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
8.	_____ it is non-development zone which is located on the periphery of the town. It usually prevents chaotic spread of the town.
Option A:	Industrial zone
Option B:	Commercial zone
Option C:	Green Belt
Option D:	Recreational Zone
9.	Recreational zone is creating for
Option A:	Professional Meeting
Option B:	Industrial Manufacturing
Option C:	Entertainment activity
Option D:	Business activity
10.	The type of planning system of Gandhinagar city is
Option A:	Concentric and radial street system
Option B:	rectangular grid iron system
Option C:	Rectangular combined with radial street system
Option D:	Organic street system
11.	Zoning is not related to the following aspect
Option A:	density zoning
Option B:	External zoning
Option C:	height zoning
Option D:	Use zoning
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.	Man-made structures, features, and facilities viewed collectively as an environment in which people live and work, is termed as _____
Option A:	Built Environment
Option B:	Town Planning
Option C:	Artificial Buildings
Option D:	Residential Zones
14.	Scaling objects make them_____

Option A:	Smaller
Option B:	Bigger
Option C:	Either smaller or bigger
Option D:	Thinner
15.	Which is not a objectives of Building Bye laws?
Option A:	Allows disciplined and systematic growth of buildings and towns and prevent haphazard development
Option B:	Protect safety of public against fire, noise, health hazards and structural failures
Option C:	They provide health, safety and comfort to the people who live in buildings
Option D:	Renovation of old buildings without any charge by the government
16.	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
17.	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
18.	Sustainability means
Option A:	Building Green
Option B:	Planting trees
Option C:	Conducting any human activity such that Resources are not permanently depleted affecting the lives of future generation
Option D:	Improving Infrastructure
19.	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
20.	Minimum width of w/c required in residential buildings is
Option A:	0.9 m
Option B:	1.0 m
Option C:	1.2 m
Option D:	1.5 m

<b>Q2</b>	<b>Solve any One</b>	<b>20 marks</b>
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 =16 no.(each having 75 sq.m. carpet area)	

	<p>(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.</p> <p><u>GROUND FLOOR PLAN (double line plan )</u> _____ 15 marks  <u>FIRST FLOOR PLAN (single line plan )</u> _____ 05 marks</p>
B	<p>It is proposed to construct a <b>Boys Hostel</b> building as (G+1) RCC framed structure with the following requirements.</p> <ol style="list-style-type: none"> <li>1) 2 Seated Rooms 8 nos -each 18 m<sup>2</sup></li> <li>2) 3 Seated Rooms 8 nos -each 30 m<sup>2</sup></li> <li>3) Guest Room - 20 m<sup>2</sup></li> <li>4) Entrance and Reception - 20 m<sup>2</sup></li> <li>5) Hostel Warden Room - 15 m<sup>2</sup></li> <li>6) Indoor Games - 35 m<sup>2</sup></li> <li>7) TV/Audio Room - 40 m<sup>2</sup></li> <li>8) Newspapers &amp; Magazines - 30 m<sup>2</sup></li> <li>9) Kitchen - 40 m<sup>2</sup></li> <li>10) Dining Area - 120 m<sup>2</sup></li> </ol> <p>Provide passage, toilet, Dog legged staircase, etc as per the bye-laws. Assume floor to floor height as 4 m.  Draw with suitable scale</p> <p><u>GROUND FLOOR PLAN (double line plan )</u> _____ 15 marks  <u>FIRST FLOOR PLAN (single line plan )</u> _____ 05 marks</p>

<b>Q3</b>	<b>Solve any one</b>	<b>20 marks</b>
A	Write short notes on the following (Five marks each)	
i	(a) Green Building	
ii	(b) Master plan	
iii	(c) Road system	
iv	(d) Green belt	
B	Draw the Two-point perspective with the following data	

	<p>Size of Dining hall=30m x 12 m.</p> <p>Plinth height=0.6 m</p> <p>Floor to floor height =4.0m</p> <p>Assume the eye level at 2.5 m. from Ground level</p>
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