

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. -2012) (CBSGS)
SEMESTER - I

Days and Dates	Time	Course 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 & Electronics Engineering.
Tuesday, January 19, 2021	12.30 p.m to 02.00 p.m.	FEC106	Environmental 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

Program: First Year Engineering

Curriculum Scheme: Rev 2012

Examination: First Year Semester I

Course Code: FEC101 and Course Name: AM 1

Time: 1 hour

Max. Marks: 50

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

Q1.	The Cartesian form of $4(\cos \cos \pi/2 + i \sin \sin \pi/2)$ is equal to
Option A:	2i
Option B:	-2i
Option C:	4i
Option D:	4
Q2.	What is the value of a if $B = [1 \ 4 \ 2 \ a]$ is a singular matrix
Option A:	5
Option B:	6
Option C:	7
Option D:	8
Q3.	In Gauss Elimination Method for solving a system of linear algebraic equations, triangularization leads to
Option A:	Diagonal Matrix
Option B:	Lower Triangular Matrix
Option C:	Upper Triangular Matrix
Option D:	Singular Matrix
Q4.	Find $\frac{\partial z}{\partial x}$ where $z = \sin \sin x^2 \cos \cos y^2$
Option A:	$2x \sin \sin x^2$
Option B:	$x \sin 2x$
Option C:	$2x \cos \cos x^2 \cos \cos y^2$
Option D:	$6x \sin \sin x^2 \cos \cos y^2$
Q5.	The rank of the matrix $A = [1 \ 1 \ 1 \ 2 \ 2 \ 2 \ 3 \ 3 \ 3]$ is equal to
Option A:	2
Option B:	1
Option C:	3
Option D:	0
Q6.	The real part of \sqrt{i} is
Option A:	1
Option B:	$\frac{1}{2}$
Option C:	$1/\sqrt{2}$
Option D:	NONE

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Examination 2020

Q7.	Necessary conditions of Euler's theorem is
Option A:	Z should be homogeneous and of order n.
Option B:	Z should not be homogeneous but of order n.
Option C:	Z should be implicit.
Option D:	Z should be the function of x and y only.
Q8.	Implicit functions are the functions
Option A:	which can be solved for a single variable
Option B:	which cannot be solved for a single variable
Option C:	which can be eliminated to give zero
Option D:	which are rational in nature
Q9.	The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = -1$ is
Option A:	2
Option B:	16
Option C:	4
Option D:	NONE
Q10.	If the equation $y = ab^x$ can be written in linear form $Y=A+BX$. What is Y, X, A, B?
Option A:	Y=log y , X=x , A=log a , B=log b
Option B:	Y=y, X=log x, B=b, A=a
Option C:	Y=y, A=a, B=log b, X=log x
Option D:	Y=log y, A=a, B=log b, X=x
Q11.	If $u = \frac{x^3+y^3+z^3}{ax+by+cz}$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = ?$
Option A:	tan u
Option B:	2tan u
Option C:	2cot u
Option D:	cot u
Q12.	Find the value of $\log(-4)$
Option A:	$\log \log 4 + 2\pi i$
Option B:	$6 + i\pi$
Option C:	$\log \log 4 - 2i\pi$
Option D:	$\log \log 4 + i\pi$
Q13.	For a non singular matrix A if PAQ is normal form then A^{-1} is equal to
Option A:	PQ
Option B:	QP
Option C:	P+Q

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Examination 2020

Option D:	Q-P
Q14.	$x = ?$
Option A:	$x + \sqrt{x^2 + 1}$
Option B:	$x - \sqrt{x^2 + 1}$
Option C:	$\frac{1}{2} \ln\left(\frac{1+x}{1-x}\right)$
Option D:	$\frac{1}{2} \ln\left(\frac{x+1}{x-1}\right)$
Q15.	If $y = x$ then select the true statement where y_1, y_2 & y_3 represents the first second & third derivative of y w.r.t x.
Option A:	$y_3 = 2xy_2^3$
Option B:	$y_2 = -2xy_1^3$
Option C:	$y_2 = 2xy_1^2$
Option D:	$y_3 = xy_1^2$
Q16.	If $\tanh x = 2/3$ then the value of $\cosh 2x$ is
Option A:	5/13
Option B:	13/5
Option C:	13/10
Option D:	10/13
Q17.	For what value of b, the matrix $A = \frac{1}{13} [b \quad -5 \quad 5 \quad b]$ is orthogonal?
Option A:	± 5
Option B:	± 13
Option C:	± 12
Option D:	± 16
Q18.	If $u = \log \log \frac{\sqrt{x^2+y^2}}{x+y}$ then the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ is
Option A:	$2e^u$
Option B:	e^u
Option C:	0
Option D:	$\frac{1}{2}e^u$
Q19.	Let $f(x) = x^9$ then ninth derivative of $f(x)$ at $x=0$ is given by
Option A:	9!
Option B:	0
Option C:	10!

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Examination 2020

Option D:	21!
Q20.	If $z = \frac{1}{2} + i\frac{\sqrt{3}}{2}$ and w is its conjugate then the value of $z^{15} + w^{15}$ is
Option A:	2
Option B:	-2
Option C:	0
Option D:	NONE
Q21.	Given system of linear equations $x-4y+5z = -1$, $2x-y+3z = 1$, $3x+2y+z = 3$ has
Option A:	unique solution
Option B:	no solution
Option C:	infinite many solutions
Option D:	n-r solutions
Q22.	Evaluate $\frac{3^x-2^x}{x}$
Option A:	3/2
Option B:	$\log \log \frac{3}{2}$
Option C:	$\log \log \frac{2}{3}$
Option D:	2/3
Q23.	Stationary point is a point where function f(x, y) have
Option A:	$\frac{\partial f}{\partial x} = 0$
Option B:	$\frac{\partial f}{\partial y} = 0$
Option C:	$\frac{\partial f}{\partial x} = 0$ and $\frac{\partial f}{\partial y} = 0$
Option D:	$\frac{\partial f}{\partial x} < 0$ and $\frac{\partial f}{\partial y} > 0$
Q24.	The roots of $(1)^{1/4}$ are
Option A:	$\pm 1, \pm i$
Option B:	$1+i, -1+i$
Option C:	$1, 0, \pm i$
Option D:	None
Q25.	The normal form of the matrix $A = [1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 3 \ 1 \ 1]$ is given by
Option A:	$[1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0]$
Option B:	$[1 \ 0 \ 0 \ 0 \ 1 \ 0 \ 0 \ 0 \ 1]$
Option C:	$[1 \ 0 \ 0 \ 0 \ 1 \ 0 \ 0 \ 0 \ 0]$
Option D:	None

University of Mumbai
Examination 2020

Program: FIRST YEAR ENGINEERING

Curriculum Scheme: Rev2012

Examination: FIRST Year Semester I

Course Code: FEC101 and Course Name: AM1

Time: 1 hour

Max. Marks: 50

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

University of Mumbai
Examination 2020 under cluster 3(Lead College: FCRIT)

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

Program: FE (Rev 2012)

Curriculum Scheme: 2012

Examination: FE Semester I

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

Time: 1.5 hour

Max. Marks: 60

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The packing factor of FCC unit cell is
Option A:	0.74
Option B:	0.34
Option C:	0.68
Option D:	0.52
2.	The molecular weight of NaCl is 58.5 and have FCC structure and its density is 2170 Kg/m ³ . Calculate the lattice constant. Given Avogadro number = 6.023 x 10 ²⁶ .
Option A:	3.75 A.U.
Option B:	2.87A.U.
Option C:	4.75 A.U.
Option D:	5.75 A.U.
3.	What is the distance between planes with Miller indices (111) of Aluminium if it's lattice constant is 3.84 A.U □
Option A:	3.84 A.U.
Option B:	1.92 A.U.
Option C:	2.217 A.U.
Option D:	2.715 A.U.
4.	The atom is present at irregular lattice site. Which type of defect is it?
Option A:	Interstitial
Option B:	Vacancy
Option C:	Impurity
Option D:	Frankel
5.	“The molecules have no positional order but they do have orientational order” This statement is valid for which of the following liquid crystal phase?
Option A:	Nematic phase
Option B:	Smectic Phase
Option C:	Cholesteric phase
Option D:	Nematic phase and Smectic phase
6.	In semiconductor the concentrations of electrons & holes are 8 x 10 ¹⁸ /m ³ &

	$5 \times 10^{18}/\text{m}^3$ respectively. If the mobilities of electrons & holes are $2.3 \text{ m}^2/\text{V}\cdot\text{sec}$ & $0.01 \text{ m}^2/\text{V}\cdot\text{sec}$ respectively, then semiconductor is
Option A:	N type & its resistivity is 0.34 ohm-m
Option B:	P type & its resistivity is 0.34 ohm-m
Option C:	N type & its resistivity is 0.034 ohm-m
Option D:	P type & its resistivity is 3.4 ohm-m
7.	If the ratio of concentration of electrons to holes in a semiconductor is 7/5 & the ratio of current is 7/4, then what is the ratio of their drift velocities
Option A:	4/5
Option B:	5/4
Option C:	4/7
Option D:	5/8
8.	Let N_p & N_e be the number of holes & conduction electrons respectively in a semiconductor. Then
Option A:	$N_p \gg N_e$ in an intrinsic semiconductor
Option B:	$N_p = N_e$ in an extrinsic semiconductor
Option C:	$N_p = N_e$ in an intrinsic semiconductor
Option D:	$N_e \gg N_p$ in an intrinsic semiconductor
9.	A semiconductor doped with a donor impurity is
Option A:	P- type
Option B:	N-type
Option C:	NPN type
Option D:	PNP type
10.	In P-N junction, the barrier potential offers resistance to
Option A:	free electrons in N region & holes in P region
Option B:	free electrons in P region & holes in N region
Option C:	only free electrons in N region
Option D:	only holes in P region
11.	A piece of ferric oxide with magnetic field intensity 10^6 A/m and susceptibility is 1.5×10^{-3} . Find the magnetization of the material.
Option A:	1500A/m
Option B:	1.5A/m
Option C:	150A/m
Option D:	15A/m
12.	For a perfect dielectric, which parameter will be zero?
Option A:	Permittivity
Option B:	Permeability
Option C:	Conductivity
Option D:	Frequency
13.	Dielectrics which show spontaneous polarization are called as
Option A:	Piezoelectric

Option B:	Pyroelectric
Option C:	Centrosymmetric
Option D:	Ferroelectric
14.	What happens if the reverberation time is too large?
Option A:	The sound becomes infrasonic
Option B:	The sound becomes inaudible
Option C:	Frequency becomes high
Option D:	Echoes are produced
15.	The speed of ultrasonic waves of frequency 75 kHz in water is 1500 m/s. The wavelength of these waves is
Option A:	2 mm
Option B:	2 cm
Option C:	2 m
Option D:	20 m

Q2 (15 Marks)	Solve any Three out of Five (5 marks each)
A	The Bragg angle corresponding to the first order reflection from (111) planes in a crystal is 30 deg when X rays of wavelength 1.755 A.U. are used . Calculate the interatomic spacing.
B	Explain the working of Bragg's spectrometer for X ray diffraction with proper diagram
C	With the help of diagram explain principle, construction & working of solar cell.
D	What is dielectric polarization and dielectric susceptibility? Find the relation between them?
E	A classroom has dimensions 10x 8 x 6 m ³ . The reverberation time is 3 sec. Calculate the total absorption of surface and average absorption.

Q3 (15 Marks)	Solve any Three out of Five (5 marks each)
A	Show that for Hexagonal Closed Packed unit cell an axial ratio (c/a) is $\sqrt{8/3}$.
B	With the energy band diagram explain the variation of Fermi level with impurity concentration in extrinsic semiconductor.
C	Find the resistance of an intrinsic Ge rod 2 mm long, 2 mm wide and 1 mm thick at 300 K. the intrinsic carrier density $2.0 \times 10^{19} \text{ m}^{-3}$ is at 300 K and the mobility of electrons and holes are $0.39 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$ and $0.16 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$.
D	An iron ring of mean circumferential length of 30 cm and cross sectional area 1 cm^2 is wound uniformly with 300 turns of a wire. When a current

	of 0.032 A flows in it, flux produced in the ring is 2×10^{-6} wb. Find the flux density, magnetic field intensity and permeability of iron.
E	Explain the piezoelectric oscillator to produce ultrasonic sound wave.

University of Mumbai
Examination 2020 under cluster 3 (Lead College: FCRIT)

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

Program: Rev 2012

Curriculum Scheme: 2012

Examination: FE Semester I

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

Time: 1.5 hour

Max. Marks: 60

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

University of Mumbai
Examination 2020 under cluster 3(Lead College: FCRIT)
Examinations Commencing from 7th January 2021 to 20th January 2021
Program: First Year Engineering
(DEC/JAN Examination)

Curriculum Scheme: **SEM-I (REV-2012)**

Examination: FE (All Branches)

Semester-I

Course Code: FEC103

Course Name: Applied Chemistry -I

Time: 1.5 hour

Max. Marks: 60

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks (Max Marks 30)
Additional Data: Atomic Weights [Ca= 40, Mg = 24, Na = 58.5, K =39, Cl =35.5, C= 12, N= 14, O =16, H =1]	
Q1.	The substance used as a coagulant in lime soda process is:
Option A:	Sodium carbonate
Option B:	Ferric chloride
Option C:	Calcium hydroxide
Option D:	Sodium aluminate
Q2.	What does Gibb's phase rule state?
Option A:	$P+F=C-1$
Option B:	$P+F=C+1$
Option C:	$P+F=C-2$
Option D:	$P+F=C+2$
Q3.	The lubricants used in refrigerators will have
Option A:	low fire point
Option B:	high viscosity
Option C:	high pour point
Option D:	low cloud point
Q4.	Plasticizers are materials which are added to resins to increase:
Option A:	Strength
Option B:	Corrosion resistance
Option C:	Stability
Option D:	Plasticity & flexibility
Q5.	What does RCC mean in construction?
Option A:	Reinforced Concrete Cement
Option B:	Reinforced Cement Concrete
Option C:	Reinforced Combined Cement
Option D:	Reinforced Constituent Cement

Q6.	The residual hardness of a zeolite process is about
Option A:	0 ppm
Option B:	10 ppm
Option C:	15-30 ppm
Option D:	50-60 ppm
Q7.	Which types of greases are not used for lubrication
Option A:	calcium soap greases
Option B:	sodium soap greases
Option C:	lithium soap greases
Option D:	Magnesium soap greases.
Q8.	What is the point at which all the three phases of a system exist?
Option A:	Triple point
Option B:	Sublimation point
Option C:	Vapor point
Option D:	Eutectic point
Q9.	Extrusion molding can be used for:
Option A:	thermoplastic resins
Option B:	thermosetting resins
Option C:	lubricants
Option D:	Cements
Q10.	Calculate the number of phases in a system consisting of emulsion of oil in water.
Option A:	2
Option B:	1
Option C:	3
Option D:	4
Q11.	A good lubricating oil should have
Option A:	high flash point and high fire point
Option B:	high flash point and low fire point
Option C:	low flash point and high fire point
Option D:	Low flash point and low fire point
Q12.	A water sample contains, $\text{Ca}(\text{HCO}_3)_2 = 81 \text{ mg/lit.}$, $\text{Mg}(\text{HCO}_3)_2 = 73 \text{ mg/lit.}$, $\text{CaSO}_4 = 68 \text{ mg/ lit.}$ $\text{MgSO}_4 = 60 \text{ mg/lit.}$ $\text{KCl} = 100 \text{ mg/lit.}$ Calculate Temporary and Permanent hardness
Option A:	50 mg/lit, 50 mg/lit
Option B:	50 ppm, 50ppm
Option C:	100 mg/lit, 100 mg/lit
Option D:	100 ppm, 50 ppm
Q13.	Polyurethane rubber is also known as :
Option A:	Hypanol
Option B:	Thiokol
Option C:	Isocyanate
Option D:	Neoprene

Q14.	The monomers of Buna-S rubber are:
Option A:	Styrene & butadiene
Option B:	Isoprene & butadiene
Option C:	Vinyl chloride & sulphur
Option D:	Butadiene
Q15.	_____ property of lubricant plays a very important role in thick film lubrication
Option A:	Viscosity
Option B:	Emulsification
Option C:	Pour point
Option D:	Oiliness

Q2	Solve any THREE out of FIVE(3* 5=15)marks
A	Discuss the mechanism of thick-film lubrication
B	Define conducting polymers. Explain Intrinsic and Doped conducting polymer with appropriate examples.
C	Discuss the setting and hardening of portland cement with help of balanced reactions as well as the role of gypsum.
D	0.28g of CaCO ₃ was dissolved in HCl and diluted to 1 liter with distilled water. 100ml of this solution required 28ml of EDTA solution. . 100 ml of hard water sample required 33 ml of EDTA. 100 ml of boiled water consumed 10 ml of EDTA. Calculate permanent type of hardness.
E	Draw a neat phase diagram of the one component water system and explain it with reference to (i) curves (ii) Triple point.

Q3	Solve any THREE out of FIVE (3* 5=15)marks
A	What is a Condensed phase system. Explain with the help of well labelled diagram the different equilibria Pb-Ag System.
B	Define moulding and discuss the Injection moulding method of fabrication of plastic
C	Find the saponification value of an oil sample weighing 1.5g, refluxed with 25ml of 0.5N KOH, required 15 ml of 0.5N HCl for the residual titration. The blank titration reading was 25 ml of 0.5 N HCl.
D	Calculate The COD of an effluent (in mg/lit) if 25 ml of sewage water is refluxed with 0.1N K ₂ Cr ₂ O ₇ in presence of H ₂ SO ₄ and Ag ₂ SO ₄ . The unreacted dichromate required 5.5 ml of 0.1N FAS solution. Blank titration consumed 15ml of 0.1N FAS solution.
E	What are carbon nano tubes? Describe the different types of CNTs? Discuss any two of their Electrical and Mechanical properties

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: First Year Engineering

(DEC/JAN Examination)

Curriculum Scheme: **SEM-I (REV-2012)**

Examination: FE (All Branches)

Semester I

Course Code: FEC103

Course Name: Applied Chemistry -I

Time: 1.5 hour

Max. Marks: 60

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

University of Mumbai
Examination 2020 under cluster 3(Lead College: FCRIT)
Examinations Commencing from 7th January 2021 to 20th January 2021

Program: F.E (ALL BRANCHES)

Curriculum Scheme: REV 2012

Examination: FE Semester : I

Course Code: FEC105
 Time: 2 hour

Course Name: Basic electrical & electronics engineering
 Max. Marks: 80

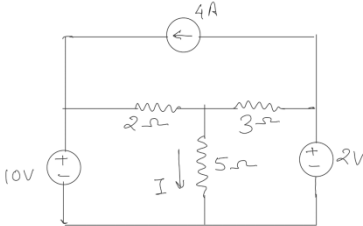
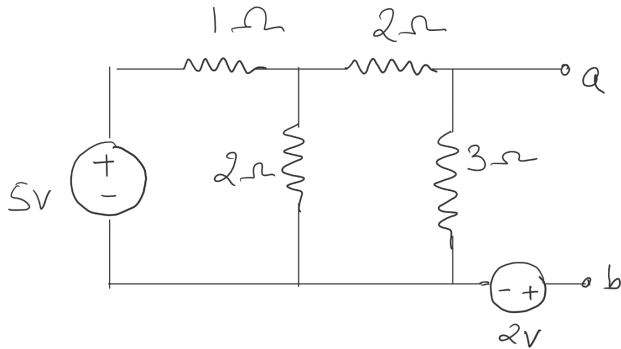
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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1. states that an induced effect is always such as to oppose the cause that produced it
Option A:	Lenz'slaw
Option B:	Ohm'slaw
Option C:	Kirchhoff'slaw
Option D:	Ampere'slaw
2.	A zener diode is used as
Option A:	multivibrator
Option B:	an amplifier
Option C:	voltage regulator
Option D:	rectifier
3.	The internal resistance of ideal voltage source is-----ohms
Option A:	Minimum
Option B:	Maximum
Option C:	Zero
Option D:	Infinite
4.	Which rectifier requires four diodes?
Option A:	half-wave voltage rectifier
Option B:	full-wave mid point rectifier
Option C:	full-wave bridge rectifier
Option D:	voltage quadrupler
5.	In pure metals increase in temperature affects
Option A:	Increase in resistance
Option B:	Decrease in resistance
Option C:	Resistance remains same
Option D:	Resistance is independent of temperature
6.	The ability of a coil to oppose any change in current is the measure of of the coil
Option A:	Self-inductance
Option B:	Impedance
Option C:	Voltage
Option D:	Current
7.	Which, among the following is the right expression for converting from delta to star?
Option A:	$R1=Ra*Rb/(Ra+Rb+Rc)$, $R2=Rb*Rc/(Ra+Rb+Rc)$, $R3=Rc*Ra/(Ra+Rb+Rc)$

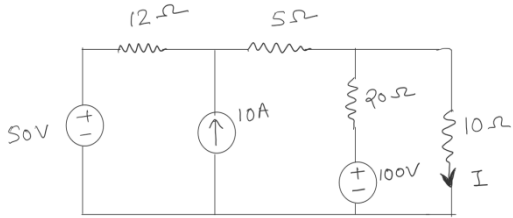
Option B:	$R1=Ra/(Ra+Rb+Rc)$, $R2=Rb/(Ra+Rb+Rc)$, $Rc=/(Ra+Rb+Rc)$
Option C:	$R1=Ra*Rb*Rc/(Ra+Rb+Rc)$, $R2=Ra*Rb/(Ra+Rb+Rc)$, $R3=Ra/(Ra+Rb+Rc)$
Option D:	$R1=Ra*Rb*Rc/(Ra+Rb+Rc)$, $R2=Ra*Rb*Rc/(Ra+Rb+Rc)$, $R3=Ra*Rb*Rc/(Ra+Rb+Rc)$
8.	To increase the current in a series RL circuit, the frequency.
Option A:	should be increased
Option B:	should be decreased
Option C:	should be constant
Option D:	cannot be determined without values
9.	At series resonance,
Option A:	circuit impedance is very large
Option B:	circuit power factor is minimum
Option C:	voltage across L or C is zero
Option D:	circuit power factor is unity
10.	When the resistance is greater than the capacitive reactance in a series RC circuit, the phase angle is
Option A:	0°
Option B:	between 0° and 45°
Option C:	between 45° and 90°
Option D:	45°
11.	Transformer cores are built up from laminations rather than from solid metal so that
Option A:	oil penetrates the core more easily
Option B:	eddy current loss is reduced
Option C:	less insulation is required for the windings
Option D:	turn ratio is higher than voltage ratio
12.	In a certain series resonant circuit, $V_C = 125$ V, $V_L = 125$ V, and $V_R = 40$ V. The value of the source voltage is
Option A:	40 V
Option B:	125 V
Option C:	250V
Option D:	290V
13.	In star connected system, V_{RY} is equal to?
Option A:	V_{YR}
Option B:	$-V_{YR}$
Option C:	$2V_{YR}$
Option D:	$3V_{YR}$

14.	The magnetizing current of a transformer is usually small because it has.....
Option A:	small air gap
Option B:	large leakage flux
Option C:	laminated silicon steel core
Option D:	fewer rotation
15.	The form factor of a sinusoidal wave is
Option A:	1.414
Option B:	1.11
Option C:	2
Option D:	1.5
16.	The expression for total power output of a delta connected system in terms of phase voltage and current is given by
Option A:	$3V_p I_p \cos\phi$
Option B:	$\sqrt{3}V_p I_p \cos\phi$
Option C:	$1/\sqrt{3} V_p I_p \cos\phi$
Option D:	$1/3 \times V_p I_p \cos\phi$
17.	At series resonance, the voltage across L or C is
Option A:	equal to applied voltage
Option B:	less than applied voltage
Option C:	much more than applied voltage
Option D:	equal to voltage across R
18.	An ideal transformer is one which
Option A:	has a common core for its primary and secondary windings
Option B:	has no losses and magnetic leakage
Option C:	has core of stainless steel and windings of pure copper metal
Option D:	has interleaved primary and secondary windings
19.	The PIV rating of each diode in a bridge rectifier is that of the equivalent centre-tap rectifier
Option A:	one-half
Option B:	the same as
Option C:	twice

Option D:	four times
20.	In a star connected system, the current flowing through the line is
Option A:	Greater than the phase current
Option B:	Equal to the phase current
Option C:	Lesser than the phase current
Option D:	Greater or lower both are possible

Q2	Solve any Four out of Six	5 marks each
A	Find I, using mesh analysis 	
B	Find Thevenin's equivalent circuit at terminals ab 	
C	In ac circuit, Supply voltage is $v(t) = 150 \sin(\omega t + 30)$ and Current is $i(t) = 2 \sin(\omega t - 30)$. Find i) power factor (ii) circuit components (iii) power consumed.	
D	Calculate line current and phase current, line and phase voltage in a delta connected load with per phase impedance of $10 \angle 60$, when supply voltage is 450 volt, 3 phase, 50 Hz.	
E	Explain the working of C-filter when connected to a full wave rectifier, with the help of waveform and circuit diagram.	
F	Derive the condition of resonance for a series R-L-C circuit.	

Q3.	Solve any Two Questions out of Three	10 marks each
A	Find I, using superposition theorem.	

	
B	<p>Explain how 2 wattmeters measure power and power factor in a three-phase star connected load with lagging power factor. Derive the expression for power and power factor in terms of wattmeter readings.</p>
C	<p>The following test results were obtained on a 10 KVA, 450/100V, 50 Hz transformer O.C. test: 100V, 4.2A, 170W (h.v. side is kept open) S.C. test: 9.65V, 22.2A, 120W (l.v. side is shorted) Calculate parameters of equivalent circuit referred to low voltage side.</p>

University of Mumbai

Examination 2020 under cluster __ (Lead College: _____)

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

Program: _

Curriculum Scheme: 2012

Examination: FE Semester I

Course Code: FEC105

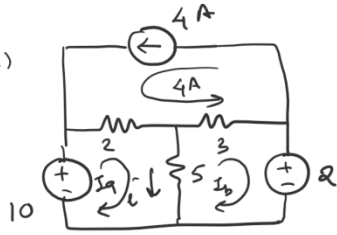
Course Name: Basic electrical and electronics engineering

Time: 2 hour

Max. Marks: 80

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

Q2 (i)



KVL in I_A

$$-10 + 2(I_A + 4) + 5(I_A - I_B) = 0$$

KVL in I_B

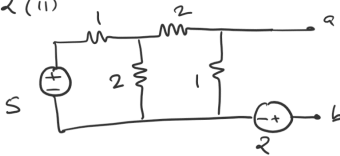
$$3(I_B + 4) + 2 + 5(I_B - I_A) = 0$$

$$\begin{bmatrix} 7 & -5 \\ -5 & 8 \end{bmatrix} \begin{bmatrix} I_A \\ I_B \end{bmatrix} = \begin{bmatrix} 2 \\ 14 \end{bmatrix}$$

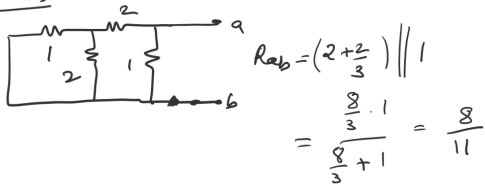
$$I_A = 2.77 \quad I_B = 3.48$$

$$I = I_A - I_B = -0.71$$

Q2 (ii)



for R_{ab}

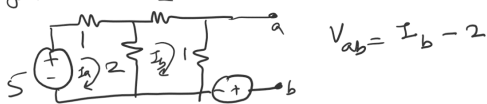


$$R_{ab} = \left(2 + \frac{2}{3}\right) \parallel 1$$

$$= \frac{\frac{8}{3} \cdot 1}{\frac{8}{3} + 1} = \frac{8}{11}$$

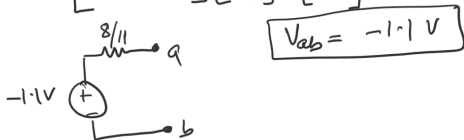
$$R_{ab} = \frac{8}{11}$$

for V_{th}



$$V_{ab} = I_b - 2$$

$$\begin{bmatrix} 3 & -2 \\ -2 & 5 \end{bmatrix} \begin{bmatrix} I_A \\ I_B \end{bmatrix} = \begin{bmatrix} 5 \\ 0 \end{bmatrix} \therefore I_B = 0.9$$



$$V_{ab} = -1.1 \text{ V}$$

Q2 (iii)

$$v_s = 150 \sin(\omega t + 30^\circ)$$

$$i = 2 \sin(\omega t - 30^\circ)$$

$$\bar{V} = \frac{150}{\sqrt{2}} \angle 30^\circ = 106.07 \angle 30^\circ$$

$$\bar{I} = 1.414 \angle -30^\circ$$

$$\bar{Z} = \frac{\bar{V}}{\bar{I}} = 75 \angle 60^\circ$$

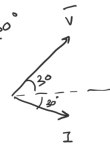
$$= 37.5 + 64.9j$$

① $\text{pf} = \cos -60^\circ = 0.5$ lagging

② $R = 37.5$

$X_L = 64.9$

③ $P = VI \cos \phi = 106.07 \times 1.414 \times 0.5 = 75 \text{ watts}$



Q2 (iv) Delta load

$$\bar{Z}_{\Delta} = 10 \angle 60^\circ$$

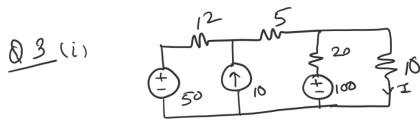
$$V_L = 450 \text{ V} = V_{\Delta}$$

$$\therefore I_{\Delta} = \frac{450}{10} = 45 \text{ A}$$

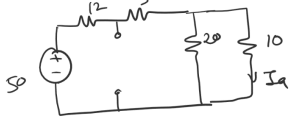
$$I_L = 45\sqrt{3}$$

$$= 77.94 \text{ A}$$

Q3:



with only 50V source



$$I_a = 1.408 \text{ A}$$

with only 10A source

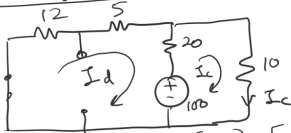


$$I_1 = 10 \times \frac{12}{12 + 5 + \frac{20}{3}}$$

$$= 5.07$$

$$\therefore I_b = I_1 \times \frac{20}{20 + 10} = 3.38 \text{ A}$$

with only 100V source



$$\begin{bmatrix} 37 & -20 \\ -20 & 30 \end{bmatrix} \begin{bmatrix} I_d \\ I_c \end{bmatrix} = \begin{bmatrix} -100 \\ +100 \end{bmatrix} \quad I_c = 2.39$$

$$\therefore I = I_a + I_b + I_c$$

$$= 1.408 + 3.38 + 2.39$$

$$\boxed{I = 7.178 \text{ A}}$$

Q 3(iii) 10 kVA, 450/100V, 50Hz

OC Test on (L.V. side)

$$V_0 = 100 \text{ V}$$

$$I_0 = 4.2 \text{ A}$$

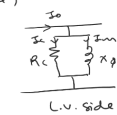
$$W_0 = 70 \text{ W}$$

$$W_0 = V_0 I_0 \cos \phi_0$$

$$\therefore \phi_0 = 80.4^\circ$$

$$I_c = I_0 \cos \phi_0 = 0.7$$

$$I_{m1} = I_0 \sin \phi_0 = 4.14$$

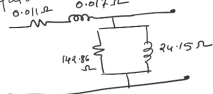


L.V. side

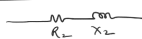
$$R_c = \frac{100}{0.7} = 142.86 \Omega$$

$$X_p = \frac{100}{4.14} = 24.15 \Omega$$

equivalent circuit referred to L.V. side



SC Test on (L.V. side)



$$V_{sc} = 9.65 \text{ V}$$

$$I_{sc} = 22.2 \text{ A}$$

$$W_{sc} = 120 \text{ W}$$

$$I_{sc}^2 R_2 = W_{sc}$$

$$R_2 = 0.237 \Omega$$

$$Z_L = 0.429 \Omega$$

$$X_2 = 0.357 \Omega$$

$$R_1 = \left(\frac{100}{450} \right)^2 R_2$$

$$X_1 = \left(\frac{100}{450} \right)^2 X_2$$

University of Mumbai
Examination 2020 under cluster FCRIT Vashi

Program: First Year Engineering (F E All)
Curriculum Scheme: Rev 2012
Examination: First Year Semester-I

Course Code: FEC 104
Time: 1 hour

Course Name: Engineering Mechanics
Max. Marks: 50

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

Q1.	Law of Transmissibility of forces is applicable to
Option A:	Rigid bodies only
Option B:	Elastic bodies only
Option C:	On any deformable bodies
Option D:	Plastic bodies only
Q2.	A person climbing up the ladder is an example of
Option A:	General force system
Option B:	Parallel force system
Option C:	Concurrent force system
Option D:	It depends on the weight of the person
Q3.	Two bodies of mass 10 kg and 2 kg are dropped from the same height, which body will strike the ground first.
Option A:	10 kg will strike first
Option B:	Both will strike at same time
Option C:	2 kg will strike first
Option D:	It depends on the material of the body
Q4.	What is the nature of force induced in members of a Truss
Option A:	It can be compressive, tensile and Zero
Option B:	Always tensile force
Option C:	Always zero force
Option D:	Always compressive force
Q5.	A block of mass 5 kg is released from rest along a 40-degree inclined plane. Determine the acceleration of the block using D Alembert's Principle. Take the coefficient of friction as 0.2.
Option A:	4.8 m/s ²
Option B:	3.8 m/s ²
Option C:	2.8 m/s ²
Option D:	5.8 m/s ²
Q6.	A body of mass 10 kg is at rest on a horizontal plane. The coefficient of friction is 0.25. what is the minimum force required to just move the block?(g= 9.81 m/s ²)
Option A:	255.25N
Option B:	245.25N
Option C:	24.525 N
Option D:	230.25N

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Examination 2020 under cluster FCRIT Vashi

Q7.	Work done by frictional force is always
Option A:	Zero
Option B:	positive
Option C:	negative
Option D:	high
Q8.	The centroid of a right angle triangle having base b and height h lies at a point from right angle corner
Option A:	$X=b/3$ and $Y=h/3$
Option B:	$X=b/2$ and $Y=h/3$
Option C:	$X=b/3$ and $Y=h/2$
Option D:	$X=b/2$ and $Y=h/2$
Q9.	Moment of a force is zero when the force
Option A:	passes through the moment point
Option B:	Distance between the force and moment point is very large
Option C:	Distance between the force and moment point is very small
Option D:	In practical, Moment of a force can't be zero
Q10.	Regarding projectile motion choose the right statement among the following
Option A:	V_x changes because of gravity and its V_y remains constant
Option B:	Both V_x and V_y remains constant
Option C:	Projectile has no acceleration in vertical direction but it does accelerates horizontally
Option D:	Projectile has vertical acceleration and constant horizontal velocity
Q11.	A body of mass 10 kg is at rest on a horizontal floor. The coefficient of friction is 0.25. Comment about the state of the body if it is acted by an external force of 250 N?
Option A:	Body will about to move
Option B:	Body will be at rest
Option C:	Body will be in motion
Option D:	Data given is insufficient
Q12.	A stone is dropped into a well is heard to strike the water in 4 seconds. Find the depth at which the water level is from the top of thr well ,assuming the velocity of the sound to be 335 m/s (take $g=9.81 \text{ m/s}^2$)
Option A:	70.35 m
Option B:	75.45 m
Option C:	60.45 m
Option D:	77.55 m
Q13.	A particle travels on a circular path, whose distance travelled is defined by $S=(0.5t^3+3t)$ m. if the total acceleration is 10m/s^2 , at $t = 2$ sec, find the radius of curvature.
Option A:	10.125 m

University of Mumbai
Examination 2020 under cluster FCRIT Vashi`

Option B:	15.152 m
Option C:	5.50 m
Option D:	12.12 m
Q14.	Lami's theorem is applicable when
Option A:	four forces are parallel and in equilibrium
Option B:	four forces are concurrent and in equilibrium
Option C:	Three forces are parallel and in equilibrium
Option D:	Three forces are concurrent and in equilibrium
Q15.	The maximum number of unknowns which can be solved in a General Force System are
Option A:	3
Option B:	1
Option C:	4
Option D:	2
Q16.	What are the number of equations used while finding the induced force in the member of trusses by method of joints
Option A:	1
Option B:	3
Option C:	It depends on the loading condition
Option D:	2
Q17.	A truss is called deficient if
Option A:	$m+3 < 2j$
Option B:	$m+3 > 2j$
Option C:	$m+3 = 2j$
Option D:	$j+3 < 2m$
Q18.	During a test, the car moves in a straight line such that for a short time its velocity is defined by $v = (9t^2 + 2t)$ m/s where t is in seconds. Determine its position when $t = 3$ sec.
Option A:	Position = 70 m
Option B:	Position = 80 m
Option C:	Position = 90 m
Option D:	Position = 100 m
Q19.	In the absence of air resistance the angle at which the throne ball goes farthest is?
Option A:	90°
Option B:	30°
Option C:	45°
Option D:	60°
Q20.	For a perfectly inelastic collision, coefficient of restitution(e) should be
Option A:	$e = 0$
Option B:	$e = 1$

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Examination 2020 under cluster FCRIT Vashi`

Option C:	$e > 1$
Option D:	$e < 1$
Q21.	The collision between two bodies is known asif the velocities of colliding bodies before impact are directed along the line of impact
Option A:	Direct Central impact
Option B:	Oblique Central impact
Option C:	Eccentric Impact
Option D:	Elastic Impact
Q22.	The angle of repose (α) holds the following relation with the angle of friction (θ) in the condition of limiting equilibrium
Option A:	$\alpha = \theta$
Option B:	$\alpha = 2\theta$
Option C:	$\alpha = \theta/2$
Option D:	$\alpha = \theta^2$
Q23.	A body of weight 500 N is resting on a ground. What will be the work done by the gravitational force?
Option A:	negative
Option B:	Zero
Option C:	positive
Option D:	Neutral
Q24.	Impulse gives a measure of the product of
Option A:	Force and velocity
Option B:	Mass and acceleration
Option C:	Force and displacement
Option D:	Force and time
Q25.	A small ball of mass 1 kg moving with a velocity of 8 m/s undergoes a direct central impact with a stationary ball of mass 2 kg. the impact is perfectly elastic. The speed of 2 kg mass ball after the impact is
Option A:	8 m/s
Option B:	16 m/s
Option C:	4 m/s
Option D:	5.34 m/s

University of Mumbai
Examination 2020 under cluster FCRIT Vashi

Program: First Year Engineering (F E All)

Curriculum Scheme: Rev 2012

Examination: First Year Semester-I

Course Code: FEC 104

Course Name: Engineering Mechanics

Time: 1 hour

Max. Marks: 50

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

University of Mumbai
Examination 2020 under cluster 3(Lead College: FCRIT)
Examinations Commencing from 7th January 2021 to 20th January 2021

Program: First Year Engineering

(DEC/JAN Examination)

Curriculum Scheme: **SEM-I (REV-2012)**

Examination: FE (All Branches) Semester I

Course Code: FEC106 and Course Name: Environmental Studies

Time: 1.5 hour

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.	The over nourished lakes with 'algal bloom' are called
Option A:	Eutrophic
Option B:	Oligotrophic
Option C:	Dystrophic
Option D:	Mesotropic
2.	The energy flow in the ecosystem is
Option A:	Unidirectional
Option B:	Bidirectional
Option C:	Multidirectional
Option D:	Cyclic
3.	The brown colour of photochemical smog over a city is mainly due to
Option A:	CO
Option B:	SO ₂
Option C:	CO ₂
Option D:	NO ₂
4.	Which of the following is not a component of disaster management cycle?
Option A:	Preparedness
Option B:	Response
Option C:	Migration
Option D:	Recovery
5.	Environmental Impact Assessment is mandatory for certain developmental project under one of the following legislation
Option A:	Air (Pollution and Control) Act
Option B:	The Factories' Act
Option C:	Environment (Protection) Act

Option D:	Forest Act
6.	Tsunami are deadly natural hazards that commonly are generated
Option A:	When the sea floor abruptly deforms and vertically displaces the overlying water
Option B:	By tides produced by gravitational attraction between the earth and the moon
Option C:	Due to hurricanes
Option D:	Due to global warming
7.	A food web consists of
Option A:	Portion of food chain
Option B:	Interconnected food chains
Option C:	Organisms position in food chain
Option D:	Set of food chains
8.	One carbon credit equals to
Option A:	One ton of methane
Option B:	One Kg carbon dioxide
Option C:	One Kg methane
Option D:	One ton of carbon dioxide
9.	Which of the following is not the purpose of a green building
Option A:	To minimize damage of the environment
Option B:	Re-use of waste materials
Option C:	Appreciation of real estate and asset price
Option D:	Energy efficiency
10.	Sustainable development can be thought of in terms of three spheres i.e.
Option A:	Environment, economy and society
Option B:	Environment, economy and equity
Option C:	Environment, ecology and society
Option D:	Environment, economy and ecology
11.	Which of the following devices is highly suitable for the removal of gaseous pollutants?
Option A:	Cyclone separator
Option B:	Electrostatic precipitator
Option C:	Fabric filter
Option D:	Wet scrubber
12.	Which of the following is not true about the powers of SPCB?
Option A:	Planning environmental testing and training.
Option B:	Creating environmental awareness.
Option C:	Advising central government on environment related issues.
Option D:	Controlling environmental emissions.
13.	Which of the following may result from a poorly designed landfill?
Option A:	Release of excess of oxygen into atmosphere
Option B:	Depletion of ozone

Option C:	Production of methane
Option D:	Contamination of Aquifers
14.	Bhopal gas tragedy is a case of
Option A:	Thermal pollution
Option B:	Nuclear pollution
Option C:	Air pollution
Option D:	Soil pollution
15.	Which of the following can be a negative impact of dams?
Option A:	Decreased rainfall
Option B:	Loss of endemic species
Option C:	Increased atmospheric carbon dioxide and cfc's
Option D:	Acid deposition

Q2	Solve any THREE out of FIVE	(3* 5=15)marks
A	Explain important features of environmental clearance and authorization mechanism.	
B	What is Solid Waste Management? How Solid Waste Management is done by landfilling.	
C	What are the sources and effects of E- pollution ?	
D	Explain briefly the concept and objectives of Green Buildings.	
E	State any four limitations of conventional energy sources. Explain the working principle involved in use of tidal power	
Q3	Solve any THREE out of FIVE	(3* 5=15)marks
A	With the help of neat diagram, explain working of Venturi Scrubber	
B	State what is 3R in sustainable development and how Resource utilisation as per carrying capacity is important for sustainable development.	
C	Draw a suitable diagram and explain how solar energy can be harnessed using photovoltaic cells.	
D	Explain salient features of Environmental Protection Act	
E	What is disaster management cycle ? Explain its relevance at the time of Earthquake	

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: First Year Engineering

(DEC/JAN Examination)

Curriculum Scheme: SEM-I (REV-2012)

Examination: FE (All Branches) Semester I

Course Code: FEC106 and Course Name: Environmental Studies

Time: 1.5 hour

Max. Marks: 60

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