K. J. Somaiya Institute of Engineering and Information Technology
Sion, Mumbai - 400022
NAAC Accredited Institute with 'A' Grade
NBA Accredited 3 Programs
(Computer Engineering, Electronics & Telecommunication Engineering and Electronics Engineering)
Permanently Affiliated to University of Mumbai

EXAMINATION TIME TABLE (JANUARY 2021)

PROGRAMME - F.E.(ALL BRANCHES)(REV-2016) (Choice Base Credit Grading System)

SEMESTER - I

Days and Dates	Time	Paper Code	Paper
Thursday, January 07, 2021	12.30 p.m to 02.30 p.m.	FEC101	Applied Mathematics – I.
Saturday, January 09, 2021	12.30 p.m to 02.00 p.m.	FEC102	Applied Physics – I.
Tuesday, January 12, 2021	12.30 p.m to 02.00 p.m.	FEC103	Applied Chemistry – I.
Thursday, January 14, 2021	12.30 p.m to 02.30 p.m.	FEC104	Engineering Mechanics.
Saturday, January 16, 2021	12.30 p.m to 02.30 p.m.	FEC105	Basic Electrical Engineering.
Tuesday, January 19, 2021	12.30 p.m to 02.00 p.m.	FEC106	Evironmental Studies (EVS).

Change if any, in the time table shall be communicated on the college web site.

Principal

Mumbai
20th December 2020

University of Mumbai
Examination 2020 under cluster no-3 FCRIT (Lead College Short name)

Program: First Year Engineering
Curriculum Scheme: Rev 2016
Examination: First Year Semester I
Course Code: FEC101 and Course Name: Applied Mathematics-I
Time: 1-hour Max. Marks: 50

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

Q1.	$Represent\ \ i^i$ in terms of e
Option A:	$e^{\frac{-\pi}{3}}$
Option B:	$e^{\frac{-3\pi}{2}}$
Option C:	$e^{\frac{-\pi}{6}}$
Option D:	$e^{\frac{-\pi}{2}}$
Q2.	$The\ first\ iterative\ values\ of\ x, y, z\ for\ the\ system\ of\ equations$ $4x - 3y - z = 40\ , x - 6y + 2z = -28$ $x - 2y + 12z = -86\ \ usig\ Gauss\ seidel\ method$
Option A:	$x = 10,\ y = 4.666\ ,\ z = -14$
Option B:	$x = 10,\ y = 6.333\ ,\ z = 6.944$
Option C:	$x = 10,\ y = 6.333\ ,\ z = -6.944$
Option D:	$x = 10,\ y = -6.333\ ,\ z = 6.944$
Q3.	$If\ f(x,y) = \sin sin\ (xy)\ + x^2 logy\ \ , then\ the\ value\ of\ \frac{\partial^2 f}{\partial y \partial x}\left(0, \frac{\pi}{2}\right)\ is$
Option A:	1
Option B:	0
Option C:	3
Option D:	33
Q4.	$The\ Taylors\ series\ expansion\ of\ f(x) = 7x^2 - 6x + 1\ about\ x = 2\ is\ given\ by$ $a + b(x-2) + c(x-2)^2\ then\ the\ value\ of\ a + b + c\ is$
Option A:	-1
Option B:	0
Option C:	46
Option D:	17
Q5.	$If\ A = [1\ -i\ -1+i\ i\ 1\ 1+i\ 1+i\ -1+i\ 0\ ]\ is\ a\ unitary\ matrix\ ,\ then\ \bar{A}$
Option A:	$[1\ i\ 1+i\ -i\ 1\ -1+i\ -1+i\ 1+i\ 0\ ]$

Option B:	$[1\ i\ 1\ +\ i\ i\ 1\ 1\ +\ i\ 1\ -\ i\ \ -\ 1\ +\ i\ 0\ ]$
Option C:	$[1\ \ -\ i\ \ -\ 1\ +\ i\ i\ 1\ 1\ +\ i\ 1\ +\ i\ \ -\ 1\ +\ i\ 0\ ]$
Option D:	$[1\ i\ 1\ +\ i\ i\ 1\ 1\ +\ i\ 1\ +\ i\ \ -\ 1\ +\ i\ 0\ ]$
Q6.	$If\ \sin sin\ 5\theta\ =\ a\ cos^4\theta sin\theta\ +\ bcos^2\theta sin^3\theta\ +\ csin^5\theta$, the values of a, b, c
Option A:	$a\ =\ 5,\quad b\ =\ 10,\quad c\ =\ 1$
Option B:	$a\ =\ 5, b\ =-\ 10,\ c\ =-\ 1$
Option C:	$a\ =\ 5,\quad b\ =-\ 10,\ c\ =\ 1$
Option D:	$a\ =-\ 5,\quad b\ =\ 10,\ c\ =\ 1$
Q7.	$The\ n^{th}\ derivative\ of\ y\ =\ sin^2 x$ is
Option A:	$-\ (2)^{n-1} cos\left(2x\ +\ \frac{n\pi}{2}\right)$
Option B:	$(2)^{n-1} cos\left(2x\ +\ \frac{n\pi}{2}\right)$
Option C:	$-\ (2)^{n-1} cos(2x\ +\ n\pi)$
Option D:	$(2)^{n-1} cos\left(2x\ -\ \frac{n\pi}{2}\right)$
Q8.	$If\ \log log\ (tanx)\ =\ y\ \ then\ the\ value\ sinhny\ \ is$
Option A:	$\frac{1}{2}(tan^n x\ +\ cot^n x)$
Option B:	$\frac{1}{2}(tan^n x\ -\ cot^n x)$
Option C:	$\frac{1}{2}(cot^n x\ -\ tan^n x)$
Option D:	$-\ \frac{1}{2}(tan^n x\ -\ cot^n x)$
Q9.	$If\ z(x,y) = \frac{x+y}{y}\ \ then\ x\frac{\partial z}{\partial x}\ +\ y\frac{\partial z}{\partial y}\ \ is$
Option A:	1
Option B:	2
Option C:	0
Option D:	3
Q10.	$The\ rank\ of\ the\ following\ matrix\ A\ =\ [3\ 2\ \ -\ 1\ 4\ 2\ 6\ 7\ 4\ 5\ ]\ \ is$
Option A:	0
Option B:	3
Option C:	1

Option D:	2
Q11.	$If\ z = sin^{-1}\left\{\frac{x^3+y^3+z^3}{x+y+z}\right\}\quad then\ x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}\quad is$
Option A:	$2\ tanz$
Option B:	$2cotz$
Option C:	$tanz$
Option D:	$cotz$
Q12.	$The\ imaginary\ part\ of cosh^{-1}\left(\frac{3i}{4}\right) is$
Option A:	$-\frac{\pi}{2}$
Option B:	$\frac{\pi}{2}$
Option C:	π
Option D:	$\frac{\pi}{4}$
Q13.	$The\ values\ of\ x, y, z\ that\ satisfy\ the\ following\ system\ of\ linear\ equations\ x + 2y + 3z = 6, x + 3y + 4z = 8, 2x + 2y + 3z = 12\ are$
Option A:	x=6, y=3, z=2
Option B:	x=12, y=3, z=4
Option C:	x=6, y=6, z=−4
Option D:	x=6, y=6, z=4
Q14.	$The\ value\ of (1 + \frac{1}{x})^x$
Option A:	1
Option B:	e^{-1}
Option C:	1
Option D:	e
Q15.	$If\ p\ log(a + ib) = (x + iy)logm\ \ then\ \frac{y}{x}\ \ is$
Option A:	$\frac{tan^{-1}\left(\frac{b}{a}\right)}{log(a^2+b^2)}$
Option B:	$\frac{2tan^{-1}\left(\frac{b}{a}\right)}{log(a^2+b^2)}$
Option C:	$\frac{2ptan^{-1}\left(\frac{b}{a}\right)}{log(a^2+b^2)}$
Option D:	$\frac{2tan^{-1}\left(\frac{a}{b}\right)}{log(a^2+b^2)}$
Q16.	$If\ y = \frac{1}{x},\ then\ fifth\ derivative\ y_5\ is$

Option A:	$-\frac{5!}{x^6}$
Option B:	$\frac{5!}{x^6}$
Option C:	$-\frac{5!}{x^5}$
Option D:	$\frac{5!}{x^5}$
Q17.	Which of the following is not a root of $(-1)^{\frac{1}{3}}$
Option A:	$\frac{-\sqrt{3}+i}{2i}$
Option B:	-1
Option C:	$\frac{\sqrt{3}-i}{2i}$
Option D:	$\frac{\sqrt{3}+i}{2i}$
Q18.	$If\ z = x^2 + y^2,\ x = cost,\ y = sint\ ,\ then\ the\ value\ of\ \frac{dz}{dt}\ at\ t = \pi$
Option A:	1
Option B:	-1
Option C:	0
Option D:	π
Q19.	$If\ y = \sin sin\ (logx)\ \ and\ x^2y_2 + xy_1 + y = 0\ \ then$
Option A:	$x^2y_{n+2} + (2n+1)y_{n+1} + (n^2+1)y_n = 0$
Option B:	$x^2y_{n+2} + (2n+1)xy_{n+1} + (n^2+1)y_n = 0$
Option C:	$x^2y_{n+2} + (2n-1)xy_{n+1} + (n^2+1)y_n = 0$
Option D:	$x^2y_{n+2} + (2n+1)xy_{n+1} + (n^2-1)y_n = 0$
Q20.	$If\ the\ matrix\ A = [2\ 2+i\ -2i\ x\ 3\ y\ 2i\ -i\ 1]\ is\ Hermitian\ then\ the\ values$
Option A:	$x = -2-i,\ y = -i$
Option B:	$x = 2-i,\ y = -i$
Option C:	$x = 2+i,\ y = i$
Option D:	$x = 2-i\ ,\ y = i$
Q21.	$The\ maximum\ or\ minimum\ value\ of\ the\ function$ $f(x,y) = y^2 + 4xy + 3x^2 + x^3$
Option A:	$minimum\ at\ (0,0)$
Option B:	$maximum\ at\ (0,0)$

Option C:	$minimum\ at\ (\frac{2}{3}, \frac{-4}{3})$
Option D:	$maximum\ at\ (\frac{2}{3}, \frac{4}{3}))$
Q22.	$Newton - Raphson\ method\ is\ used\ to\ find\ root\ of\ the\ equation\ x^2 - 13 = 0$ $with\ 3.5\ as\ the\ initial\ value\ ,then\ the\ first\ iterative\ approximation\ is$
Option A:	3.575
Option B:	3.676
Option C:	3.607
Option D:	3.667
Q23.	$The\ following\ system\ of\ equations\ 2x - y + 3z = 1,$ $3x - 2y + 5z = 2\ ,\ -x + 4y + z = 3\ has$
Option A:	No solution
Option B:	An infinite number of solutions
Option C:	More than one but a finite number of solutions
Option D:	Unique solution
Q24.	$Given\ p = x + y + z\ , q = y + z,\ r = z\ then\ the\ value\ of\ \frac{\partial(p,q,r)}{\partial(x,y,z)}$ is
Option A:	0
Option B:	1
Option C:	2
Option D:	-1
Q25.	$The\ expansion\ of\ f(x) = \log log\left(1 + e^x\right)\ is$
Option A:	$log2 + \frac{x}{2} + \frac{x^2}{8} - \frac{x^4}{192} + \cdots\ldots\ldots\ldots$
Option B:	$log2 + \frac{x}{2} + \frac{x^2}{8} + \frac{x^4}{192} + \cdots\ldots\ldots\ldots$
Option C:	$log2 + \frac{x}{2} + \frac{x^3}{8} - \frac{x^5}{192} + \cdots\ldots\ldots\ldots$
Option D:	$log2 + \frac{x}{2} + \frac{x^3}{8} + \frac{x^5}{192} + \cdots\ldots\ldots\ldots$

University of Mumbai

Examination 2020 under cluster no-03 (FCRIT)

Program: First Year Engineering

Curriculum Scheme: Rev2016

Examination: First Year Semester I

Course Code:FEC101 and Course Name: Applied Mathematics I

Time: 1 hour Max. Marks: 50

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	B
Q3.	A
Q4	C
Q5	A
Q6	C
Q7	A
Q8.	B
Q9.	C
Q10.	D
Q11.	A
Q12.	B
Q13.	C
Q14.	D
Q15.	B
Q16.	A
Q17.	C
Q18.	C
Q19.	B
Q20.	D
Q21.	C
Q22.	C
Q23.	D
Q24.	B
Q25.	A

University of Mumbai

Examination 2020 under cluster _3__ (FCRIT)

Program: **F.E.(All branches)**

Curriculum Scheme: Rev 2016

Examination: FE/ Semester-I

Course Code: C103 and Course Name: Applied Chemistry-I

Time: 1½hour Max. Marks: 60

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Additional Data: Atomic Weights **[Ca= 40, Mg = 24, Na = 58.5, K =39, Cl =35.5, C= 12, N= 14, O =16, H =1]**	
Q.1	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	A hard water sample have following impurities: $Ca(HCO_3)_2$ = 150 mg/L, $MgCl_2$ = 135 mg/L and NaCl =78mg/L. The temporary hardness of the above water is _____ $mgCaCO_3/L$
Option A:	142.10
Option B:	92.59
Option C:	234.69
Option D:	150
2.	Which of the following is the condensation polymer?
Option A:	Polyethylene
Option B:	PVC
Option C:	PMMA
Option D:	Kevlar
3.	In Sap value experiment 3g of oil was mixed with 25 ml of 0.5N alcoholic KOH. When the reaction mixture was titrated it required exactly 10ml of 0.5N HCl. The sap value of the oil is close to which of the following?
Option A:	140
Option B:	178
Option C:	280
Option D:	330
4.	In the manufacturing of Cement, quicklime from limestone is produced in which of the following zone inside the rotary kiln?
Option A:	Drying Zone
Option B:	Clinckering zone
Option C:	Calcination zone
Option D:	Reducing zone
5.	Which of the following is not true for a Thermoplastic?
Option A:	They become soft on heating and regains back on cooling.
Option B:	They are strong and hard.
Option C:	They can be reclaimed from the waste.
Option D:	They are mostly linear polymers.

6.	As oil is gradually heated, the temperature at which vapors produced by it give rise to tiny spark in the presence of external flame is known as_____.
Option A:	Flash Point
Option B:	Aniline Point
Option C:	Emulsification Point
Option D:	Fire Point
7.	Which of the following is not related to Buckminster Fullerene?
Option A:	Compositionally Buckminster Fullerene is C60.
Option B:	Bonding of carbon in fullerene is same as that of carbon in diamond.
Option C:	Fullerene finds good applications in electronic devices.
Option D:	Fullerene has good tensile strength.
8.	Fillers are added at the time of manufacturing of plastic because .
Option A:	They improve the flexibility of the plastic.
Option B:	They prevent plastic from sticking to the mold at the time of fabrication.
Option C:	They impart the strength to plastic when it is formed.
Option D:	They accelerate plastic formation from its raw materials.
9.	One liter of hard water with hardness of 120 mg $CaCO_3$/L was passed through the zeolite softener. The amount of NaCl obtained in the treated water will be closer to which of the following?
Option A:	70.4 mg
Option B:	100 mg
Option C:	120 mg
Option D:	140.4 mg
10.	Which of the following is true for 'Ion Exchange' softening process for water?
Option A:	It removes dissolved organic impurities from water.
Option B:	It removes colloidal impurities from water.
Option C:	It removes ionic impurities from water
Option D:	All of the above
11.	Which of the following construction material has highest strength?
Option A:	Lime
Option B:	Cement
Option C:	Concrete
Option D:	RCC
12.	Degree of freedom is likely to be zero in which of the following equilibrium of water system?
Option A:	Ice = Water = Vapors
Option B:	Water = Vapors
Option C:	Ice = Water
Option D:	Ice = Vapors
13.	Select the correct option about reverse osmosis process.

Option A:	During the process, dissolved organic impurities are allowed to pass through the semi-permeable membrane.
Option B:	During the process, only dissolved ionic salts are allowed to pass through the semi-permeable membrane.
Option C:	During the process, only Pure water is allowed to pass through the semi-permeable membrane.
Option D:	Both water and dissolved salts are allowed to pass through the semi-permeable membrane.
14.	Which of the following on polymerization gives Natural Rubber?
Option A:	Styrene
Option B:	Ethylene
Option C:	Vinyl Chloride
Option D:	Isoprene
15.	Which of the following is incorrect with respect to functions of Lubricants?
Option A:	They reduce the friction of machine.
Option B:	They reduce the corrosion resistance of machine.
Option C:	They reduce wear and tear of machine.
Option D:	They reduce entry of dirt and dust to the machine

Q.2	**Attempt any THREE from the following** **[5 marks each]**
(a)	Explain Ion Exchange method of softening of hard water.
(b)	Draw and explain phase diagram of two component Ag-Pb system.
(c)	Discuss the mechanism of Extreme Pressure Lubrication.
(d)	Write a brief note on Compounding of Plastics.
(e)	One liter of hard water sample contains $Ca(HCO_3)_2$ = 135 mg, $CaCl_2$ =170 mg, $MgCl_2$ = 140mg. Calculate pure lime and soda required to soften one million liters of this hard water.

Q.3	**Solve any THREE from the following:-** **[5 marks each]**
(a)	Explain briefly Transfer molding of plastic material.
(b)	Explain wet process of manufacturing of the Portland cement.
(c)	Under which conditions Solid Lubricants are used? Explain the structure of Graphite.
(d)	In determination of hardness of water, the standard hard water was prepared by dissolving one gram of $CaCO_3$ in one liter of distilled water. 50 ml of this water required 48 ml of EDTA. 50 ml of unknown hard water required 37 ml of same EDTA. This unknown hard water was boiled, cooled and filtered.50 ml of this boiled water required 29 ml of EDTA. Calculate hardness of all types.
(e)	Write a short note on Conducting Polymers.

University of Mumbai
Examination 2020 under cluster __3_ (FCRIT)

Program: FE (All Branches)
Curriculum Scheme: Rev2016
Examination: FE/ Semester I
Course Code: FEC103 and Course Name: Applied Chemistry-I
Time: 1½ hour Max. Marks: 60

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	D
Q3.	A
Q4	C
Q5	B
Q6	A
Q7	B
Q8.	C
Q9.	D
Q10.	C
Q11.	D
Q12.	A
Q13.	C
Q14.	D
Q15.	B

University of Mumbai

Examination 2020 under cluster No.3 (Lead College: FCRIT)

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

Program: FE Engineering (All Branches)

Curriculum Scheme: Rev-2016

Examination: FE Semester I

Course Code: FEC102 and Course Name: Applied Physics I

Time: 2 hours Max. Marks: 60

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(15 x 2 = 30)

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The atomic radius of FCC crystal is
Option A:	r = a
Option B:	r = a /2√2
Option C:	r = 3a / √2
Option D:	r = √3 /2a
2.	In a Hexagonal unit cell
Option A:	a = b = c , α = β = γ = 90º
Option B:	a ≠ b ≠ c , α ≠ β = γ ≠ 90º
Option C:	a ≠ b ≠ c , α = β = γ = 90º
Option D:	a = b ≠ c , α = β=90º , γ = 120º
3.	Line defects are called
Option A:	Zero order disorder
Option B:	One-dimensional disorder
Option C:	Two-dimensional disorder
Option D:	Three-dimensional disorder
4.	De-Broglie matter waves are like
Option A:	Electromagnetic waves
Option B:	Mechanical waves
Option C:	Symbolic probability waves
Option D:	Transverse waves
5.	$\|\Psi\|^2 = 0$,where Ψ is a wave function, means at time t
Option A:	Strong probability of finding a particle
Option B:	Particle is absent at that point
Option C:	little probability of finding the particle
Option D:	Cannot ascertain with this condition
6.	The energy operator in a system can be expressed as
Option A:	$E\Psi = i\,\hbar\,\frac{\partial\Psi}{\partial t}$
Option B:	$E\Psi = i\,2\hbar\,\frac{\partial\Psi}{\partial l}$
Option C:	$E\Psi = i\,4\hbar\frac{\partial\Psi}{\partial t}$

Option D:	$E\Psi = i\hbar\frac{\partial\Psi}{\partial v}$
7.	Fermi energy is defined as the ---------- energy that a free electron can have in a material at 0ºK
Option A:	maximum
Option B:	minimum
Option C:	acceptor level
Option D:	donor level
8.	In an intrinsic semiconductor, the electron concentration (n) and hole concentration(p) are
Option A:	n = p
Option B:	n > p
Option C:	n < p
Option D:	n x p
9.	In a p-type semiconductor at normal temperature the acceptor level is just------the valence band
Option A:	below
Option B:	above
Option C:	matches
Option D:	un predictable
10.	Super conductors are perfect--------
Option A:	Ferromagnetic materials
Option B:	Ferri magnetic materials
Option C:	Para magnetic materials
Option D:	Dia magnetic materials
11.	A sound has intensity of $5x10^{-8}$ w/m^2. What is the intensity of sound level in decibels ($I_o = 10^{-12}$ w/m^2)
Option A:	46.99 dB
Option B:	40.99 dB
Option C:	41.99 dB
Option D:	36.99 dB
12.	When mechanical pressure is applied on the opposite faces of certain crystal then there would develop equal and opposite electric charges on the other faces, this phenomenon is called ---
Option A:	Magneto striction effect
Option B:	Messiner effect
Option C:	Hall effect
Option D:	Piezo electric effect
13.	The high frequency oscillation with magnetostriction can be calculated by(l = length of rod, Y = Youngs modulus, ρ = density
Option A:	$N = \frac{1\sqrt{Y}}{2l\sqrt{\rho}}$
Option B:	$N = \frac{3\sqrt{Y}}{2l\sqrt{\rho}}$

Option C:	$N = \frac{4\sqrt{Y}}{3l\sqrt{\rho}}$
Option D:	$N = \frac{1\sqrt{Y}}{2V\sqrt{\rho}}$
14.	The temperature at which a material in a normal state goes into a superconducting state is known as
Option A:	Zero point
Option B:	Critical magnetic field
Option C:	Critical temperature
Option D:	Vortex state
15.	The equation of one dimensional motion of a free particle is
Option A:	$\frac{d^2\Psi}{dx^2} + K^2\Psi = 0$
Option B:	$H = \frac{\hbar^2}{2m}\nabla^2 + V$
Option C:	$\frac{d^2y}{dx^2} = \frac{1}{v^2}.\frac{d^2y}{dt^2}$
Option D:	$E = \frac{p^2}{2m} + V$

Q2	**Solve any Three out of Five** **5 marks each (15 Marks)**
A	Derive Bragg's equation for X-ray diffraction in crystal.
B	Draw the following in a unit cubic cell: (113) ,(200) ,(001), [123], [103]
C	Show that Fermi level lies in the middle of the forbidden energy gap in an intrinsic semiconductor.
D	Find out the lowest energy of an electron in a one-dimensional box width of 4Aº.
E	Distinguish between Type-I and Type-II superconductors.

Q3.	**Solve any Three Questions out of ive** **5 marks each (15 Marks)**
A	Explain Heisenberg's uncertainty principle and give two examples.
B	Derive the formula to calculate the interplanar spacing for a family of planes < h k l > and cube edge a.
C	With energy level diagram, explain the variation of Fermi energy level with temperature in an n-type semiconductor.
D	Copper has FCC structure. If the interplanar spacing for the set of (111) planes is 2.08 Aº, find the density and the diameter of a Cu atom. The atomic weight of Cu is 63.54.

E	List any five factors of Good acoustics.

University of Mumbai

Examination 2020 under cluster No.3 (Lead College: FCRIT)

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

Program: FE Engineering (All Branches)

Curriculum Scheme: Rev-2016

Examination: FE Semester I

Course Code: FEC102 and Course Name: Applied Physics-I

Time: 2 hour Max. Marks: 60

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	D
Q3.	B
Q4	C
Q5	B
Q6	A
Q7	A
Q8.	A
Q9.	B
Q10.	D
Q11.	A
Q12.	D
Q13.	A
Q14.	C
Q15.	A

University of Mumbai

Examination 2020 under cluster 3(Lead College: FCRIT)

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

Program: **FE (ALL BRANCHES)**

Curriculum Scheme: Rev 2016

Examination: FE Semester I

Course Code: FEC105 and Course Name: Basic Electrical Engineering

Time: 2 hours 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.	If two resistors of same value are connected in series, its equivalent resistance will be
Option A:	Double the value of a resistor
Option B:	Half the value of a resistor
Option C:	Four times the value of the resistor
Option D:	Quarter the value of a resistor
2.	If each branch of a star network has resistance 9 Ohms, then each branch of the equivalent delta circuit will have a resistance of _____Ohms.
Option A:	27
Option B:	9
Option C:	6
Option D:	3
3.	A network contains only an independent current source and resistors. If the values of all resistors are doubled, the value of node voltage will
Option A:	become half
Option B:	remain unchanged
Option C:	become double
Option D:	become triple
4.	For a dc circuit, if Thevenin's voltage is 5 Volts and Thevenin's resistance is 10 Ohms, calculate the current through load resistor of value 10 Ohms.
Option A:	0.5 A
Option B:	0.25 A
Option C:	1 A
Option D:	5 A
5.	In Superposition theorem, when one current source is under consideration, the other voltage sources are
Option A:	opened
Option B:	removed
Option C:	shorted
Option D:	undisturbed

6.	Norton current is
Option A:	open circuit current
Option B:	short circuit current
Option C:	open circuit and short circuit current
Option D:	load current
7.	Calculate current through 15 Ohms load resistor, if the Norton's current is 3 Amperes and Norton's resistance is 15 Ohms.
Option A:	0.1 Amperes
Option B:	0.2 Amperes
Option C:	1.5 Amperes
Option D:	3 Amperes
8.	Nodal analysis involves application of
Option A:	Kirchoff's Voltage Law
Option B:	Kirchoff's Current Law
Option C:	Ohms Law
Option D:	Superposition theorem
9.	For a purely capacitive circuit, current _____the voltage by _____.
Option A:	lags, 180 degree
Option B:	leads, 180degree
Option C:	lags, 90degree
Option D:	leads, 90degree
10.	The average and effective values for a sinusoidal a.c waveform are
Option A:	Vavg=0.637 V_m, V=0.5 V_m
Option B:	Vavg=0.5 V_m, V=0.5 V_m
Option C:	Vavg=0.11 V_m, V=0.707 V_m
Option D:	Vavg=0.637 V_m, V=0.707 V_m
11.	A series R-L-C circuit will have unity power factor if operated at a frequency of
Option A:	1/ (LC)
Option B:	1/ (ω times root of (LC))
Option C:	1/ (ω^2 times root of (LC))
Option D:	1/ (2pi times root of (LC))
12.	A sinusoidal voltage varies from 0 to a maximum of 20 Volts. The voltage at the instant of 60 degrees of the cycle will be
Option A:	17.32 Volts
Option B:	10 Volts
Option C:	13.33 Volts
Option D:	5 Volts
13.	A voltage of 150 V, 50 Hz is applied to a coil having negligible resistance and inductance 0.2 H. If voltage is taken as reference, the value of current is
Option A:	3.378 Sin(314t – 90)
Option B:	3.378 Sin(314t + 90)
Option C:	3.378 Sin(314t – 180)

Option D:	3.378 Sin(314t + 180)
14.	Three identical coils each (3+2j) Ohms are connected in star across 415Volts, 50Hertz, 3 phase supply. Determine i) Vph ii) Iph .
Option A:	Vph=240 Volts, Iph=33.45 Amperes
Option B:	Vph= 239.6 Volts, Iph= 66.45 Amperes
Option C:	Vph=415 Volts, Iph=115.1 Amperes
Option D:	Vph= 415 Volts, Iph=50 Amperes
15.	In a three phase system, when three equal phase impedances are connected in delta, the equivalent star impedance is _____of the delta impedance
Option A:	half
Option B:	one- third
Option C:	equal
Option D:	one-fourth
16.	The voltage and current relation for a three phase balanced star connected load is
Option A:	V_L= root 3 times V_{PH}, I_L=I_{PH}
Option B:	V_L= V_{PH}, I_L=I_{PH}
Option C:	V_L= root 3 times V_{PH}, I_L= root 3 times I_{PH}
Option D:	V_L=V_{PH}, I_L= root 3 times I_{PH}
17.	Short circuit test on transformer is conducted to determine
Option A:	Core losses
Option B:	Copper losses
Option C:	Hysteresis losses
Option D:	Eddy current losses
18.	If R is the resistance of secondary winding of an electrical transformer and K is the transformation ratio then the equivalent secondary resistance referred to primary will be
Option A:	R/VK
Option B:	R/K^2
Option C:	RK^2
Option D:	K/R^2
19.	Where is a field winding mounted in a dc machine?
Option A:	Stator
Option B:	Rotor
Option C:	Anywhere on stator or rotor
Option D:	There is no field winding in a dc machine
20.	A generator is a machine that converts _____energy at its prime mover to produce _____energy.
Option A:	Mechanical, sound
Option B:	Solar , mechanical
Option C:	Mechanical, electrical

Option D:	Electrical, mechanical

Q2. **(20 Marks)**	
A	**Solve any Two (5 marks each)**
i.	Three identical coils, each having resistance of 20 Ohms and inductance of 0.05 H, are connected in star across a three phase 50 Hz, 230 V supply. Calculate the phase current, line current and total power absorbed. Draw phasor diagram.
ii.	A coil having a resistance of 5 Ohms and inductance of 31.8 mH, is connected to 230 V, 50 Hz supply. Find circuit current, impedance, phase angle, power factor and power consumed.
iii.	Explain the principle of operation of DC generator.
B	**Solve any One (10marks each)**
i.	State and explain the Superposition theorem with an example containing both a voltage source and a current source
ii.	A 200/400 V, 50 Hz single phase transformer gave the following test results: OC test: 200 V 1 A 100 W (with an open circuit at secondary) SC test: 15 V 10 A 85 W (with a short circuit at primary) Obtain the parameters and draw the equivalent circuit of the transformer as referred to the primary.
Q3. **(20 Marks)**	
A	**Solve any Two (5 marks each)**
i.	Derive the expressions to convert star network to its equivalent delta network.
ii.	Draw a no- load phasor diagram of a transformer and explain it.
iii.	State and explain the various steps involved in Superposition theorem.
B	**Solve any One (10marks each)**
i.	Draw the circuit diagram and phasor diagram for measurement of power in a 3 phase system using Two Wattmeter method. Two wattmeters connected to measure power in a three phase circuit using the two wattmeter method indicate 1250 W and 250 W respectively. Find the total power supplied and the power factor of the circuit: when i) both the readings are positive, ii) when the latter reading is obtained by reversing the connections of the pressure coil.
ii.	Derive the expression for resonant frequency of a series RLC circuit. A series RLC circuit has values R = 10 ohms, L = 10 mH, and C = 10 micro F. It is connected to a 200 V variable frequency supply. Find the resonant frequency? At resonance find, i) current drawn, ii) power consumed, iii) power factor and iv) quality factor.

University of Mumbai

Examination 2020 under cluster __ (Lead College: _____)

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

Program: _____

Curriculum Scheme: Rev 2016

Examination: FE Semester I

Course Code: FEC105 and Course Name: Basic Electrical Engineering

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	A
Q3.	C
Q4	B
Q5	C
Q6	B
Q7	C
Q8.	B
Q9.	D
Q10.	D
Q11.	D
Q12.	A
Q13.	A
Q14.	B
Q15.	B
Q16.	A
Q17.	B
Q18.	B
Q19.	A
Q20.	C

University of Mumbai

Examination 2020 under cluster 3(Lead College: FCRIT)

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

Program: FE (ALL BRANCHES)

Curriculum Scheme: Rev 2016

Examination: FE Semester I

Course Code: FEC104 Course Name: Engineering Mechanics

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 steel ball is rolled over a horizontal table. It is then allowed to fall freely from the table onto the floor. During its fall the ball will follow _____ .
Option A:	rectilinear motion
Option B:	circular motion
Option C:	projectile motion
Option D:	sinusoidal motion
2.	An elevator is moving with constant acceleration acquires an upward velocity of 5 m/s over a distance of 10 m. If it starts from rest, find the magnitude of the acceleration.
Option A:	2.5 m/s^2
Option B:	1.25 m/s^2
Option C:	2 m/s^2
Option D:	5 m/s^2
3.	A particle moves along a straight line such that distance (x) traversed in t seconds is given by $x = t^2 (4 - t) + 7$ m, the acceleration of the particle, at time, t, equal to 1 second will be _____ m/s^2
Option A:	11
Option B:	5
Option C:	2
Option D:	7
4.	An isosceles triangle has its two equal sides placed along the two axes in the first quadrant. If these side measure 3 m, the coordinates of the centroid of the triangle are _____ .
Option A:	(2 m, 2 m)
Option B:	(1.33 m, 1.33 m)
Option C:	(1 m, 1 m)
Option D:	(2 m, 1.33 m)
5.	Four forces 25 N, 25 N, 50 N and 50 N are acting along with sides LM, MN, NO and OL of a rectangle LMNO. Their resultant force will be inclined at _____ to the side ON.
Option A:	45°

Option B:	0^o
Option C:	15^o
Option D:	30^o
6.	A cricket ball hit in the air by the batsman, with velocity 'u' inclined with the horizontal with angle 'α', reaches the boundary in a projectile fashion. Assuming the batsman's height to be zero, the horizontal distance travelled by the ball is given by _____.
Option A:	$\frac{4u^2 sin\propto}{2g}$
Option B:	$\frac{2u^2 sin3\propto}{g}$
Option C:	$\frac{u^2 sin2\propto}{g}$
Option D:	$\frac{u^2 sin\propto}{2g}$
7.	Which one of the following statements is TRUE?
Option A:	the tangent of the coefficient of friction is equal to the angle of friction
Option B:	the angle of repose is always greater than the angle of friction
Option C:	the angle of repose is always less than the angle of friction
Option D:	Limiting frictional force is directly proportional to the normal reaction.
8.	A vertical parallel force system has four forces. They are placed one after other with a distance of separation of 1 m each between them. The first force acts upwards and has a magnitude of 100 N, the second force has a magnitude of 200 N and too acts upward. The third and fourth have equal magnitude of 400 N. The third force is acting downwards whereas the fourth one acts upwards. Find the position of the resultant force with respect to the first force.
Option A:	2 m on the left of the first force
Option B:	4 m on the right of the first force
Option C:	2 m on the right of the first force
Option D:	3 m on the right of the first force
9.	A person drops a ball from a height of 1.5 m on a concrete floor. The ball then bounces from the ground vertically upwards and reaches a height of 1 m. The coefficient of restitution in this case is _____.
Option A:	1.2247
Option B:	0.6667
Option C:	1.5
Option D:	0.8165
10.	A wheel of radius 0.5 m rolls without slipping on a horizontal surface in theh clockwise direction. Determine the velocity of the top-most point, A, of the wheel, when the velocity of the center, C, of the wheel is 8 m/sec. towards right.
Option A:	14.14 m/s
Option B:	16 m/s

Option C:	12 m/s
Option D:	18 m/s
11.	A 5 kg block travels a distance of 10 m along a smooth horizonal surface. Find the work-done by the weight of the block?
Option A:	0 J
Option B:	50 J
Option C:	490.5 J
Option D:	49.05 J
12.	Three forces are acting at point A. The forces are P = 150 N (along the East), Q = 200 N (along the North) and S = 150 N (along the West). Their resultant is _____.
Option A:	200 N acting along the South
Option B:	200 N acting along the North
Option C:	500 N acting along the East-West
Option D:	500 N acting along the North-West
13.	Under the application of which of the following force system body undergoes pure rotational motion?
Option A:	Coplanar concurrent force system
Option B:	Coplanar parallel force system
Option C:	Non-coplanar concurrent force system
Option D:	Coplanar non-concurrent non-parallel force system
14.	Which of the following statements is FALSE?
Option A:	Magnitude of the moment of a force is obtained by multiplying the magnitude of the force by its shortest distance from the moment centre.
Option B:	The moment of a force is a vector quantity.
Option C:	The moment of a force is always the same irrespective of the location of the moment centre.
Option D:	The magnitude of the moment of a force about a moment centre located along its line of action is always zero.
15.	Two unlike parallel forces A & B of different magnitudes are acting on a rigid body. Which of the following statements is TRUE?
Option A:	The body will be in the pure rotary motion.
Option B:	The body will be in the pure translatory motion.
Option C:	The body will remain stationary.
Option D:	The body will be in the general plane motion.
16.	Two steel balls underwent a direct central impact along a horizontal line. Before the impact, the first ball was travelling at 4 m/s towards the right whereas the second was travelling with 3 m/s towards the left. After the impact the second ball was found to travel with a velocity of 4 m/s towards the right. If the coefficient of restitution is 0.8, find the velocity of the first ball after the impact.
Option A:	1.6 m/s towards left
Option B:	1.6 m/s towards right
Option C:	3 m/s towards left
Option D:	3 m/s towards right

17.	A body of weight 100 N kept on a rough plane inclined at 10° with horizontal is at rest. If the coefficient of friction is 0.3, determine the frictional force.
Option A:	29.54 N
Option B:	100 N
Option C:	30 N
Option D:	17.36 N
18.	Which of the following statements is TRUE about the instantaneous centre of rotation (ICR)?
Option A:	An ICR always lies within the physical boundary of the rigid body under consideration.
Option B:	An ICR has a fixed position at all the times.
Option C:	An ICR travels with some finite linear velocity.
Option D:	For a rigid body in general plane motion a point which has a zero linear velocity is knows as an ICR.
19.	A Vertical force of 200 N force is acting at a point A(4,-3). The magnitude of the moment of this force about the origin is _____.
Option A:	600 Nm
Option B:	800 Nm
Option C:	1000 Nm
Option D:	0 Nm
20.	A massless ladder is kept on the rough floor and leans against a rough vertical wall. In this case, the ladder will _____.
Option A:	remain in stationary position
Option B:	slide downwards along the wall and horizontally along the floor
Option C:	rotate about the vertical axis
Option D:	rotate about the horizontal axis

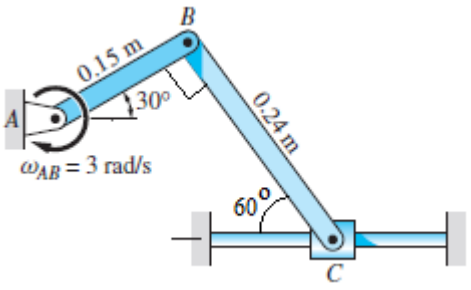
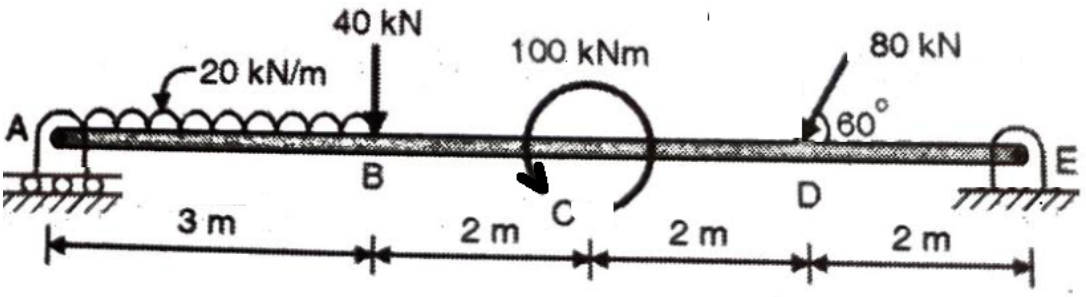
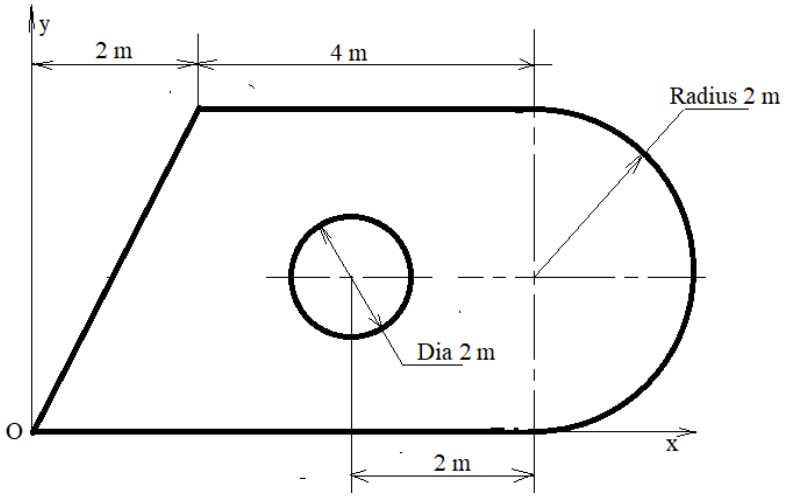
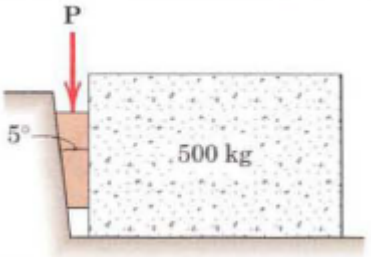
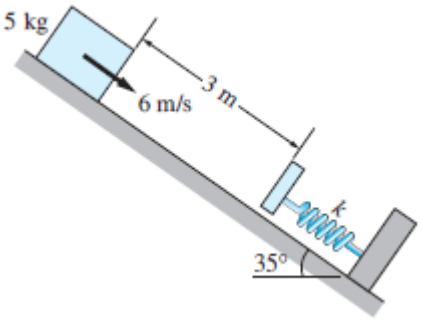
Q2.	**Solve any Two.** **[10 marks each]**
A	When the mechanism of Figure 1 is in the position shown, the angular velocity of bar *AB* is 3 rad/s clockwise. Using instantaneous center of rotation, calculate the angular velocity of bar *BC* and the velocity of slider *C* for this position.
	

	Figure 1
B	Find the reactions at the supports A & B for the given beam shown in Figure 2.
	 **Figure 2**
C	Find the centroid of the shaded area shown in Figure 3 with respect to the given reference axes x & y.
	.  **Figure 3**

Q3.	**Solve any Two.** **[10 marks each]**
A	The position of a particle that moves along the *x*-axis is given by

	$x = t^3 - 3t^2 - 45t$ m, where t is the time in seconds. Determine the position, velocity, acceleration, and distance traveled at $t = 8$ s. What time will the particle reverses its direction? What is the corresponding displacement?
B	The horizontal position of the 500 kg rectangular block of concrete, shown in Figure 4, is adjusted by the 5° wedge under the action of the force P. If the coefficient of static friction for all the surfaces in contact is 0.4, determine the force P required to move the block to the right.
	 **Figure 4**
C	When in the position shown in Figure 5, the 5-kg box is moving down the inclined plane at a speed of 6 m/s. What is the compression of the spring when the box comes to rest? The coefficient of kinetic friction between the box and the plane is 0.25, and the spring constant is $k = 4000$ N/m.
	 **Figure 5**

University of Mumbai

Examination 2020 under cluster _RAIT_ (Lead College: _____)

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

Program: Bachelor of Engineering

Curriculum Scheme: Rev 2016

Examination: FE/Semester I

Course Code: FEC104 and Course Name: Engineering Mechanics

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	B
Q3.	C
Q4	C
Q5	A
Q6	C
Q7	D
Q8.	C
Q9.	D
Q10.	B
Q11.	A
Q12.	B
Q13.	B
Q14.	C
Q15.	D
Q16.	A
Q17.	D
Q18.	D
Q19.	B
Q20.	A

University of Mumbai

Examination 2020 under cluster 3 (Lead College: FCRIT)

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

Program: FE/SEM I/Rev.2016/Dec Jan Examination.

Curriculum Scheme: Rev.2016

Examination: FE Semester I

Course Code: FEC106 and Course Name: Environmental Studies

Time: 1hour 30 min. Max. Marks: 60

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks .**
1.	Sustainable development
Option A:	Takes care of needs of future and current generations
Option B:	Compromises needs of future generation
Option C:	Compromises needs of current generation
Option D:	Does not takes care of needs of both generations
2.	A food web consist of
Option A:	A portion of food chain
Option B:	Producer, consumer and decomposers
Option C:	Interlocking Food chain
Option D:	A set of similar consumers.
3.	Which of the following removes both gaseous and particulate contaminants?
Option A:	Ventury Scrubber
Option B:	Gravitational settling Chamber
Option C:	Dynamic Precipitator
Option D:	Wet Scrubber
4.	The process of burning municipal solid wastes under suitable temperature and conditions in a specific furnace is called _____.
Option A:	Landfill
Option B:	Incineration
Option C:	Recycling
Option D:	Vermicomposting
5.	Which of the following river is called the world's most polluted river?
Option A:	Ganga River
Option B:	Chenab River
Option C:	Cauvery River
Option D:	Yamuna River
6.	Which of the following is the chief component formed in Photochemical smog?
Option A:	Carbon dioxide
Option B:	Peroxyacylnitrate

Option C:	Chlorofluorocarbon
Option D:	Sulphur dioxide
7.	What is noise?
Option A:	Desirable sound
Option B:	Desirable and unwanted Sound
Option C:	Undesirable and unwanted sound
Option D:	Undesirable and wanted sound.
8.	Environmental Protection Act was enacted in India during
Option A:	1986
Option B:	1984
Option C:	1994
Option D:	1987
9.	CPCB stand for
Option A:	Central public control board
Option B:	Central pollution control bank
Option C:	Central pollution control board
Option D:	Central pollution control book
10.	What is called for the phenomenon when the radiation absorbed by the atmosphere is re-radiated towards the surface of the Earth?
Option A:	Greenhouse effect
Option B:	Darwin effect
Option C:	Smog
Option D:	Newton effect
11.	Which of the following is a non-renewable energy resource?
Option A:	Solar
Option B:	Methane
Option C:	Hydroelectric
Option D:	Coal
12.	Geothermal energy is produced from
Option A:	Temperature difference between Earth surface and atmosphere
Option B:	Thermal energy from deep below the earth surface
Option C:	Temperature difference between Earth surface and oceans
Option D:	Thermal energy from ocean
13.	One carbon credit equals to
Option A:	One ton of methane
Option B:	One ton of carbon dioxide
Option C:	One Kg methane
Option D:	One Kg of carbon dioxide
14.	Which of the following are the advantages of Green Buildings?
Option A:	Use of more water
Option B:	Use of more energy

Option C:	Increased use of natural resources
Option D:	Use of less water, use of less energy, and reduced use of natural resources.
15.	Disaster management does not includes
Option A:	Mitigation
Option B:	Reconstruction
Option C:	Rehabilitation
Option D:	Depletion of soil

Q2	**Attempt any THREE from the following.** **15 Marks**
A	*Write a note on Green House Effect.*
B	*With suitable examples explain the concept of food Chain and Food Web.*
C	*Explain in detail the 3Rs namely reduce, Reuse, Recycle as a control measure of sustainability.*
D	Explain working of hydropower electricity plant with the help of neat sketch.
E	Explain what is Indoor Pollution. Give examples and state its ill effects.

Q3.	**Attempt any THREE from the following.** **15 Marks**
A	*Write a case study on Fukushima Disaster.*
B	*What are the functions of Central Pollution Control Board?*
C	*Explain the concept of Green Building.*
D	*What is water pollution ?Explain sources and effects of water pollution*
E	*What are the limitations of conventional energy sources?*

University of Mumbai

Examination 2020 under cluster 3(Lead College: FCRIT)

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

Program: FE/SEM I/Rev.2016/Dec Jan Examination.

Curriculum Scheme: Rev 2016

Examination: FE Semester I

Course Code: FEC106 and Course Name: Environmental Studies

Time: 1 hour 30 min Max. Marks: 60

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	C
Q3.	A
Q4	B
Q5	A
Q6	B
Q7	C
Q8.	A
Q9.	C
Q10.	A
Q11.	D
Q12.	B
Q13.	B
Q14.	D
Q15.	D