

Booklet
code

A

Test Registration No. _____



The Maharaja Sayajirao University of Baroda Faculty of Science

ADMISSION ENTRANCE EXAMINATION

SUBJECT: Five Year Integrated M.Sc. in Cell & Molecular Biology

DAY: Thursday DATE: 14th June 2018 TIME: 10:00 am to 12:00 pm

Important Instructions:

1. This test booklet is to be opened only when instructed by the invigilators to do so.
2. This booklet carries 100 questions on 13 printed pages. All questions carry equal marks.
3. For every correct answer, candidate will earn 1 mark. 0.25 mark will be deducted for every wrong answer.
4. **Test Registration Number** must be entered correctly in the OMR sheet, as advised by the invigilators. The **Question Booklet code (A, B, C, or D)** must also be mentioned on the OMR sheet (if not printed already) as instructed.
5. Answers must be marked in the OMR sheet using a **black or dark blue ball point pen only**. The circle should be filled in completely, leaving no gaps.

Correct way of marking answer:

A B C D

Incorrect ways of marking answer:

A B C D A B C D

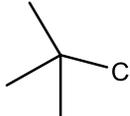
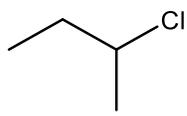
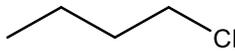
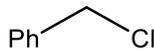
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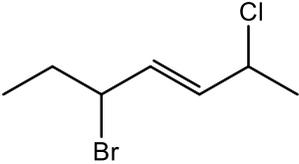
6. **Gadgets** (mobile phone, smart watch, ear phone, music players, etc.) **are strictly prohibited** in the exam hall. If any candidate is found in possession of any of these at his/her exam seat, he/she is liable to be disqualified.

Five Year Integrated M.Sc. in Cell & Molecular Biology
Faculty of Science
The M. S. University of Baroda
Vadodara
Entrance Test - 2018

Part-A		
GENERAL APTITUDE & GENERAL KNOWLEDGE QUESTIONS		
No.	Questions	Answer
1	Which of the following fossil men, used burial customs? A. Ramapithecus B. Neanderthal man C. Australopithecus D. Java man	
2	In a 2×4 rectangle grid shown below, each cell is a rectangle. How many rectangles can be observed in the grid? <div style="text-align: center;">  </div> A. 21 B. 27 C. 30 D. 32	
3	For a post in a factory, husband and wife both applied. The probability of selection of a male is $1/5$ and that of female is $1/3$. The probability of selection of only one of them is A. $2/15$ B. $4/15$ C. $8/15$ D. $2/5$	
4	The Average age of a class of 22 students is 21 years. The average increases by 1 when the teacher's age also included. What is the age of the teacher? A. 44 B. 43 C. 41 D. 40	
5	In the question below is given a statement followed by two assumptions numbered I and II. You have to consider the statement and the following assumptions and decide which of the assumptions is implicit in the statement. Statement: If it is easy to become an engineer, I don't want to be an engineer. Assumptions: I. An individual aspires to be professional.	

	<p style="text-align: center;">II. One desires to achieve a thing which is hard earned.</p> <p>A. Only assumption I is implicit B. Only assumption II is implicit C. Either I or II is implicit D. Neither I nor II is implicit</p>	
6	<p>The mean temperature for the past ten days was 22° Celsius. If the sum of the temperatures for the first nine days was 200, what was the temperature on day 10?</p> <p>A. 32 B. 10 C. 20 D. 22</p>	
7	<p>Two trains are running in the opposite direction and cross each other in 23 seconds. These trains cross a man standing on a platform in 27 and 17 seconds respectively. What is their relative speed?</p> <p>A. 1:9 B. 8:3 C. 3:8 D. 3:2</p>	
8	<p>Which of the following species is NOT endemic to India?</p> <p>A. Sangai Deer B. Lion-tailed Macaque C. Purple Frog D. Wallaby</p>	
9	<p>Who among the following did not win Nobel prize in Physiology/Medicine in 2017?</p> <p>A. Jeffrey C. Hall B. Michael Rosbash C. Michael W. Young D. Richard Henderson</p>	
10	<p>Nipah virus outbreak was first reported in</p> <p>A. India B. Malaysia C. Bangladesh D. Sri Lanka</p>	
11	<p>Northern lights are also known as</p> <p>A. aurora australis B. aurora borealis C. aurora atlantis D. aurora Europa</p>	
12.	<p>Brazil has the most number of world cup football titles to its credits. How many times has it won the world cup so far?</p> <p>A. 5 B. 4 C. 6 D. 7</p>	
13	<p>What is the full form of PDF?</p>	

	<p>A. Printable document format B. Portable document file C. Portable document format D. Print direct from file</p>	
14	<p>Choose the appropriate answer to complete the following sentence: Despite several _____ the mission succeeded in its attempt to resolve the conflict.</p> <p>A. Attempts B. Setbacks C. Meetings D. Delegations</p>	
15.	<p>Which one is the faster in processing?</p> <p>A. RAM B. CPU C. ROM D. Hard Drive</p>	
Part B- CHEMISTRY and PHYSICS		
16	<p>Primary amine react with nitrous acid (HNO₂) in water to give alcohol. Which if the following amine will react quickest.</p> <p>A. PhCH₂CH₂NH₂ B. PhCH₂NH₂ C. PhNH₂ D. CH₃CH₂CH₂NH₂</p>	
17	<p>Which of the following alkyl halides will prefer to undergo S_N1 reaction when treated with NaOH.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>I</p> </div> <div style="text-align: center;">  <p>II</p> </div> <div style="text-align: center;">  <p>III</p> </div> <div style="text-align: center;">  <p>IV</p> </div> </div> <p>A. I and II B. I and IV C. Only I D. II and III</p>	
18	<p>When glucose is heated for a long time with HI, the following compound is produced.</p> <p>A. n-Hexane B. Gluconic acid C. Saccharic acid D. C₁₂H₂₆</p>	

19	<p>The correct IUPAC nomenclature of the following compound is:</p>  <p>A. (Z)-5-Bromo-2-chlorohept-3-ene B. (E)-2-Chloro-5-bromohept-3-ene C. (E)-3-Bromo-6-chlorohept-4-ene D. (E)-5-Bromo-2-chlorohept-3-ene</p>	
20	<p>Find out 'odd' statement during Inorganic qualitative analysis</p> <p>A. NH_4OH is added before the addition of NH_4Cl B. NH_4Cl dissociates completely C. NH_4OH dissociates completely D. Common ion help in increasing the concentration of OH^-</p>	
21	<p>Which of the following will have highest lattice energy</p> <p>A. NaCl B. KCl C. MgO D. Al_2O_3</p>	
22	<p>Which is 'in-correct' (wrong) statement</p> <p>A. KMnO_4 is coloured due to charge transfer B. ZnCl_2 and CuCl are colourless salts C. d-d transition is responsible for the colour of NiCl_2 D. π-π transition leads to colour in the case of organic compounds</p>	
23	<p>Covalent bond is formed between</p> <p>A. Two electropositive elements B. Two electronegative elements C. One electropositive and one electronegative element D. None of these</p>	
24	<p>Which will have smallest radii</p> <p>A. Na B. Na^+ C. Cl D. Cl^-</p>	
25	<p>Read following three statements and then choose appropriate option</p> <p>a) Iron is used for making NH_3 b) Vanadium is used in H_2SO_4 production c) Nitric acid manufacturing employs platinum as catalyst</p> <p>A. Statements (a) and (b) are correct B. Only 1 statement is correct C. All the three statements are correct D. Only two statements are correct</p>	

26	How many structures are possible for a compound, AB_4X_2 , (A is central element, B is any element, X is lone of electron) A. 2 B. 3 C. 4 D. 5	
27	' dsp^2 ' hybridization leads to which of the following geometrical structure A. tetrahedral B. square planar C. octahedral D. trigonal bipyramidal	
28	What mass of oxygen would require for complete combustion of 2.8 kilogram of ethene (C_2H_4)? A. 2.8 Kg B. 6.4 Kg C. 9.6 Kg D. 96 Kg	
29	What is the Normality of aqueous solution of 0.5 M $Al_2(SO_4)_3$. A. 1.0 N B. 1.5 N C. 2.5 N D. 3.0 N	
30	Which of the following is a heterogeneous mixture? A. Milk B. Petrol C. Kerosene D. Brass	
31	Which gas at low pressure shows positive deviation? A. NH_3 B. CO_2 C. CH_4 D. He	
32	During the electrolysis of aqueous $CuSO_4$ solution using Pt electrode, A. Cu is deposited at the anode B. Cu is deposited at the cathode C. H_2 (g) is liberated at the anode D. O_2 (g) is liberated at the cathode	
33	If the rate law for a reaction is $rate = k [A] [B]^2$, the units of k would be: A. $mol L^{-1} s^{-1}$ B. $mol s^{-1}$ C. $L^2 mol^{-2} s^{-1}$ D. $mol^2 L^{-2} s^{-1}$	
34	The stability of the dispersed phase in a lyophobic colloid is due to A. high viscosity of the medium B. the formation of an electrical layer between two phases C. high surface tension of solution D. increase in the density of the medium	
35	Ideal solution is formed when its components A. have zero enthalpy of mixing B. have zero volume change C. obey Raoult's law D. can be converted into gases	
36	In which of the following polymers, empirical formula resembles with monomer A. Bakelite B. Teflon C. Nylon-6,6 D. Decron	

37	<p>When an obstruction, such as a small rectangular sheet is placed in the path of a beam of light, a shadow of the object is observed on the screen behind it. What would be observed on the screen, if instead of the rectangular sheet, a hair (about a few tens of microns thick) is placed in the path of the light beam?</p> <p>A. Nothing, as the light beam passes unobstructed B. A shadow of the hair C. A diffraction pattern, with light and dark fringes on either side of a central dark band D. A bright circular spot</p>	
38	<p>A parabolic mirror is usually used for concentrating solar power and all incoming rays parallel to the axis of the parabola are reflected and concentrated at the focus. Then for achieving the highest intensity and greatest flux at the focus, which of the following changes should be done to the parabolic mirror?</p> <p>A. The mirror should be made flatter, i.e, the focal length should be increased B. The curvature of the mirror should be increased, i.e, the focal length should be decreased. C. The mirror aperture, i.e, the diameter should be decreased. D. The mirror aperture should be increased and focal length decreased.</p>	
39	<p>When a ray of white light passes through a glass prism, the phenomenon of dispersion is observed. Then which of the following colours are (is) deviated the most?</p> <p>A. Violet B. Red C. Yellow D. Both (a) and (c)</p>	
40	<p>Which of the following is true about X-rays?</p> <p>A. They have wavelength between 0.1 – 1 nm B. They travel slower than visible light C. They are absorbed by bones and pass through soft body tissue D. Both (a) and (c)</p>	
41	<p>If a metal bob is suspended by a thin string and undergoes simple harmonic motion, then which of the following is true?</p> <p>A. Kinetic energy + potential energy is conserved B. Only kinetic energy is conserved C. Only potential energy is conserved D. Velocity of the metal bob is constant throughout</p>	
42	<p>The motion of an object of mass 2 kg follows an equation as a function of time, given by $x(t) = at + bt^2 + ct^3$, where $x(t)$ is the displacement at any instant of time, t. What is the force experienced by the object at $t = 2$ secs., if $a = 3$ m/s, $b = 4$ m/s², $c = 5$ m/s³ ?</p>	

	A. 62 N	B. 68 N	C. 124 N	D. 0 N	
43	<p>If a negatively charged particle is moving in a magnetic field with velocity parallel to the magnetic field direction, then the trajectory of the particle is</p> <p>A. Linear B. Circular C. Elliptical D. Helical</p>				
44	<p>Some people rejected the notion that the Earth is rotating when it was first proposed. Since the Earth is so large, points on the equator would be moving quite fast and it was thought that objects on the equator would be flung off into space. What is the force which prevents this from happening?</p> <p>A. Gravitational force of the earth B. Centrifugal force C. Centripetal force D. Atmospheric pressure</p>				
45	<p>Sir C. V. Raman received the Nobel Prize for his discovery of the Raman effect. Which of the following statements is true about this effect?</p> <p>A. It is the inelastic scattering of light, and explains the blue colour of the sea B. It is the elastic scattering of light, and explains the blue colour of the sky C. It is the inelastic scattering of light, and explains the red colour of the sky during sunset D. It is the elastic scattering of light, and explains the blue colour of the sea</p>				
46	<p>What is the value of one electron volt?</p> <p>A. 1.6×10^{-19} Joules B. 1.6×10^{-19} calories C. 1.6×10^{-19} volts D. 1.6×10^{-19} ergs</p>				
47	<p>What is the impedance of a circuit containing a resistor and a capacitor in series to AC current?</p> <p>A. R B. $R + i\omega C$ C. $R - i/\omega C$ D. $R + \omega C$</p>				
48	<p>If there are four capacitors $C_1, C_2, C_3,$ and $C_4(C_1 > C_2 > C_3 > C_4)$, then what is the best way to connect them so as to store maximum electrostatic energy?</p> <p>A. Connect all the four in series B. Connect all the four in parallel C. Connect C_1, C_2 in series and parallel to C_3, C_4 in series D. Connect C_1 parallel to C_2, C_3, C_4 in series</p>				

49	<p>What is the current through the $3.0\ \Omega$ resistor just adjacent to the 9V battery shown in the following figure?</p> <p>A. 1.5 Amp B. 1.2 Amp C. 3 Amp D. 9 Amp</p>	
50	<p>Curie temperature is the temperature above which.</p> <p>A. A ferromagnetic material becomes paramagnetic B. A paramagnetic material becomes diamagnetic C. A ferromagnetic become diamagnetic D. A Paramagnetic material becomes ferromagnetic</p>	
51	<p>Which of the following is the weakest of the following forces?</p> <p>A. Electrostatic Force B. Gravitational force C. Nuclear force D. Magnetic force</p>	
52	<p>A thief stole a box with valuable article of weight 'W' and jumped down a wall of height h. Before he reach the ground he experienced a load of.</p> <p>A. Zero B. $W/2$ C. W D. 2 W</p>	
53	<p>Solar energy is converted to electrical energy by a photovoltaic cell. Suppose 10 watt of solar energy is incident on a $100 \times 100\ \text{mm}^2$ photovoltaic cell, and it gives an output voltage of 10 Volts and an output current of 0.5 A. What is the efficiency of this photovoltaic cell?</p> <p>A. 70% B. 50% C. 5 % D. 10%</p>	
54	<p>What is the frequency of a sound wave that has a speed of 0.4 m/s and a wavelength of 0.020 meter?</p> <p>A. 10 hertz. B. 20 hertz. C. 0.008 hertz. D. 0.5 hertz.</p>	
55	<p>Which phenomenon can occur with light, but not with sound?</p> <p>A. Doppler effect B. Interference C. Polarization D. Refraction</p>	
Part C (for BIOLOGY subject)		
56	<p>Which of the following is harvested commercially to produce agar?</p>	

	<ul style="list-style-type: none"> A. Brown algae B. Blue-green algae C. Green algae D. Red algae 	
57	<p>Which one of the following statements about photosynthesis is false?</p> <ul style="list-style-type: none"> A. Photosynthesis is a redox process in which water is oxidized and carbon dioxide is reduced B. In green plants, both PSI and PSII are required for the formation of NADPH + H⁺ C. The enzymes required for carbon fixation are located only in the grana of chloroplasts D. The electron carriers involved in photophosphorylation are located on the thylakoid membranes 	
58	<p>A bacterium divides after every 35 minutes. If a culture containing 10⁵ cells per ml is grown then cell concentration per ml after 175 minutes will be</p> <ul style="list-style-type: none"> A. 32 x 10⁵ B. 125 x 10⁵ C. 175 x 10⁵ D. 48 x 10⁵ 	
59	<p>On which of the following, does the hyperosmotic urine formation depend?</p> <ul style="list-style-type: none"> A. Width of Bowman's capsule B. Length of loop of Henle C. Length of PCT D. Length of DCT 	
60	<p>A protein has a molecular weight of 55 kDa, how many amino acids it is likely to have:</p> <ul style="list-style-type: none"> A. 50. B. 500. C. 5000. D. 50000. 	
61	<p>Which of the following types of cleavage is followed in division of human egg?</p> <ul style="list-style-type: none"> A. Holoblastic unequal B. Holoblastic equal C. Meroblastic D. Partial 	
62	<p>Pneumatic bones are expected to be found in</p> <ul style="list-style-type: none"> A. Whale B. Flying fish C. Pigeon D. Frog 	
63	<p>Plant hormone induces development of lateral root meristem is</p> <ul style="list-style-type: none"> A. Auxins B. Cytokinins C. Ethylene D. Gibberellins 	

64	Thermogenin is responsible for A. Uncoupling of oxidative phosphorylation B. Thermal insulation C. Shivering thermogenesis D. Glucose production	
65	Number of chromosomes in Down's syndrome is A. 46 B. 47 C. 48 D. 49	
66	A phenomenon where the third base of t-RNA at its 5' end can pair with a non-complementary base of m-RNA is called A. Collinearity B. Wobbling C. Universality D. Degeneracy	
67	Complete metamorphosis involves one of the following stages: A. Egg→Larva→Pupa→Adult C. Egg→Larva→Adult B. Egg→Nymph→Adult D. Egg→Pupa→Adult	
68	The first amino acid at the start of codon in bacteria is A. Formyl methionine B. Serine C. Methionine D. Tryptophan	
69	Small genetic element that are usually double stranded and circular are referred as A. Introns B. Plasmids C. primers D. Exons	
70	Angiosperms seed contain A. Female gametophyte B. Gametophyte embryo C. Male gametophyte D. Sporophyte embryo	
71	In immature plant cell the precursor of chloroplast is A. Amyloplast B. Elaioplast C. Etioplast D. proplastid	
72	The amino acids primarily responsible for absorption maxima of proteins at 280 nm are: A. Phenylalanine, Tryptophan, Tyrosine B. Serine, Glycine, Alanine C. Serine, Alanine, Threonine D. Serine, Threonine, Asparagine	

73	Rust fungi are members of A. Ascomycetes B. Basidiomycetes C. Zygomycetes D. Oomycetes	
74	Biochemical Oxygen Demand (BOD) in a river water: A. has no relationship with concentration of oxygen in the water. B. gives a measure of salmonella in the water. C. increases when sewage gets mixed with river water. D. remains unchanged when algal bloom occurs	
75	Read the characters of blood and lymph as described below. Select true combination of characters describing each: A: Red corpuscles are present, B: Lymphocytes are most numerous, C: Neutrophils are most numerous, D: It flows in bidirectional manner A. blood: A & D; lymph: B & C B. blood: A, C & D; lymph: B C. blood: A & C; lymph: B & D D. blood: A & D; lymph: B & C	
76	Bacteria is considered to be a plant because A. is sometimes green B. it is present everywhere C. it contains a cell wall D. it can reproduce both by sexual and asexual means	
77	Tapetum provides enzymes, hormones and nutrition for developing A. Anther B. Endosperm C. Megaspore D. Microspore	
78	<i>Batrachospermum</i> is found in A. Fresh water B. Marine water C. Soil D. Small pond	
79	The "Great Irish Famine" was caused by A. <i>Aspergillus</i> B. <i>Phytophthora</i> C. <i>Puccinia</i> D. <i>Rhizopus</i>	
80	Leprosy in humans is primarily known to be caused by a species: A. <i>Leptospirillum</i> . B. <i>Lepraemurium</i> . C. <i>Microbacterium</i> . D. <i>Mycobacterium</i> .	
81	Where is Pyruvic acid reduced to lactic acid anaerobically? A. Liver B. Muscle C. Brain D. Skin	

82	The first commercially grown genetically engineered food to be granted a license for human consumption was A. Golden rice B. StarLink corn C. The Flavr Savr tomato D. BT-cotton	
83	Alleles that are both expressed in a heterozygote are A. Co-dominant B. Complete dominant C. Epistatic D. Incomplete dominant	
84	During which phase can nucleolus be observed clearly? A. Metaphase-II B. Anaphase C. Early Prophase D. Metaphase	
85	A cross between F1 plants and their recessive parent is A. Dihybrid cross B. Monohybrid cross C. Reciprocal cross D. Test cross	
86	The tallest tree known in the world is A. <i>Sequoia sempervirens</i> B. <i>Pinus longavea</i> C. <i>Sequoiadendron giganteum</i> D. <i>Eucalyptus regnans</i>	
87	Which of the following is a polysaccharide of animal origin A. Pectin B. Cellulose C. Chitin D. Arabinoxylans	
88	Beadle and Tatum showed that each kind of mutant bread mould they studied lacked a specific enzyme. Their experiments demonstrated that: A. Cells need specific enzymes in order to function B. Genes are made of DNA C. Genes carry information for making proteins D. Enzymes are required to repair damage	
89	An enzyme catalysing following reaction will fall in which class of enzymes: $\text{HOOC-CH}_2\text{-CH}_2\text{-CH(NH}_2\text{)-COOH} \rightarrow \text{CO}_2 + \text{HOOC-CH}_2\text{-CH}_2\text{-CH}_2\text{NH}_2$ A. Dehydrogenases B. Transferases C. Lyases D. Isomerases	
90	Which statement about archaeal genome is true? A. It is much more similar to the bacterial genome than to eukaryotic genome B. More than half of its genes are never observed in bacteria or eukaryota	

	<p>C. It is much smaller than the bacterial genome D. It is housed in the nucleus and no archaeal genome has yet been sequenced</p>	
91	<p>In spermatogenesis, which of the following is produced after the first meiotic division of spermatogonia? A. Primary spermatocytes B. Secondary spermatocytes C. Spermatids D. Spermatozoa</p>	
92	<p>Glycolysis occurs in A. Cytosol B. Chloroplast C. Mitochondria D. Golgi body</p>	
93	<p>Which of the following cells present in the mammalian testes help to nourish sperms? A. Leydig cells B. Oxyntic cells C. Interstitial cells D. Sertoli cells</p>	
94	<p>Inheritance of skin colour in man is an example of: A. Blending inheritance B. Cumulative genes C. Pleiotropism D. Codominance</p>	
95	<p>Bombay blood group is characterized by the presence of A. A antibody only B. B Antibody only C. AB Antibody only D. ABH Antibody</p>	
96	<p>Which of the following immune system components can function as an opsonin?: A. T-cell receptors. B. Antibodies. C. Histamines. D. Interferons.</p>	
97	<p>Average weight of a DNA base pair is 660 daltons. The number of nucleotide bases in 5940 dalton stretch of DNA is A. 9 B. 27 C. 18 D. None of the above</p>	
98	<p>What is 'Fascia'? A. An epithelial layer surrounding muscle bundles B. A connective tissue layer holding muscle bundles together C. A network of blood capillaries surrounding myofibres D. Parallely arranged filaments in sarcoplasm</p>	
99	<p>Which of these electromagnetic radiations hit the Earth's surface more if stratospheric ozone is found depleted? A. UV-A B. UV-B C. UV-C D. UV-D</p>	
100	<p>What defines Bohr's effect most correctly? A. Rise of P50 with rise in pH B. Rise of P50 with rise in CO₂ C. Rise of P50 with fall in CO₂ D. Fall of P50 with rise in pH</p>	