SAMPLE MEDICAL SELECTION TEST PAPER

INSTRUCTION FOR STUDENTS

A. GENERAL INSTRUCTIONS

1. There are total 90 questions and four sections - Section I (Physics), Section II (Chemistry), Section III (Zoology) & Section IV (Botany).
2. There are 20 Questions each in Section I & II and 25 Questions each in Section III & IV.
3. +4 marks will be given for each correct answer and –1 mark for each wrong answer. In all other cases, no marks will be given.
4. There is only one correct response for each question. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 3 above.
5. **Duration of test will be 2 hours.**
6. **Maximum marks is 240.**

PHYSICS (SECTION - I)

1. In an experiment four quantities a, b, c, d are measured with percentage error 1%, 2%, 3% and 4% respectively.

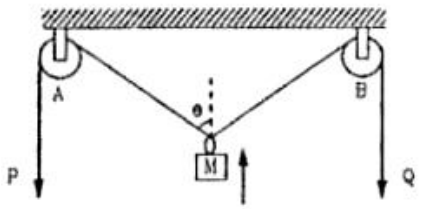
Quantity P is calculated as follows $P = \frac{a^3 b^2}{cd}$, percentage error in P is

(A) 7%
(B) 4%
(C) 14%
(D) 10%

2. The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectile is

(A) $\tan^{-1}\left(\frac{1}{4}\right)$
(B) $\tan^{-1}(4)$
(C) $\tan^{-1}(2)$
(D) 45°

3. In the fig, the ends P and Q of an unstrechable string moves downward with uniform speed V. Mass M moves upwards with speed

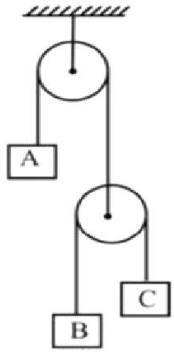


(A) $V\cos\theta$
(B) $\frac{V}{\cos\theta}$
(C) $2V\cos\theta$
(D) $\frac{2}{V\cos\theta}$

4. The potential energy between two atoms, in a molecule, is given by $U(x) = \frac{a}{x^{12}} - \frac{b}{x^6}$ where a and b are positive constant and x is the distance between the atoms. The atom is in stable equilibrium, when

(A) $x = \left(\frac{2a}{b}\right)^{1/6}$
(B) $x = \left(\frac{11a}{5b}\right)^{1/6}$
(C) $x = 0$
(D) $x = \left(\frac{a}{2b}\right)^{1/6}$

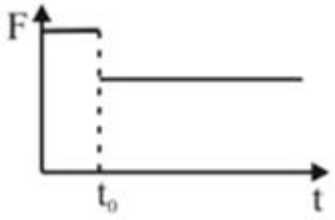
5. Three blocks A, B and C having masses m kg, 2 kg and 3 kg respectively are attached by massless strings and ideal pulleys as shown in the figure. When the system is released from rest, if the block 'A' remains stationary, the mass of block 'A' is

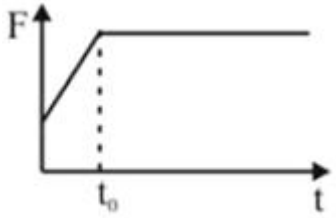


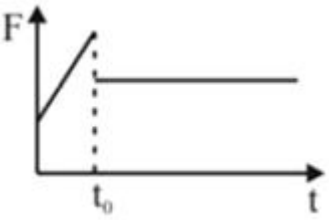
(A) 2.2 kg
(B) 2.6 kg
(C) 2.4 kg
(D) 4.8 kg

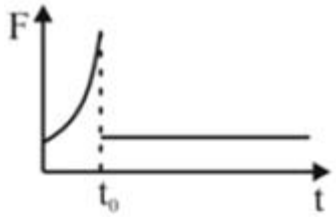
Space for rough work

6. The following graph represents speed of a car as a function of time. We know that as the car speed up there is a friction force with air that can be approximately considered to be proportional to the speed of the car. Which of the following graphs can be the force of the engine as a function of time?

(A) 

(B) 

(C) 

(D) 

7. A swimmer jumps from a bridge over a canal and swims 1 km up stream. After that first km, he passes a floating cork. He continues swimming for half an hour and then turns around and swims back to the bridge. The swimmer and the cork reach the bridge at the same time. The swimmer has been swimming at a constant speed. The water in the canal flow at a speed of

(A) 1/2 km/hr (B) 1/3 km/hr

(C) 2 km/hr (D) 1 km/hr

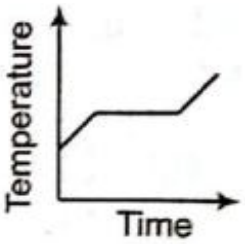
8. A glass marble dropped from a certain height above the horizontal surface reaches the surface in time t and then continues to bounce up and down. The time in which the marble finally comes to rest is

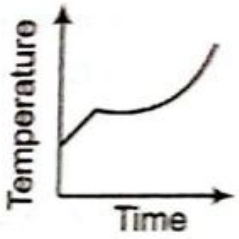
(take e as the coefficient of restitution)

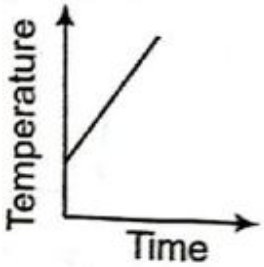
(A) $e^n t$ (B) $e^2 t$

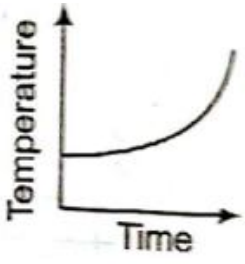
(C) $t\left[\frac{1+e}{1-e}\right]$ (D) $t\left[\frac{1-e}{1+e}\right]$

9. Liquid oxygen at 50 K is heated to 300 K at constant pressure of 1 atm. The rate of heating is constant. Which one of the following graphs represents the variation of temperature with time?

(A) 

(B) 

(C) 

(D) 

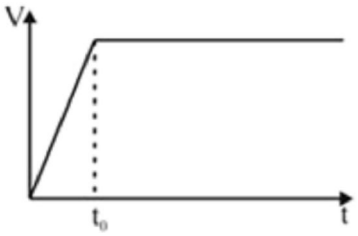
Space for rough work

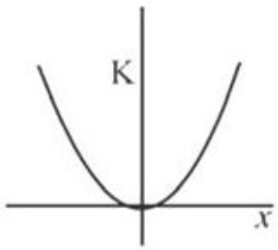
10. Time period of a simple pendulum is 2 sec. If its length is increased by 4 times then its time period becomes :

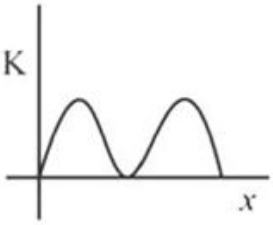
(A) 8 sec (B) 12 sec

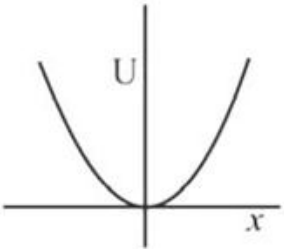
(C) 16 sec (D) 4 sec

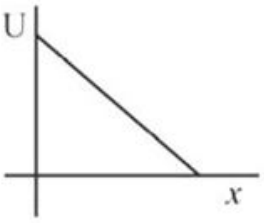
11. During Simple Harmonic Motion (SHM) a particle has displacement x from mean position. If kinetic energy and potential energy are represented by K and U respectively, then choose the appropriate graph



(A) 

(B) 

(C) 

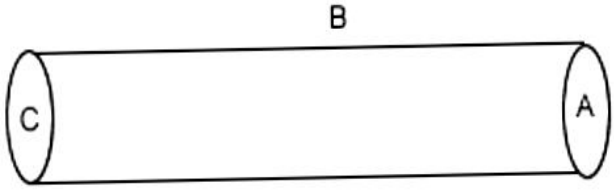
(D) 

12. A charge Q is situated at the corner of a cube, the electric flux passing through all the six faces of the cube is

(A) $\frac{Q}{6\varepsilon_0}$ (B) $\frac{Q}{8\varepsilon_0}$

(C) $\frac{Q}{\varepsilon_0}$ (D) none

13. A hollow cylinder has a charge q coulomb within it. If ϕ is the electric flux (in unit of voltmeter) associated with the curved surface B, then the flux linked with the plane surface A in unit of V-m will be

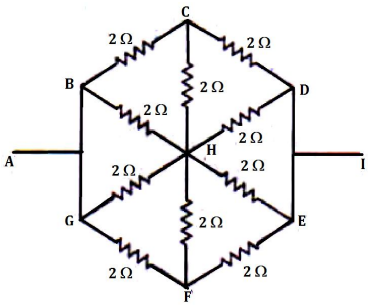


(A) $\frac{q}{2\varepsilon_0}$ (B) $\frac{\phi}{3}$

(C) $\frac{q}{\varepsilon_0}-\phi$ (D) $\frac{1}{2}\left(\frac{q}{\varepsilon_0}-\phi\right)$

Space for rough work

14. The effective resistance across the points A and I is



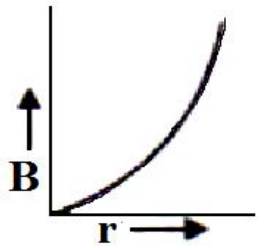
(A) 2 Ω

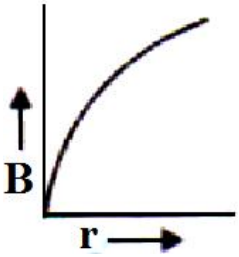
(B) 1 Ω

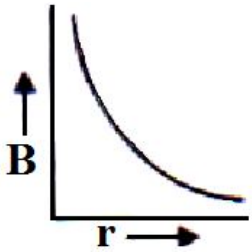
(C) 0.5 Ω

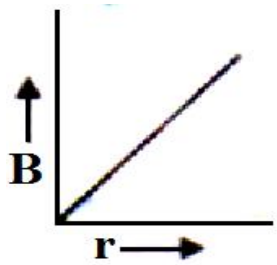
(D) 5 Ω

15. The magnetic field B at a distance r from a long straight wire carrying current which varies with distance r can be represented by which of the following graphs?

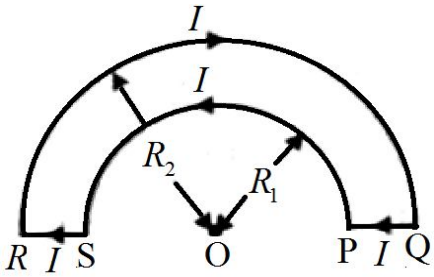
(A) 

(B) 

(C) 

(D) 

16. The wire loop PQRS formed by joining two semi circular wires of radii R_1 and R_2 carries a current I as shown the figure. The magnitude of magnetic induction at the centre O is



(A) $\frac{\mu_0 I}{4}\left(\frac{1}{R_2}-\frac{1}{R_1}\right)$

(B) $\frac{\mu_0 I}{4}\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

(C) $\mu_0 I\left(\frac{1}{R_2}-\frac{1}{R_1}\right)$

(D) $\mu_0 I\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

17. A rod of length l rotates with a uniform angular velocity ω about an axis passing through its middle point but normal to its length in a uniform magnetic field of induction B with its direction parallel to the axis of rotation. The induced emf between the two ends of the rod is

(A) $\frac{Bl^2\omega}{2}$

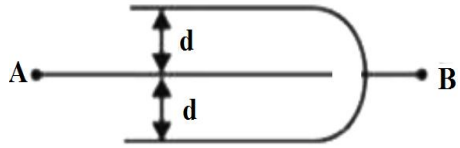
(B) zero

(C) $\left(\frac{Bl^2\omega}{8}\right)$

(D) $2Bl^2\omega$

Space for rough work

18. Three plates of common surface area A are connected as shown in figure. The effective capacitance will be



(A) $\varepsilon_0 A / d$

(B) $3\varepsilon_0 A / d$

(C) $\frac{3}{2}\varepsilon_0 A / d$

(D) $2\varepsilon_0 A / d$

19. A coil of inductance L = 5H and resistance R = 55Ω is connected in series to the mains alternating voltage of frequency = 50 Hz in series. What can be the non-zero capacitance of the capacitor (in μF) connected in series with the coil if the power dissipated has to remain unchanged. (take $\pi^2 = 10$)

(A) 2

(B) 1

(C) 4

(D) 3

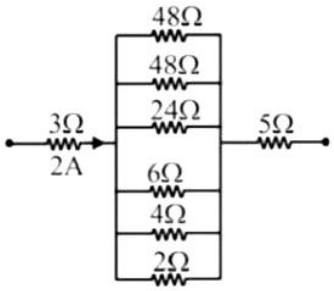
20. Find potential difference across 24Ω :-

(A) 2 volt

(B) 48 volt

(C) 1 volt

(D) 4 volt



Space for rough work

CHEMISTRY (SECTION - II)

21. How many unit cells are present in a cube shaped ideal crystal of NaCl of mass 1.00 g?

(A) 2.57×10^{21} unit cells
(B) 5.14×10^{21} unit cells
(C) 1.28×10^{21} unit cells
(D) 1.71×10^{21} unit cells

22. Complete the reaction : $Ph - CH = CH - CHO \xrightarrow[H_3O^+]{PhMgBr}$ product

(A) $Ph - \underset{Ph}{CH} - \underset{OH}{CH} - CHO$
(B) $Ph - \underset{Ph}{CH} - CH_2 - CHO$
(C) $Ph - \underset{OH}{CH} - \underset{Ph}{CH} - CHO$
(D) $Ph - \underset{Ph}{CH} - CH_2 - CH_2 - OH$

23. The largest number of molecules are in

(A) 28 g of CO
(B) 46 g of C_2H_5OH
(C) 36 g of H_2O
(D) 54 g of N_2O_5

24. Which is the correct arrangement of molecules regarding dipole moment?

(A) $BF_3 = NH_3 = NF_3$
(B) $BF_3 > NH_3 > NF_3$
(C) $BF_3 < NH_3 < NF_3$
(D) $BF_3 < NF_3 < NH_3$

25. Rate constant of a first order reaction is 6.93×10^{-3} min^{-1}. If we start with 10 mol/L. It is reduced to 1.25 mol/L in

(A) 100 minute
(B) 200 minute
(C) 30 minute
(D) 300 minute

26. The atomic mass of Cu is 63.546. There are only two naturally occurring isotopes of copper Cu^{63} and Cu^{65}. The percentage of natural abundance of Cu^{63} is nearly

(A) 30
(B) 10
(C) 50
(D) 73

27. A sample of copper sulphate pentahydrate contains 3.782 g of Cu. How many grams of oxygen are in the sample?

(A) 0.952 g
(B) 3.809 g
(C) 4.761 g
(D) 8.576 g

Space for rough work

28. On passing 3 faradays of electricity through three electrolytic cells connected in series containing Ag^{+}, Ca^{+2} and $A1^{+3}$ ion respectively, the molar ratio in which three metal ions are liberated at the electrode is

(A) 1 : 2 : 3 (B) 3 : 2 : 1

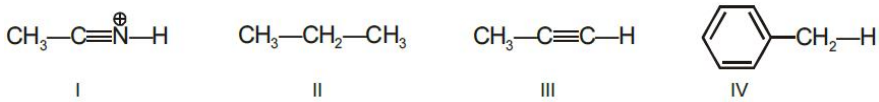
(C) 6 : 3 : 2 (D) 3 : 4 : 2

29. S–S bond is present in

(A) $H_2S_2O_7$ (B) $H_2S_2O_8$

(C) $H_2S_2O_6$ (D) $H_2S_2O_5$

30. Correct order of acidic strength for the given species



I II III IV

(A) I > II > IV > III (B) II > IV > III > I

(C) III > I > IV > II (D) I > III > IV > II

31. Which one among the following compounds will produce a secondary alcohol on reaction with Grignard reagent?

(A) CH_3COCH_3 (B) $CH_3 - COOCH_3$

(C) $HCOOCH_3$ (D) All of these

32. Order of boiling point of boron trihalides is as follows

(A) $BI_3 > BBr_3 > BCl_3 > BF_3$ (B) $BF_3 > BCl_3 > BBr_3 > BI_3$

(C) $BCl_3 > BF_3 > BBr_3 > BI_3$ (D) $BI_3 > BBr_3 < BF_3 < BCl_3$

33. The diagonal similarities are due to similar polarising powers for the elements

The polarising power is directly proportional to

(A) $\frac{\text{ionic charge}}{\text{ionic radius}}$ (B) $\frac{(\text{ionic charge})^2}{\text{ionic radius}}$

(C) $\frac{\text{ionic charge}}{(\text{ionic radius})^2}$ (D) $\frac{\text{ionic charge}}{(\text{ionic radius})^{1/2}}$

Space for rough work

34. A 50 ml of a 20% (w/w) solution of density 1.2 g/ml is diluted until its strength becomes 6% (w/w). Determine the mass of water added

(A) 88 g (B) 120 g

(C) 140 g (D) 180 g

35. How many gm of $K_2Cr_2O_7$ is present in 1 L of its N/10 solution in acid medium?

(A) 4.9 (B) 49

(C) 0.49 (D) 0.049

36. $BaC_2 + N_2 \xrightarrow{\Delta}$ (A)

$CaC_2 + N_2 \xrightarrow{\Delta}$ (B)

The compound (A) and (B) are

(A) $BaCN_2$, $CaCN_2$ (B) $Ba(CN)_2$, $Ca(CN)_2$

(C) $Ba(CN)_2$, $CaCN_2$ (D) Ba_3N_2, $Ca(CN)_2$

37. A binary solid has atoms B constituting FCC lattice and atoms A occupying 25% of tetrahedral holes. The formula of solid is

(A) AB (B) A_2B

(C) AB_2 (D) AB_4

38. At what temperature, the average speed of gas molecules will be double than that at 27°C?

(A) 27°C (B) 327°C

(C) 527°C (D) 927°C

39. In the emission line spectra of hydrogen atom, how many lines can be accounted for all possible electronic transitions from 5th energy level within the atom?

(A) 4 (B) 5

(C) 10 (D) 20

40. Reaction A → B follows second order kinetics. Doubling the concentration of A will increase the rate of formation of B by a factor of :

(A) 1/4 (B) 1/2

(C) 2 (D) 4

Space for rough work

ZOOLOGY (SECTION - III)

41. Which of the followmg is not a feature of the plasmids?

(A) Transferable
(B) Single-stranded
(C) Independent replication
(D) Circular structure

42. Which of the following is a restriction endonuclease?

(A) DNase I
(B) RNase
(C) Hind II
(D) Protease

43. Stirred-tank bioreactors have been designed for

(A) Availability of oxygen througour the process
(B) Ensuring anaerobic conditions in the culture vessel
(C) Purification of product
(D) Addition of preservatives to the product

44. Which of the following layers in an antral follicle is acellular?

(A) Theca interna
(B) Stroma
(C) Zona pellucida
(D) Granulosa

45. In human females, meiosis-II is not completed until

(A) Fertilization
(B) Uterine implantation
(C) Birth
(D) Puberty

46. Which of the following events is not associated with ovulation in human female?

(A) Full development of Graafian follicle
(B) Release of secondary oocyte
(C) LH surge
(D) Decrease in estradiol

47. Tobacco plants resistant to nematodes have been developed by introduction of DNA that produces

(A) Both sense and antisence RNA
(B) An antifeedent
(C) A toxic protein
(D) A particular hormone

48. Basic principle for developing transgenic plants and animals is to introduce the gene of interest into nucleus of

(A) Body cell
(B) Vegetative cell
(C) Germ cell
(D) Somatic cell

49. RNA interference is useful for

(A) Micropropagation
(B) Cell defence
(C) Cell proliferation
(D) Cell differentiation

Space for rough work

50. A phylum with true coelom is

(A) Porifera (B) Coelentrata

(C) Arthropoda (D) Aschelminthes

51. Protostomia are those animals in which the blastopore of gastrula becomes

(A) Mouth (B) Anus

(C) Nasal opening (D) None of the above

52. Which one of the following belongs to phylum Arthropoda?

(A) Dog fish (B) Devil fish

(C) Jelly fish (D) Silver fish

53. Payer's patches found in the small intestine are

(A) Lymphatic tissue (B) Glandular tissue

(C) Epithelial tissue (D) Haemopoietic tissue

54. Stimulation of acid secretion of stomach is due to

(A) Gastrin (B) Histamine

(C) Vagal activation (D) All of the above

55. Gall bladder is attached to liver in the region of

(A) Quadrate lobe (B) Caudate lobe

(C) Right lobe proper (D) Left lobe

56. Human being is hungry when

(A) Food cannot meet energy requirement (B) Stomach is empty

(C) Food can meet energy requirement of the body (D) Food has been digested

57. Neanderthal man lived in

(A) Desert (B) Deep forest

(C) Mountains (D) Caves

58. Cranial capacity of Australopithecus was

(A) 390–510 cc (B) 675 – 719 cc

(C) 1015 – 1075 cc (D) 882 – 897 cc

Space for rough work

59. Modern Man differs from apes in

(A) Protruding eyes
(B) Sparse body hair
(C) Arms shorter than legs
(D) Wearing of clothes

60. A decrease in blood pressure/volume will not cause the release of

(A) Atrial Natriuretic factor
(B) Aldosterone
(C) ADD
(D) Renin

61. Which of the following statements is correct?

(A) The descending limb of loop of Henle is impermeable to water
(B) The ascending limb of loop of Henle is permeable to water
(C) The descending limb of loop of Henle is permeable to electrolytes
(D) The descending limb of loop of Henle is impermeable to water

62. Match the items given in Column I with those in Column II and select the correct option given below.

	Column - I		**Column - II**
a.	*Glycosuria*	(i)	Accumulation of uric acid in joints
b.	Gout	(ii)	Mass of crystallised salts within the kidney
c.	Renal calculi	(iii)	Inflammation in glomeruli
d.	Glomerular nephritis	(iv)	Presence of glucose in urine

(A) (a) (ii), (b) (iii), (c) (iv), (d) (i)
(B) (a) (i), (b) (ii), (c) (iii), (d) (iv)
(C) (a) (ii), (b) (iii), (c) (i), (d) (iv)
(D) (a) (iii), (b) (i), (c) (ii), (d) (iv)

63. Nerve gas affects neuromuscular working by

(A) Enhancing release of acetylcholine
(B) Inhibiting acetyleholinesterase
(C) Inhibiting release of acetylcholine
(D) Blocking acetylcholine receptors

64. It converts short term memory into long term remembrance

(A) Reticular system
(B) Thalamus
(C) Medulla oblongata
(D) Hippocambus

65. Brain sterm is made of

(A) Mid brain, pons, cerebellum
(B) Mid brain, pons, Medulla oblongata
(C) Diencephalon, medulla oblongata, cerebellum
(D) Cerebellum, cerebrum, medulla oblongata

Space for rough work

BOTANY (SECTION - IV)

66. Process of sexual reproduction which involves meiosis and syngamy is

(A) Apomixis
(B) Amphimixis
(C) Agamospermy
(D) Diplospory

67. A polyestrous animal is

(A) Man
(B) Cat
(C) Rabbit
(D) Horse

68. Syngamy can occur outside the body of the organism in

(A) Mosses
(B) Algae
(C) Ferns
(D) Fungi

69. Breeding place of Flamingo (Hansawar) in India is

(A) Chilka Lake
(B) Sambar Lake
(C) Rann of Kutch
(D) Ghana Vihar

70. Bandipur (Karnataka) national Park is site of

(A) Deer project
(B) Peacock project
(C) Elephant project
(D) Tiger project

71. Gir national Park is famous for

(A) Tiger
(B) Asiatic Lion
(C) Panther
(D) Musk Deer

72. Which communities are more vulnerable to invasion by outside plants and animals?

(A) Tropical evergreen forests
(B) Temperate forests
(C) mangrove
(D) Oceanic island communities

73. The gene for ABO blood group is located on

(A) Chromosome 4
(B) Chromosome 7
(C) Chromosome 9
(D) Chromosome 11

Space for rough work

74. Down syndrome is one of the most common chromosome abnormalities in humans. It occurs

(A) When there is an extra copy of chromosome 21
(B) When there is an extra copy of chromosome 22
(C) When there is an extra copy of chromosome 11
(D) When there is an extra copy of chromosome 09

75. The mechanism that causes a gene to move from one linkage group to another is called

(A) Translocation
(B) Crossing-over
(C) Inversion
(D) Duplication

76. *Zygospore of spirogyra* at the time of meiosis is divided into 4 nuclei. How many nuclei degenerate out of these four?

(A) One
(B) Two
(C) Three
(D) Four

77. *Cycas* is

(A) monoecious
(B) bisexual
(C) dioecious
(D) hermaphrodite

78. Maximum nutritional diversity is found in

(A) Plantae
(B) Animalia
(C) Fungi
(D) Monera

79. The shape of the cocci bacteria is

(A) Rod shaped
(B) Spherical
(C) Comma shaped
(D) Spiral

80. The fungus which grows on dung is called

(A) Hemicolous
(B) Lignicolous
(C) Coprophilous
(D) Fungicolous

81. Aflatoxins are produced by

(A) Bacteria
(B) Viruses
(C) Fungi
(D) Nematodes

Space for rough work

82. A phylum with true coelom is

(A) Porifera (B) Coelentrata

(C) Arthropoda (D) Aschelminthes

83. Protostomia are those animals in which the blastopore of gastrula becomes

(A) Mouth (B) Anus

(C) Nasal opening (D) None of the above

84. Which one of the following belongs to phylum Arthropoda?

(A) Dog fish (B) Devil fish

(C) Jelly fish (D) Silver fish

85. Spliceosomes are not found in cells of

(A) Fungi (B) Animals

(C) Bacteria (D) Plants

86. The association of histone H_1 with a nucleosome indicates

(A) DNA replication is occurring. (B) The DNA is condensed into a Chromatin Fibre.

(C) The DNA double helix is exposed. (D) Transcription is occurring.

87. Twin characteristic of growth are

(A) Increase in length (B) Increase in width

(C) Increase in mass and number (D) Both A and B

88. In binomial nomenclature, the name of an organism consists of

(A) A scientific and a common name (B) Name of genus and species

(C) A name given by two scientists (D) One name is Latin, other common

89. The word systematics is derived from the systema which is a

(A) Latin word (B) Greek word

(C) English word (D) Italic letter

90. Common feature of Insects is

(A) Jointed appendages and antennal (B) Two pairs of wings

(C) Three pairs of jointed legs (D) Biting and chewing type of mouth part

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CENTRE FOR SOCIAL RESPONSIBILITY & LEADERSHIP

ANSWERS KEY

4-S, SAMPLE MEDICAL SELECTION TEST 2020-21

PHYSICS		CHEMISTRY		ZOOLOGY		BOTANY	
S.No	Ans.	S.No	Ans.	S.No	Ans.	S.No	Ans.
1	C	21	B	41	B	66	B
2	B	22	B	42	C	67	C
3	B	23	C	43	A	68	B
4	A	24	D	44	C	69	C
5	D	25	D	45	A	70	D
6	C	26	C	46	D	71	B
7	A	27	C	47	A	72	A
8	C	28	C	48	C	73	C
9	A	29	D	49	B	74	A
10	D	30	D	50	C	75	A
11	B	31	C	51	A	76	C
12	B	32	A	52	D	77	C
13	D	33	C	53	A	78	B
14	B	34	A	54	D	79	D
15	C	35	A	55	C	80	C
16	B	36	C	56	B	81	C
17	B	37	C	57	D	82	C
18	A	38	D	58	A	83	A
19	D	39	C	59	C	84	D
20	B	40	B	60	A	85	C
				61	D	86	B
				62	D	87	C
				63	B	88	B
				64	D	89	A
				65	B	90	C