श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेंद्रम , केरल– 695 011
(एक राष्ट्रीय महत्व का संस्थान, विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार)
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Entrance Examination 2020 PhD _ Physical Sciences

Sl No	Question	Answer	OptionA	OptionB	OptionC	OptionD
1	Emmanuelle Charpentier and Jennifer A. Doudna received Nobel prize in the year 2020 for the development of a method for genome editing in the field of:	B	Physics	Chemistry	Physiology	Medicine
2	Due to an increase in taxes on electronic devices, the price of a cooler has increased to Rs. 8450, which is 30% increase of the original price. What was the original price of the cooler prior to its increase?	C	5154.5	5915.0	6500	6760
3	One-tenth of one bag of potatoes weighs the same as one-seventh of one bag of small pebbles. What is the ratio of the weight of 2 bags of potatoes to 3 bags of pebbles?	B	7:15	20:21	21:20	3:2
4	A and B started a business by investing Rs. 36,000 and Rs. 63,000 each. Find the share of each, out of the annual profit of Rs. 5500.	A	Rs. 2000, Rs. 3500	Rs. 2500, Rs. 3500	Rs. 3500, Rs. 2500	None of these
5	A sum of Rs. 13,950 should be divided among three persons A, B and C. B must get the double of A's share and C must get Rs. 50 less than the double of B's share. The share of A will be:	C	Rs. 1950	Rs. 1981.25	Rs. 2000	Rs. 2007.75
6	GENEALOGY: ANCESTRY, ENTOMOLOGY:_____	B	Words	Insects	Fossils	Inscriptions
7	Which number comes next in this sequence? 1, 1.5, 2.5, 4,___?	D	9	8	7	6
8	If 3 less than twice a certain number is equal to 2 more than 3 times the number, then 5 less than 5 times the number is:	A	-30	-20	-5	0
9	_____ helps in veiwing objects at the surface of water from a submarine under water	A	Periscope	Kaleidoscope	Telescope	Spectroscope
10	A person has the capability of thinking 100 lines of code in five minutes and can type 100 lines of code in 10 minutes. He takes a break for five minutes after every ten minutes. How many lines of codes will he complete typing after an hour?	B	100	250	350	600
11	A pescatarian is someone who eats	C	Egg	Chicken	Fish	Clams
12	If 'a' is the smallest prime number greater than 50 and 'b' is the largest prime number less than 10, then ab =	B	299	371	229	261
13	According to the Centre for Disease Control (CDC), what does 'N' in the N95 respirator stand for?	A	Not resistant to oil	Not resistant to water	Number of particles	Not resistant to bacteria
14	What is the greatest value of x for which (3x– 2)(x+ 1) = 0 ?	C	-1	-2/3	2/3	1
15	For safety, the fuse wire used in the mains for household supply of electricity must be made of metal having	B	high resistance	low melting point	low specific heat	high melting point
16	The radius as well as the height of a circular cone increases by 10%. The percentage increase in its volume is _____.	C	17.1	21	33.1	72.8
17	The perimeters of a circle, a square and an equilateral triangle are equal. Which one of the following statements is true?	A	The circle has the largest area.	The square has the largest area.	The equilateral triangle has the largest area.	All the three shapes have the same area.
18	In doing action research what is the usual sequence of steps?	B	Reflect, observe, plan, act	Plan, act, observe, reflect	Plan, reflect, observe, act	Act, observe, plan, reflect
19	Escape velocity of a rocket fired from the earth towards the moon is a velocity to get rid of the	C	Centripetal force due to the earth's rotation	Moon's gravitational pull	Earth's gravitational pull	Pressure of the atmosphere
20	A, B and C are intelligent, A, D and E are laborious and D, C and E are honest and A, B and E are ambitious. Who is neither laborious nor honest?	B	A and D	B only	E only	C only
21	Which is the odd number in the series: 81, 121, 169, 289, 361	A	81	169	289	361
22	Which pair of words among the following are odd ones Crime and Punishment, Exercise and Health, Judgement and Advocacy, Hardwork and Success, Slowth and Failure	C	Slowth and Failure	Hardwork and Success	Judgement and Advocacy	Exercise and Health

23	Select the lettered pair that best expresses a relationship similar to that expressed in the original pair COLOR : SPECTRUM	A	tone : scale	sound : waves	dimension : space	cell : organism
24	Frederick Sanger is a twice recipient of the Nobel Prize for	C	Chemistry in 1954 and Peace in 1962	Physics in 1956 and 1972	Chemistry in 1958 and 1980	Physics in 1903 and Chemistry in 1911
25	Fill up the blanks in the following sentence “Early _____ of hearing loss is _____ by the fact that the other senses are able to compensate for moderate amounts of loss, so that people frequently do not know that their hearing is imperfect.	C	discovery . . Indicated	development . . prevented	detection . . complicated	treatment . . facilitated
26	Choose word or phrase that is most nearly opposite in meaning to the word DIFFUSE	A	concentrate	contend	imply	pretend
27	Select the lettered pair that best expresses a relationship similar to that expressed in the original pair Antidote: Poison	B	Cure: recovery	Tonic: lethargy	Narcotic: sleep	Stimulant: relapse
28	The corporation expects only _____ increases in sales next year despite a yearlong effort to revive its retailing business.	D	dynamic	predictable	expanding	modest
29	Although it does contain some pioneering ideas, one would hardly characterize the work as _____.	C	orthodox	eccentric	original	trifling
30	NITI Aayog was established in?	B	03-Jan-19	01-Jan-15	01-Sep-15	26-Jan-19
31	Choose word or phrase that is most nearly opposite in meaning to the word AMALGAMATE	D	Circulate	Reduce	Endure	Separate
32	Choose word or phrase that is most nearly opposite in meaning to the word ENERVATE	C	Recuperate	Resurrect	Strengthen	Gather
33	A rectangle becomes a square when its length and breadth are reduced by 10 m and 5 m, respectively. During this process, the rectangle loses 650 sq.m of area. What is the area of the original rectangle in square meters?	B	1125	2250	2500	4500
34	A set of 4 parallel lines intersect with another set of 5 parallel lines. How many parallelograms are formed?	C	20	48	60	72
35	Which metal is used for galvanizing iron?	D	Lead	Copper	Aluminium	Zinc
36	This simple discovery led to a population boom in 1900	B	Pencillin	Haber-Bosch Process	Small pox vaccine	none of the above
37	A wire would enclose an area of 1936 sq.m, if it is bent into a square. The wire is cut into two pieces. The longer piece is thrice as long as the shorter piece. The long and the short pieces are bent into a square and a circle, respectively. Which of the following choices is closest to the sum of the areas enclosed by the two pieces in square meters?	C	1096	1111	1243	2486
38	Whose autobiography is the book " My Music, My Life"	B	Pandit Shiv kumarsharma	Pandit Ravi Shankar	Ustad Zakir Hussain	ustad Amjad Ali Khan
39	In which one of the following countries, is Tamil a major language?	A	Singapore	Indonesia	Mauritius	Myanmar
40	Biotic index gives us an idea about the pollution of:	A	water	air	sound	all the above
41	To obtain laser from a system, the stimulating radiation must be	C	An electromagnetic wave of any frequency with suitable phase	An electromagnetic wave of any frequency with any phase	An electromagnetic wave of suitable frequency with any phase	Any wave with suitable frequency
42	A physical system is invariant under rotation about a fixed axis. Then the following quantity is conserved	D	Total linear momentum	Linear momentum along the axis of rotation	Total angular momentum	Angular momentum along the axis of rotation
43	The device which converts heat into mechanical work is	C	Motor	Generator	Heat Engine	Energy Converter
44	According to wave mechanics, a free particle can possess	B	Discrete energies	Continuous energies	Only one single value of energy	None of these
45	A thermocouple	A	Has a low time constant when it is bare	Has a low time constant if it is provided with a sheath	Has the same time constant whether it is bare or provided with sheath	None of the above

46	Which of the following statement about the energy in a quantum is true?	A	Varies directly with frequency	Varies inversely with frequency	Same for all frequencies	None of the above
47	The focal length of the objective of a microscope is	B	Greater than the focal length of the eyepiece	Less than the focal length of the eyepiece	Equal to the focal length of the eyepiece	Arbitrary
48	The amount of heat required to raise the temperature of 5 Kg of water by 10oC is	A	50 Kcal	50 cal	0.02Kcal	50 watt
49	When a wave enters from one medium to another medium, which characteristics change?	C	Frequency and velocity	Frequency and wavelength	Wavelength and velocity	Frequency, wavelength and Velocity
50	The ionization potential of H atoms is 16.3 V. The energy difference between n=2 and n=3 levels is nearest to	A	1.9eV	2.3eV	3.4eV	4.5eV
51	A particle starting from rest and moving with constant acceleration covers a distance x in first 2 seconds and distance y in the next 2 seconds. Then	C	y = x	y=2x	y=3x	y=4x
52	In case of wave function Ψ = eikr/r, the probability current density is	A	γ/r2	γ/r	γ/r3	γ
53	If r is the radius of the atom in a crystal, crystallizing in the simple cubic structure, then the nearest neighbour distance is	B	r/2	2r	4r	8r
54	The vibrational energy of a molecule in its ground state is	B	0	1/2hυ0	hυ0	3/2hυ0
55	Mobility of the electron is	C	flow of electron per unit electric field	reciprocal of conductivity	average electron dirft velocity per unit electric field	none of these
56	Caesium has nuclear spin of 7/2. The hyperfine spectrum of the d lines of the caesium atom of the d line will consist of	A	10 lines	4 lines	6 lines	14 lines
57	Magnetic materials which can be readily magnetized in either direction are called	A	soft magnetic materials	hard magnetic materials	low hysteresis loss materials	high hysteresis loss materials
58	Which one of the following electronic transitions in neon is not responsible for laser action in He-Ne laser	A	6s---5p	5s---4p	5s---3p	4s---3p
59	Electrons behave as waves because they can be	B	deflected by an electric field	diffracted by a crystal	deflected by a magnetic field	used for ionise a gas
60	In diamond cubic structure,minimum number of atoms present in cubic cell is	B	1	2	3	4
61	In which of the following situations is an electric current NOT produced?	C	A magnet moves relative to a stationary wire	A wire moves relative to a stationary magnet	A wire has been wrapped around a stationary magnet	A magnetic field within a loop is decreasing.
62	A 9A fuse wire is connected in the elelctric line of 220V. Maximum number of 60W bulbs which can be connected in parallel is	D	44	20	22	33
63	In a junction diode, (where X is the width of the depletion layer) the transition capacitance (C) is proportional to	D	X	X2	1/X2	1/X
64	Magnetic susceptibility χ is	C	dipole moment per unit volume	torque per unit area	magnetization per unit magnetic field intensity	none of these
65	The flux density is related to the electric field as	D	D = ε + E	D = ε E	D = ε / E	D= ε E
66	Density of states of a one dimensional Fermi system is proportio	A	ε1/2	ε-1/2	ε	a constant
67	Ohm's law relates to the electric field E, conductivity σ and current density J as	D	J = E/σ	J = σ E2	J = σ /E	J = σ E
68	The temperature at which a conductor becomes a superconductor is called	D	Superconductin g temperature	Curie temperature	Onne's temperature	Transition temperature
69	Intrinsic concentration of charge carriers in a semiconductor varies as	C	T	T2	T 3/2	1/T
70	If 0.28 nm is the spacing between the nearest neighboring ions in NaCl lattice, the unit cell parameter is	B	1.4 Å	5.6 Å	0.7 Å	1 nm
71	The orientational polarizability per molecule in a polyatomic gas is proportional to	C	T	T2	1/T	1/T2
72	The Fermi level in an n type semiconductor at 0 K	B	lies below the donor level	at half way between the conduction band and donor level	coincides with intrinsic Fermi level	completely disappears

73	Value of critical current densitv (jc) in a superconductor depends upon	C	electrical conductivity and magnetic field strength	thermal conductivity and potential difference	temperature and magnetic field strength	Electrical conductivity and potential difference
74	The dipole moment per unit volume of a solid is the sum of all the individual dipole moments and is called	A	polarization of the solid	permittivity of the solid	electrostatic moment	none of these
75	In a Coolidge Tube, X rays are produced when target metal of high atomic weight is bambarded by high energy	D	protons	photons	Neutrons	Electrons
76	The short wavelength limit of x rays depend upon	B	nature of the target	voltage across the x ray tube	nature of the filament used	none of these
77	Splitting of spectral lines in a strong magnetic field is	C	Compton effect	Stark effect	Zeeman effect	Magnetic dispersion
78	The term ' eB / 2m' (related to an electron of charge e and mass m in a magnetic flux B) represents	C	Bohr magneton	Debye angular frequency	Larmor frequency	Linear frequency
79	For a given dielectric, the electronic polarizability	C	increases with temperature	decreases with temperature	is not affected by temperature change	may increase or decrease with temperature
80	According to Moseley's law, the frequency of the characteristic X radiation is proportional to the square of	B	atomic weight of the element	atomic number of the element	ionization potential of the element	none of these
81	In NMR spectrum of ethanol (CH3CH2OH) comprises to three bunches of spectral lines in the bunch corresponding to CH2 group is	D	1	2	3	4
82	The Miller indices of the plane parallel to the x and y axes are	C	(1 0 0)	(0 1 0)	(0 0 1)	(1 1 1)
83	In a dielectric, the polarization is related to the applied field as a	A	linear function	square function	exponential function	logarithmic function
84	The number of fundamental vibrational modes of CO2 molecule is	D	Four: 2Raman active and 2 IR active	Four: 1 Raman active and 3 IR active	Three: 1 Raman active and 2 IR active	Three: 2 Raman and 1 IR active
85	The losses in a dielectric subjected to alternating electric field are determined by	B	real part of the complex dielectric constant	imaginary part of the complex dielectric constant	both real and imaginary parts of the complex dielectric	none of these
86	The variation of the intensity of X rays with the thickness of the absorbing material (with the absorption coefficient μ) is given by	A	I = Io exp(μx)	I = Io exp(μx)	I = Io exp(μ/x)	I = Io exp(μ/x)
87	The temperature, below which certain materials are antiferromagnetic and above which they are paramagnetic, is called	B	Curie temperature	Neel temperature	Transition temperature	Weiss temperature
88	When a free electron recombines with a hole, there results	A	release of energy	absorption of energy	no change of energy	emission of alpha particle
89	When the potential difference between the electrodes of an X ray tube is increased, there take place an increase in the	B	Intensity	Frequency	Wavelength	Speed of X rays
90	The factor responsible for spontaneous polarization is	C	free electrons	atoms	permanent dipoles	none of these
91	A plane intercepts at a, b/2, 3c in a simple cubic unit cell. The Miller indices of the plane are	C	(1 3 2)	(2 6 1)	(3 6 1)	(1 2 3)
92	If σ and E are the electric conductivity and applied field respectively on a current carrying conduc-tor, the heat developed per unit volume per second is	A	σ E2	σ 2 E	σ / E	E / σ
93	Einstein's theory concludes that at lower temperatures the specific heat	C	drops linearly with increase of temperature	drops linearly with decrease of temperature	drops exponentially with decrease of temperature	remains constant of temperature
94	The magnetization of a solid is related to its magnetic induction B and the field strength H by the relation	A	M = (B /μo) - H	B = μoH + M	B = H + μoM	B = μo(H M)
95	Each ferromagnetic material has a characteristic temperature above which its properties are vitally different from those below it. This temperature is called	B	demagnetizatio n temperature	Curie temperature	Transition temperature	Faraday's temperature
96	At Neel temperature	D	permeability is minimum	permeability is maximum	susceptibility is minimum	susceptibility is maximum
97	A light wave can travel	A	In vacuum	In vacuum only	In a material medium other than water	In a material medium only

98	If a star is moving towards earth, then the lines are shifted towards	C	red	Infrar-red	blue	green
99	Below the ferromagnetic Curie temperature, the ferromagnetic material exhibits B H curve in the form of	A	B H loop	straight line	exponential curve	B-H curve without loop
100	Piezoelectric effect is the production of electricity by	D	chemical effect	varying field	temperature	Pressure