160 PU Ph D Nano Sciences and Technology

1 of 100
100 PU_2016_160_E
Lorentz and Fitzgerald putforth the suggestion that there was contraction of bodies:-

- Along the direction of their motion through the earth
- Along the direction of their motion through the sun
- Perpendicular to the direction of their motion through the earth
- None of these

2 of 100
104 PU_2016_160_E
Sound travels 40 m during 20 vibrations its wavelength l is:-

- 0.5 m
- 2 m
- 4 m
- 3 m

3 of 100
118 PU_2016_160_E
"A Moving particle, whatever its nature has wave properties associated with it." is known as:-

- De-Broglie hypothesis
- Bragg's hypothesis
- Frank's hypothesis
- None of these

4 of 100
121 PU_2016_160_E
Water rises through a height h in a capillary tube of internal radius r). If T is the S.T. of water, then the pressure difference between the liquid level in the container and the lowest point of the concave meniscus is:-

- T/r
- r/T
- r/2T
- 2T/r

5 of 100
110 PU_2016_160_E
A gas expands adiabatically at constant pressure such that its temperature T a $1/\sqrt{v}$. The value of C_P/CV of the gas is:-

- 2.00
- 1.50

- 1.30
- 1.67

6 of 100

112 PU_2016_160_E

The ratio n of the velocity of the aircraft to the velocity of sound is referred to as:-

- Mach Number
- Reynolds Number
- Critical Number
- None of these

7 of 100

107 PU_2016_160_E

The flow of heat from a hot body to a cold body is an example of:-

- Irreversible process
- Adiabatic process
- Reversible process
- Isothermal process

8 of 100

103 PU_2016_160_E

A pendulum suspended from the roof of a train has a period T When the train is at rest). When the train is accelerating with a uniform acceleration 'a', the time period of the pendulum will:-

- Increase
- Decrease
- Remain unaffected
- Become infinite

9 of 100

106 PU_2016_160_E

A body at higher temperature Tin Kelvin) radiates heat at a rate which is proportional to:-

- T^4
- T
- T^{-4}
- T^2

10 of 100

101 PU_2016_160_E

The addition of any velocity to the velocity of light merely reproduces:-

- Greater than the velocity of light

- The velocity of sound
- The velocity of light
- None of these

11 of 100

109 PU_2016_160_E

The temperature of a black body is gradually increased. The colour of the body will change from:-

- White-green-red
- Yellow-green-red
- Red-violet-yellow
- Red-yellow-blue

12 of 100

115 PU_2016_160_E

Which of the following experiment is a direct evidence for the quantised nature of energy states in atom?

- Frank Hertz experiment
- Fermi Dirac experiment
- Stern-Gelarch experiment
- None of these

13 of 100

226 PU_2016_160_M

The resistance of a conductor is 5 Ω at 100°C. What is it resistance at 0°C?

- 4 Ω
- 3 Ω
- 2 Ω
- 1 Ω

14 of 100

224 PU_2016_160_M

Moseley's law relates:-

- Frequency and atomic number
- Wavelength and intensity of X-Rays
- Wavelength and angle of scattering
- Frequency and Voltage applied

15 of 100

220 PU_2016_160_M

The property of rotating the plane of vibration of a plane polarised light is called:-

- Optical photometry

- Optical activity
- Optical Illumination
- None of these

16 of 100

222 PU_2016_160_M

In a Joule-Thomson experiment (Throttling process) :-

- The inversion temperature is the same for all real gases
- The inversion temperature is independent of the density of the real gas
- Ideal gases cannot be cooled for any P and T values
- Ideal gases can be cooled for certain P and T values

17 of 100

261 PU_2016_160_D

A particle of mass m is moving with a constant velocity along a line parallel to the positive direction of the X-axis. The magnitude of its angular momentum w.r.t the origin:-

- Remains constant for all positions of the particle
- Goes on decreasing as x is increased
- Goes on increasing as x is increased
- Is zero

18 of 100

263 PU_2016_160_D

A spherical solid ball of a kg mass and radius 3 cm is rotating about an axis passing through its centre with an angular velocity of 50 radian/s. The kinetic energy of rotation is:-

- 4500 J
- 910 J
- 9/20 J
- 90 J

19 of 100

265 PU_2016_160_D

The spin angular momentum of an electron is:-

- In integral multiples of h/2π
- Always the same, h/2π
- In half integral multiples like (s+1/2)*h/2π where S as running integer
- Always the same, h/4π

20 of 100

267 PU_2016_160_D

A resistance potentiometer is a _____.

- Second order instrument
- First order instrument
- Zero order instrument
- None of the above

21 of 100

139 PU_2016_160_E

A polarizer used in dry cell is:-

- Sodium carbonate
- Manganese dioxide
- Lead sulphate
- Ammonium chloride

22 of 100

142 PU_2016_160_E

Which metal is protected by a layer of its own oxide:-

- Ag
- Al
- Fe
- Au

23 of 100

125 PU_2016_160_E

Among the following the molecule with highest dipole moment:-

- $CHCl_3$
- CH_3Cl
- CCl4
- CH_2Cl_2

24 of 100

131 PU_2016_160_E

In the Neptunium series: ${}_{94}Pu^{241} \rightarrow Am \rightarrow Np \rightarrow Pa \rightarrow {}_{94}U^{233}$:-

- α,α,β,β
- α,β,α,β
- β,β,α,α
- β,α,α,β

25 of 100

145 PU_2016_160_E

There is a plenty of room at the bottom. This was stated by:-

- Issac Newton
- Eric Drexler
- Richard Feynman
- Albert Einstein

26 of 100
134 PU_2016_160_E
A plot of log[A] vs time (t) gives a straight line with negative slope. The order of the reactions:-

- 3
- 1
- 2
- Zero

27 of 100
140 PU_2016_160_E
The poisonous gas evolved in Bhopal gas tragedy:-

- CO
- Methyl isocyanate
- Potassium cyanide
- None of the these

28 of 100
146 PU_2016_160_E
A bucky ball is a molecules consisting of _____ carbon atom.

- 60
- 75
- 50
- 100

29 of 100
143 PU_2016_160_E
Which is 3D silicates:-

- Talc
- Quartz
- Asbestos
- All of the above

30 of 100
124 PU_2016_160_E
What is graphene:-

- Thin film made from fullerenes
- A one atom thick sheet of carbon
- A software tool to measure and graphically represent nanoparticle
- New material made from carbon nanotube

31 of 100

137 PU_2016_160_E

Which of the following ions has zero crystal field stabilization energy in octahedral field:-

- Ca^{2+} low spin
- Fe^{3+} low spin
- Cr^{3+} high spin
- Fe^{3+} high spin

32 of 100

128 PU_2016_160_E

Phenol undergoes the Freidel-Crafts reaction to form mainly the:-

- m-derivative
- P-derivative
- O-derivative
- All the above

33 of 100

230 PU_2016_160_M

Which ration decides the efficiency of nanosubstances:-

- Pressure/volume
- Volume/weight
- Weight/volume
- Surface area/volume

34 of 100

232 PU_2016_160_M

Graphene is a:-

- Wide band gap semiconductor
- Not a semiconductor but behaves like graphite
- A narrow bandgap semiconductor
- Gapless band semiconductor

35 of 100

228 PU_2016_160_M

Who coined the work nanotechnology:-

- Sumiolijima
- Richard Feynman
- Eric Drexler
- Albert Einstein

36 of 100

234 PU_2016_160_M

A TCO is a semiconductor which has:-

- Low electrical resistivity and low optical transparency
- High electrical conductivity and low optical transparency
- High electrical resistivity and high optical transparency
- High electrical conductivity and high optical transparency

37 of 100

268 PU_2016_160_D

Which pair is incorrect:-

- TiO-nonstoichiometric solid
- AgBr-Frenkel defect
- UO_2-anion deficient structure
- $CaTiO_3$-pervoskite

38 of 100

274 PU_2016_160_D

Which of the following is microwave inactive:-

- CO
- NO
- HCl
- Cl_2

39 of 100

272 PU_2016_160_D

The symmetry in quasi crystals is:-

- 4 fold
- 3 fold
- 5 fold
- 6 fold

40 of 100

270 PU_2016_160_D

According to Stefan-Boltzmann law, heat loss proportion to:-

- T
- T^4
- T^6
- T^2

41 of 100

160 PU_2016_160_E

If three identical dice are rolled, then probability that the same number appears on each of them is:-

- 1/36
- 1/18
- 3/28
- 1/6

42 of 100

168 PU_2016_160_E

If $f: R \rightarrow R$ be a function satisfying $f(2x + 3) + f(2x + 7) = 2\ \forall x \in R$ then fundamentalperiod of f (x) is:-

- 8
- 2
- 4
- 16

43 of 100

166 PU_2016_160_E

If $a = \log_{24}12$,$b = \log_{36}24$, $c = \log_{48}36$, then value of (1 + abc) is:-

- 2ac
- 2ab
- 0
- 2bc

44 of 100

148 PU_2016_160_E

Functionsf and g are given by $f(x) = 3x^2 - 1$ and $g(x) = x^2 + 2$. Find an ^{2}expression for:-

- $3x^4 + 12x^2 + 11$
- $4x^2 + 1$
- $3x^4 + 5x^2 - 2$
- $9x^4 + 1$

45 of 100

162 PU_2016_160_E

If A and B are two square matrices of order nnandAB = B, BA = A, then $A^2 + B^2 = 2I$ holds true for thecondition:-

- | A | and | B | are non-zero
- | A | ≠ | B | ≠ 0
- | A | = | B | ≠ 0
- | A | = | B | = 0

46 of 100

150 PU_2016_160_E

If all the roots of equations $(a-1)(1+x+x^2)^2 = (a+1)(x^4+x^2+1)$ are imaginary , then range of 'a' is:-

- $(-\infty, -2]$
- $(2, \infty)$
- $(-2, 2)$
- $(-2, \infty)$

47 of 100

156 PU_2016_160_E

If the binomial coefficients of three consecutive termsin the expansion of $(1 + x)^n$ are in the ratio 1 : 7 : 42 ,then value of 'n' is:-

- 50
- 55
- 65
- 32

48 of 100

158 PU_2016_160_E

Total number of non-negative integral solutions of $18 < x_1+x_2+x_3 \leq 20$, is given by:-

- 441
- 1245
- 685
- 1150

49 of 100

154 PU_2016_160_E

Let complex numbers z_1 and z_2 satisfy the conditions $|z+6i| = 2$ and $|z-4i| = \left(\frac{z-\bar{z}}{2i}\right)$ then minimum value of $|z_1-z_2|$ is:-

- 2
- 4

- 6
- 8

50 of 100

152 PU_2016_160_E

Let x , y be non-zero real numbers and the expression $x^{12} + y^{12}$ $48x^4y^4$ is not less than 'k' , then value of 'k'is equal to:-

- 2^{12}
- -2^8
- -2^{12}
- 2^8

51 of 100

164 PU_2016_160_E

Let 'M' be a 3x3 matrix , where MMT =I and det (M) = 1, then:-

- det(M I) is always zero.
- det(M -I) ≠ 0 .
- det(M + I) is always zero.
- det(M + 2I) = 0.

52 of 100

170 PU_2016_160_E

If $y = f\left(\frac{2x-1}{1+x^2}\right)$ and $f'(x) = \sin^2 x$, then $\left.\frac{dy}{dx}\right|_{x=0}$ is:-

- $\sin^2(1)$
- 1 -cos 2
- $-2\sin^2(1)$
- 1 + cos(1)

53 of 100

240 PU_2016_160_M

If xdy= y(dx + ydy), y (1) = 1 and y(x) < 0, then y(-3) is equal to:-

- 1
- 3
- 2
- 3

54 of 100

238 PU_2016_160_M
Minimum value of function f x) =max{x,x+1,2 -x} is:-

- 3/2
- 1
- 1/2
- 0

55 of 100

242 PU_2016_160_M
If circle $x^2 + y^2 - 2x - 6y + 8 = 0$ meets the y-axis at 'A' and 'B', then circumcentre of ΔABC, where 'C' isthe centre of circle, is given by:-

- (0 , 3)
- (1/2 , 3)
- (1, 1/2)
- (1/2, 5/2)

56 of 100

236 PU_2016_160_M
If f (x) and g (x) are differentiable functions for all x ∈[0 , 1] such that f (0) = g (1) = 2, g (0) = 0 and f(1) = 6, then there exists some value of x ∈(0, 1) forwhich:-

- f(α) = 2g '(α)
- f(α) = 3g '(α)
- f(α) = 4g '(α)
- f'(α) =g '(α)

57 of 100

276 PU_2016_160_D
If the point Pa^2 , a) lies in region correspondingto the acute angle between lines 2y = x and 4y = x ,then 'a' belongs to:-

- 2 , 6
- 4 , 8
- 4 , 6
- 2 , 4

58 of 100

280 PU_2016_160_D

For coplanar points $A(\vec{a}), B(\vec{b}), C(\vec{c}), D(\vec{d})$, if $(\vec{a}-\vec{d})\cdot(\vec{b}-\vec{c}) = (\vec{b}-\vec{d})\cdot(\vec{c}-\vec{a}) = 0$

then point D for ΔABC is:-

- Circumcentre

- Incentre
- Centroid
- Orthocentre

59 of 100

278 PU_2016_160_D

If the pair of angular bisectors of the lines y^2 -3xy + $2x^2$ - 4x + 6y - 16 = 0 forms a triangle with theline 3x + 4y = 12, then the orthocentre of triangle is given by:-

- (5, 8)
- (10, 12)
- (12, 10)
- (8, 5)

60 of 100

282 PU_2016_160_D

If a matrix A is Hermitian, its Eigen values are always:-

- zero
- Real
- Complex
- infinite

61 of 100

174 PU_2016_160_E

Semiconductors have the conductivity in the range of (ohm.m) :-

- 10^{8}
- 10^{-8}
- 10^{4}
- 10^{-2}

62 of 100

180 PU_2016_160_E

Minimum number of slip systems that must be operative during plastic deformation:-

- 4
- 5
- 6
- 3

63 of 100

176 PU_2016_160_E

Anisotropy is shown by_____ materials.

- single crystalline
- amorphous
- glass
- polycrystalline

64 of 100

192 PU_2016_160_E

In a fiber reinforced polymer composites, for a given fiber volume content, Young's modulus depends on the orientation of the fiber with respect to the applied load Which orientation of the fibers will give the maximum value of Young's modulus?

- transverse
- longitudinal
- random
- both transverse and longitudinal

65 of 100

178 PU_2016_160_E

The structures formed by rapid quenching from its molten state is known as:-

- pyrites
- metallic glasses
- chalcogenides
- perovskites

66 of 100

190 PU_2016_160_E

Which one of the following material property is of significance in shock absorber:-

- hardness
- corrosion resistance
- fatigue
- yield strength

67 of 100

194 PU_2016_160_E

Highly sensitive piezoresistive materials are made from:-

- single crystalline Si
- polycrystalline Si
- amorphous Si
- nanocrystalline Si

68 of 100

184 PU_2016_160_E
At smallest sizes, colour of the gold nanoparticles become:-

- pink
- yellow
- red
- colourless

69 of 100

182 PU_2016_160_E
Important property to be considered for shock resisting steel is:-

- low tensile strength
- high corrosion resistant
- low hardness
- high toughness

70 of 100

188 PU_2016_160_E
Fuel cells are used to _____.

- generate energy
- harvest solar energy
- store energy
- induce photoelectric effect

71 of 100

186 PU_2016_160_E
Burgers vector is related to:-

- dislocation
- acceleration
- deceleration
- unit cell

72 of 100

172 PU_2016_160_E
Perovskites have the general formula of:-

- $A^{2+}B^{2+}X^{2-}_3$
- $A^{3+}B^{3+}X^{2-}_3$
- $A^{2+}B^{4+}X^{2-}_3$
- $A^{2+}B^{2+}X^{2-}_2$

73 of 100

251 PU_2016_160_M
Seebeck effect is used in:-

- Thermoelectricity
- Piezoelectricity
- Piezoresistivity
- Electrostriction

74 of 100

247 PU_2016_160_M
Grain boundary area is higher for_____ material.

- amorphous
- single crystalline
- poly crystalline
- nano crystalline

75 of 100

245 PU_2016_160_M
For piezoelectricity generation:-

- silicon is preferred
- materials with charge asymmetry in the unit cell is preferred
- nanocrystalline materials are preferred
- centro symmetric structures are preferred

76 of 100

249 PU_2016_160_M
Residual stress is not measured by:-

- transmission electron microscopy
- substrate curvature method
- nanoindentation
- X-ray diffraction

77 of 100

291 PU_2016_160_D
The phenomenon of the growth of smaller particles in sol to bigger particle is known as:-

- annealing
- Ostwald ripening
- normalizing
- sintering

78 of 100

289 PU_2016_160_D
The conductivity value:-

- increases with temperature for semiconductor
- does not depend on mobility of charge carriers
- does not change with dopant nature
- increases with temperature for metals

79 of 100

285 PU_2016_160_D
Mean free path for electronic conduction is higher in:-

- nanotube
- nanowire
- nanoparticle
- quantum dots

80 of 100

287 PU_2016_160_D
The saturation magnetization diminishes gradually and then abruptly drops to zero at the temperature known as:-

- Curie
- Meissner
- Neel
- Hall

81 of 100

216 PU_2016_160_E
The biosynthesis of both RNA and proteins is dependent upon the nucleotide sequence of:-

- tRNA
- DNA
- mRNA
- rRNA

82 of 100

208 PU_2016_160_E
A cell to cell channel is made up of:-

- 24 connexin
- 12 connexin
- 14 connexin
- 10 connexin

83 of 100

210 PU_2016_160_E

Which of the following eukaryotic cell lacks nucleus:-

- Nerve cell
- WBC
- RBC
- Platelets

84 of 100

218 PU_2016_160_E

When a molecule of pyruvic acid is subjected to anaerobic oxidation there is:-

- Gain of 2 molecules of ATP
- Loss of 3 molecules of ATP
- Loss of 6 molecules of ATP
- Gain of 4 molecules of ATP

85 of 100

202 PU_2016_160_E

Which of the following is a non-membranous organelle?

- Plastid
- Endoplasmic Recticulum
- Ribosome
- Mitrochondrium

86 of 100

212 PU_2016_160_E

Cell growth occurs during:-

- Interphase and Postmitotic growth
- Interphase
- Mitotic phase
- Postmitotic growth

87 of 100

214 PU_2016_160_E

In human beings, which part shows the minimum increase in weight from birth to adulthood?

- Brain
- Fat
- Skeleton
- Muscles

88 of 100

196 PU_2016_160_E

Who among the following proposed the hypothesis: the bodies of animals and plants are composed of cells and products of cells?

- Robert Hooke
- Theodore Schwann
- Darwin
- Rudolf Virchow

89 of 100

206 PU_2016_160_E

G-protein is:-

- Tetrameric
- Bimeric
- Unimeric
- Trimeric

90 of 100

204 PU_2016_160_E

The cell wall of plants are made up of fibrils which predominantly contain:-

- Glucose
- Proteins
- Phospholipids
- Polysaccharides

91 of 100

200 PU_2016_160_E

Each ribosome consists of two unequal subunits composed of:-

- RNA and proteins
- Only RNA
- DNA and proteins
- RNA and carbohydrates

92 of 100

198 PU_2016_160_E

Thylakoids in a plastid are place one above the other like a stack of coins to form a:-

- Granum
- Crista
- Stroma
- Matrix

93 of 100
256 PU_2016_160_M
Different types of haemoglobin are produced in different stages of human development. It is an example of:-

- Multiplegene family
- Split genes
- Repeated genes
- Gene replacement

94 of 100
252 PU_2016_160_M
The acetyl groups for cytoplasmic fatty acid synthesis appear in the cytoplasm, as a result of the activity of:-

- Citrate synthetase
- Isocitrate dehydrogenase
- Thiolase
- Citrate lyase

95 of 100
254 PU_2016_160_M
Microsatellite sequences are repeat units with base pairs:-

- 11-60
- 5-30
- 1-6
- 20-120

96 of 100
258 PU_2016_160_M
The enzyme which converts glucose to glucose 6-phosphate is:-

- Glucose 6-phosphate
- Hexokinase
- Glucose synthetase
- Phosphorylase

97 of 100
296 PU_2016_160_D
Life without air is:-

- free from oxidative damage
- reduction
- impossible

- anaerobic

98 of 100

294 PU_2016_160_D

When ATP is converted into ADP it releases:-

- Energy
- Hormones
- Oxygen
- Enzymes

99 of 100

298 PU_2016_160_D

Zymase is:-

- Enzyme complex
- Pyruvate dehydrogenase
- Acetaldehyde dehydrogenase
- Pyruvate decarboxylase

100 of 100

292 PU_2016_160_D

Respiration is an:-

- Anabolic process
- Endergonic process
- Exothermic process
- Endothermic process