



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 Biomaterial Sciences & Technology

SI 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 viewing 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, Slowness and Failure	C	Slowness 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	Penicillin	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	The order of average molecular weights of a polymer is	A	Mz > Mw > Mv > Mn	Mw > Mz > Mn > Mv	Mn > Mw > Mv > Mz	Mz > Mv > Mn > Mw
42	Storage modulus and tan δ of a polymer are experimentally measured by	D	Differential scanning calorimetry	Thermogravimetric analysis	Thermomechanical analysis	Dynamic mechanical thermal analysis
43	Flexible PVC tubes are used for watering. If some organic solvents are passed through this tube, it becomes stiff. This is due to the fact that the organic solvents	B	plasticize PVC and raise Tg.	remove plasticizer and raise Tg.	remove plasticizer and lower Tg	react with PVC and increase Tg
44	If a material is repelled in an external magnetic field then it is	B	Ferromagnetic	Diamagnetic	Paramagnetic	Antiferromagnetic
45	Tensile strength of steel is increased by addition of	A	Manganese	Sulphur	Phosphorous	Carbon
46	The body centered cubic (BCC) lattice is found in	D	Aluminium	Cadmium	Copper	Tungsten
47	Which of the following technique(s) can be used to study conformational changes in myoglobin? I. Mass spectrometry; II. Fluorescence spectroscopy; III. Circular dichroism spectroscopy; IV. Light microscopy	C	I only	I and IV only	II and III only	IV only
48	Which one of the following bioreactor configurations is the basis for a trickling biological filter?	B	Stirred tank	Packed bed	Air lift	Fluidized bed
49	Alginate is a biopolymer composed of	B	Glucosamine and N-acetyl glucosamine	Mannuronic acid and Guluronic acid	Glucosamine and mannuronic acid	None of the above
50	Which of the following functions as joint or tissue replacements and can be used as coatings to improve the biocompatibility of metal implants	B	Biopolymers	Bioceramics	Metallic composites	Bioactive materials
51	During sintering densification is not due to	B	atomic diffusion	surface diffusion	bulk diffusion	grain growth
52	What is the maximum number of phases that can be at equilibrium with each other in a three component mixture	D	2	3	4	5

53	The high temperature stable phase of Shape Memory Alloys (SMA) is called	A	austenite	martensite	Nitiosite	None of these
54	Elastic deformation in polymers is due to _____	A	Slight adjust of molecular chains	Slippage of molecular chains	Straightening of molecular chains	Severe of Covalent bonds
55	Pyrolytic carbon is used for I. implant fabrication and surface coatings. II. artificial heart valve material III. fabrication of small joint implants such as fingers and spinal inserts	D	I and III only	II only	III only	I, II and III
56	Select the correct option which shows mechanical property of ceramic materials?	A	Non-crystalline ceramics become brittle below recrystallization temperature	At high temperatures ceramics have favorable properties	Ceramic products are resistant to oxidation	Ceramics can be used as a moderator
57	In glycoproteins, the carbohydrate moiety always get attached through which of the following amino acids?	C	alanine or glycine	glutamine or arginine	asparagine, serine or threonine	aspartate or glutamate
58	The generally acceptable value of sterility assurance level (SAL) for biomedical devices is _____	C	$10^{-4}$	$10^{-5}$	$10^{-6}$	$10^{-7}$
59	The lower critical solution temperature (LCST) of temperature-sensitive polymer Poly(N-isopropyl acrylamide) PNIPAM is _____	B	31	32	32.5	33
60	Which of the following cells belong to connective tissue I. Osteoblasts II. Chondrocytes III. Schwann cells IV. Endothelial cells	C	I and II only	III only	I, II and IV	II and IV only
61	Different forms of CaP ceramics are used as biomaterials, Which among the following is the chemical formula of brushite?	A	$\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$	$\text{CaHPO}_4$	$\text{Ca}_3(\text{PO}_4)_2$	$\text{Ca}_8\text{H}_2(\text{PO}_4)_6 \cdot 5\text{H}_2\text{O}$
62	At very high temperatures zirconia ( $\text{ZrO}_2$ ) exists in a tetragonal phase. A tetragonal–monoclinic transformation occurs when $\text{ZrO}_2$ ceramics are cooled below _____ °C	D	a. 2300	2270	1190	1170
63	The principal functions of extracellular matrix among the following	D	Determination of cell orientation	Control of cell growth	Maintenance of cell differentiation	All the above
64	The rate of hydrolysis of the polymers poly(glycolic acid), polycaprolactone, polydioxanone is in the order	B	PGA<PCL<PDO	PCL<PDO<PGA	PCL=PDO>PGA	PDO<PCL<PGA
65	IR and Raman are highly complementary as Raman spectroscopy is based on _____ and IR spectroscopy is concerned with _____	A	polarizability and dipole moments	dipole moments and polarizability	elastic scattering and molecular vibrations	None of the above
66	The equation $DH = DU + PDV$ is applicable	B	Always	Only for constant pressure process	only for constant temperature process	only for constant volume process
67	Which of the following is classified as a conjugate acid-base pair?	B	HCl/NaOH	$\text{H}_3\text{O}^+/\text{H}_2\text{O}$	c. $\text{O}_2/\text{H}_2\text{O}$	d. NaCl/NaOH
68	Of the following solutions which will have highest ionic strength (assume complete dissociation)	A	0.050 M $\text{AlCl}_3$	0.100 M NaCl	0.050 M $\text{CaCl}_2$	0.100 M HCl
69	Which of the following statements explains why light is refracted as it moves from air into glass?	A	The speed of light decreases in glass	The energy of light increases in glass.	The frequency of light decreases in glass.	The wavelength of light increases in glass.
70	The best type of laser with which to do spectroscopy over a range of visible wavelength is	B	He-Ne laser	Dye laser	Neodymium-YAG laser	Ruby laser
71	Which of the following equipment can be used to measure the glass transition temperature?	B	Spectrophotometer	DSC	TGA	Viscometer
72	Electromagnetic radiation emitted from a nucleus is most likely to be in the form of	A	Gamma rays	ultraviolet radiation	infrared radiation	microwaves
73	If one mole of an ideal gas doubles its volume as it undergoes an isothermal expansion, its pressure is	D	quadrupled	doubled	unchanged	halved
74	An example of aprotic solvent	C	water	formic acid	acetone	ammonia
75	The most abundant protein in animal world	C	albumin	haemoglobin	collagen	fibrinogen

76	A 10Kg box slides horizontally without friction at a speed of 1m/s. At one point, a constant force is applied to the box in the direction of its motion. The box travels 5m with the constant force applied. The force is then removed, leaving the box with a speed of 2m/s. Which of the following gives the magnitude of the applied force?	C	1N	2N	3N	5N
77	The coordination geometries around the copper ion of plastocyanin (a blue-copper protein) in oxidized and reduced form, respectively, are	C	tetrahedral and square-planar	square-planar and tetrahedral	distorted tetrahedral for both	ideal tetrahedral for both
78	Which one of the following is NOT a principal component of innate immunity?	D	Mucosal epithelia	Dendritic cells	Complement system	Memory B-cells
79	Which one of the following amino acids is catalyzed by activated macrophages to produce reactive nitrogen species?	A	Arginine	Asparagine	Cysteine	Histidine
80	Which molecules are involved in the anchoring of cells to an extracellular matrix?	A	Integrins	Interleukins	Cyclic peptides	Collagen
81	Melatonin is synthesized from	C	Tyrosine	Glutamic acid	Tryptophan	Histidine
82	Post-translational modifications include all the following, except	C	Phosphorylation	SUMOylation	Decarboxylation	NEDDylation
83	Which of the events is likely to happen if proteasome inhibitor is added to synchronously cycling human cells in G2 phase:	B	Arrest cells in G2	Arrest cells in anaphase	Block chromatin condensation	Induce DNA re-replication
84	DNA replication in Prokaryotes is inhibited by	B	Rifampicin	Ciprofloxacin	Erythromycin	Streptomycin
85	All are extracellular matrix proteins, EXCEPT	A	Cyclin	Laminin	Fibronectin	Vitronectin
86	Which of the following is NOT a NAD <sup>+</sup> dependent enzyme?	B	Lactate dehydrogenase	Glucose-6-phosphate dehydrogenase	Pyruvate dehydrogenase	Glyceraldehyde-3-phosphate dehydrogenase
87	The absorbance of a double stranded DNA preparation at 260 nm is 0.8. The measurement was carried out in a 1 ml cuvette. What is the concentration of the DNA sample? (extinction coefficient for double-stranded DNA is 0.02 µg/ml)	C	75 µg/ml	50 µg/ml	40 µg/ml	60 mg/ml
88	Secondary, tertiary and quaternary structures of proteins are maintained by following forces, EXCEPT	C	Electrostatic bonds	van der Waal's forces	Peptide bonds	Hydrophobic forces
89	All are due to defective DNA repair, EXCEPT	D	Xeroderma pigmentosum	Fanconi Aemia	Progeria	Cystic fibrosis
90	Trypsin, chymotrypsin and carboxypeptidase-B are added to the peptide F-A-R-P-M-T-S-R-P-G-F. Apart from the original peptide, the number of fragments obtained will be:	A	0	2	3	4
91	Nylon fabrics are made of	A	polyamide polymer	polyester polymer	polyethylene polymer	polyvinyl polymer
92	Which of the following is a branched polymer?	B	polyester	low density polymer	nylon	high density polymer
93	The polymer used in making hair synthetic hair wigs is made up of	D	CH <sub>2</sub> =CHCOOCH <sub>3</sub>	C <sub>6</sub> H <sub>5</sub> CH=CH <sub>2</sub>	CH <sub>2</sub> =CH-CH=CH <sub>2</sub>	CH <sub>2</sub> =CHCl
94	Which of the following monomers form biodegradable polymers?	D	Glycine + amino caproic acid	3-hydroxybutanoic acid + 3-hydroxypentanoic acid	ethylene glycol + phthalic acid	both 1 and 2
95	Natural rubber has	B	All trans-configuration	All cis-configuration	Alternate cis- and trans-configuration	Random cis- and trans-configuration
96	Which of the following is formed when glycine is reacted with aminocaproic acid	A	nylon 2-nylon 6	PHBV	buna-N	nylon-6, 6
97	_____ is not a monomer for a high molecular mass silicone polymer?	B	PhSiCl <sub>3</sub>	Me <sub>3</sub> SiCl	Me <sub>2</sub> SiCl <sub>2</sub>	MeSiCl <sub>3</sub>
98	Find the false statmente among the following:	C	Both starch and cellulose are polymers of glucose	The repeat unit in natural rubber is isoprene	Nylon-66 is an example of elastomer	Artificial silk is derived from cellulose
99	[NH(CH)2NHCO(CH <sub>2</sub> )4CO] <sub>n</sub> is a:	B	addition polymer	co-polymer	thermo-setting polymer	homopolymer
100	The initial reaction between phenol and formaldehyde to form bakelite is an example of:	D	aldol reaction	free radical reaction	aromatic nucleophilic substitution	aromatic electrophilic substitution

