

Scholarship cum Admission Test

Class : XI (Medical)

Time allowed : 2 hours

Maximum Marks : 320

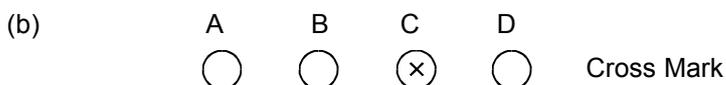
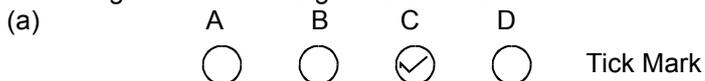
GENERAL INSTRUCTIONS

01. The question paper consists of '80' objective type questions. Each question carry 4 marks and all of them are compulsory.
02. Each question contains four alternatives out of which only **ONE** is correct.
03. There is **NEGATIVE** marking. 1 mark will be deducted for each wrong answer.
04. Indicate the correct answer for each question by filling appropriate bubble in your answer sheet.
05. The answers of the questions must be marked by shading the circle against the question by dark **Black Ball point Pen** only.
06. Use of **blank papers, clip boards, log tables, calculator, slide rule, mobile** or any other **electronic gadgets** in any form is "**NOT PERMISSIBLE**".
07. You must not carry mobile phone even if you have the same, give it to your Invigilator before commencement of the test and take it back from him/her after the exam.
08. The Answer Sheet will be checked through computer hence the answer of the questions must be marked by shading the circles against the question by dark **Black Ball point Pen** only.

For example if only 'C' choice is correct then, the correct method for filling the bubble is



the wrong method for filling the bubble are



The answer of the questions in wrong or any other manner will be treated as wrong.

PHYSICS

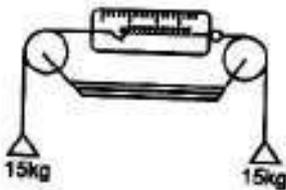
SECTION – I

There are 20 questions in this section. Each question has four options out of which only **ONE** is correct.

1. A stunt man jumps his car over a crater as shown (neglect air resistance)



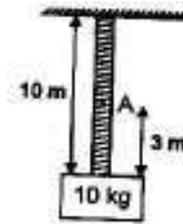
- (A) during the whole flight the driver experiences weightlessness
(B) during the whole flight the driver never experiences weightlessness
(C) during the whole flight the driver experiences weightlessness at highest point only
(D) the apparent weight increases during upward journey
2. Two weights of 15 kg each are attached by means of two strings to the two ends of a spring balance, as shown in the diagram. The pulleys are frictionless. The reading of the balance would be



- (A) zero (B) 15 kg

- (C) 30 kg (D) 75 kg

3. The adjoining figure shows a block of mass 10 kg connected to free end of a rope of mass 10 kg and length 10 m. The tension of the rope at point A is ($g = 10 \text{ m/s}^2$)



- (A) 170 N (B) 30 N
(C) 130 N (D) 70 N

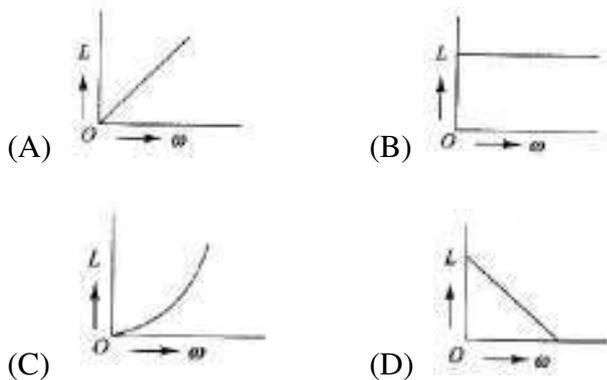
4. Moment of inertia of a hollow cylinder about its long axis of symmetry is



- (A) MR^2 (B) $2MR^2$
(C) $1/2MR^2$ (D) $2/3 MR^2$

5. For a fixed value of moment of inertia, which of the following correctly represents the variation of L with ω ?

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6. The angular speed of hour's hand of a watch is (in rad s^{-1})
- (A) $\frac{\pi}{60 \times 60}$ (B) $\frac{2\pi}{60 \times 60}$
 (C) $\frac{\pi}{6 \times 60 \times 60}$ (D) $\frac{\pi}{12 \times 60 \times 60}$
7. The numerical ratio of displacement to distance is
- (A) always more than one
 (B) always less than one
 (C) always equal to one
 (D) equal to or less than one
8. A body is moved along a straight line by a machine delivering constant power. The distance covered by the body in time t second is directly proportional to
- (A) $t^{1/2}$ (B) $t^{3/2}$
 (C) $t^{3/4}$ (D) $t^{5/2}$

9. The area under acceleration – time graph represents
- (A) velocity
 (B) displacement travelled
 (C) distance travelled
 (D) change in velocity
10. $[ML^2T^{-3}]$ represents dimensions of
- (A) work (B) power
 (C) momentum
 (D) potential energy
11. A bullet hits and gets embedded in a solid block resting on a horizontal frictionless table. What is conserved?
- (A) momentum alone
 (B) kinetic energy alone
 (C) momentum and kinetic energy
 (D) neither kinetic energy nor momentum
12. SI units of spring force constant will be
- (A) N (B) J
 (C) Nm^{-1} (D) Jm
13. Fast neutrons can easily be slowed down by
- (A) the use of lead shield
 (B) passing them through water
 (C) elastic collision with heavy nuclei
 (D) applying a strong electric field
14. The work done in moving a body of mass m through distance h up a rough inclined plane which makes an angle θ with the horizontal

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is given by (in terms of coefficient of friction μ)

- (A) $mgh \sin \theta$ (B) $mgh \cos \theta$
(C) $mgh (\sin \theta + \cos \theta)$
(D) $mgh (\sin \theta + \mu \cos \theta)$

15. If μ is coefficient of friction between the tyres and road, then the minimum stopping distance for a car of mass m moving with velocity v is given by

- (A) $\mu v g$ (B) $\frac{v^2}{2\mu g}$
(C) $v^2 \mu g$ (D) $\frac{\mu v}{2g}$

16. The average force necessary to stop a hammer with 50 Ns momentum in 0.10 s is

- (A) 50 N (B) 500 N
(C) 5000 N (D) 5 N

17. The coefficient of static friction between two surfaces depends upon the

- (A) normal reaction

- (B) shape of the surfaces in contact
(C) area of contact
(D) none of these

18. Area under the force – displacement graph represents

- (A) work done
(B) change in momentum
(C) torque
(D) pressure gradient

19. Work done by centripetal force in displacing a particle along a circular path is

- (A) positive (B) negative
(C) zero
(D) nothing can be decided

20. Choose the wrong statement

- (A) work done is a scalar quantity
(B) work done by a body does not depend on the time taken to complete the work
(C) work done can never be zero
(D) SI unit of work is joule

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CHEMISTRY

SECTION – II

There are 20 questions in this section. Each question has four options out of which only ONE is correct.

21. A partially dried clay mineral contains 8% water. The original sample contains 12% water and 45% silica. The % of silica in the partially dried sample is nearly.
(A) 50% (B) 49%
(C) 55% (D) 47%
22. If the mole fraction of solute is changed from $\frac{1}{4}$ to $\frac{1}{2}$ by adding some solute in the 800 g of H₂O solvent, then the ratio of molality of two solutions will be
(A) 1 : 3 (B) 1 : 4
(C) 2 : 3 (D) 1 : 2
23. Suppose two elements X and Y combine to form two compounds XY₂ and X₂Y₃ when 0.05 mole of XY₂ weights 5 g while 3.011×10^{23} molecules of X₂Y₃ weights 85 g. The atomic masses of X and Y are respectively
(A) 20,30 (B) 30,40
(C) 35,30 (D) 80,60
24. Carbon occur in nature as a mixture of C – 12 and C – 13. Average atomic mass of carbon is 12.011 what is the % abundance of C – 12 in nature?
(A) 98.9 % (B) 60.9%
(C) 32.9% (D) 1.4 %
25. Observe the following statements regarding isotones
a. ³⁹K and ⁴⁰Ca are isotones
b. Nuclides having different atomic number (Z) and mass numbers (a) but same number of neutrons (n) are called isotones.
c. ¹⁹F and ²³Na are isotones
- The correct answer is
(A) a, b and c are correct
(B) only a and b are correct
(C) only a and c are correct
(D) only b and c are correct
26. Last line by Lyman series for H – atom has wavelength $\lambda, \text{\AA}$, 2nd line of Balmer series has wavelength $\lambda_2 \text{\AA}$ then
(A) $\frac{16}{\lambda_1} = \frac{9}{\lambda_2}$ (B) $\frac{16}{\lambda_2} = \frac{3}{\lambda_1}$
(C) $\frac{4}{\lambda_1} = \frac{1}{\lambda_2}$ (D) $\frac{16}{\lambda_1} = \frac{3}{\lambda_2}$

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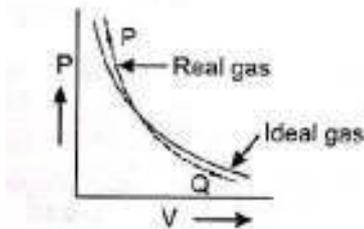
27. The correct order of wavelength of Hydrogen (${}_1\text{H}^1$), Deuterium (${}_1\text{H}^2$) and Tritium (${}_1\text{H}^3$) moving with same kinetic energy is

- (A) $\lambda_{\text{H}} > \lambda_{\text{D}} > \lambda_{\text{T}}$
- (B) $\lambda_{\text{H}} = \lambda_{\text{D}} = \lambda_{\text{T}}$
- (C) $\lambda_{\text{H}} < \lambda_{\text{D}} < \lambda_{\text{T}}$
- (D) $\lambda_{\text{H}} < \lambda_{\text{D}} > \lambda_{\text{T}}$

28. According to Bohr's atomic theory, which of the following is correct?

- (A) potential energy of electron $\propto \frac{Z^2}{n^2}$
- (B) the product of velocity of electron and principle quantum number (n) $\propto Z^2$
- (C) frequency of revolution of electron in an orbit $\propto \frac{Z^2}{n^3}$
- (D) coulombic force of attraction one the electron $\propto \frac{Z^2}{n^2}$

29. At point P and Q, the real gas deviation with respect to ideal gas is respectively



- (A) positive, negative
- (B) positive, positive
- (C) negative, positive
- (D) negative, negative

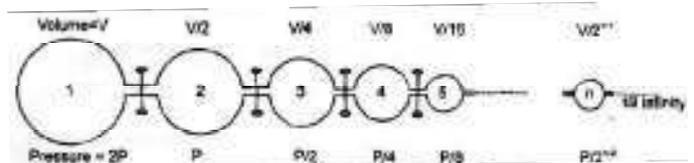
30. The ratio of among most probable velocity, mean velocity and root mean square velocity is given by

- (A) 1 : 2 : 3
- (B) $1 : \sqrt{2} : \sqrt{3}$
- (C) $\sqrt{2} : \sqrt{3} : \sqrt{8/\pi}$
- (D) $\sqrt{2} : \sqrt{8/\pi} : \sqrt{3}$

31. The root mean square velocity of hydrogen is $\sqrt{5}$ times than that of nitrogen. If T is the temperature of the gas, then

- (A) $T_{\text{H}_2} = T_{\text{N}_2}$
- (B) $T_{\text{H}_2} > T_{\text{N}_2}$
- (C) $T_{\text{H}_2} < T_{\text{N}_2}$
- (D) $T_{\text{H}_2} < \sqrt{7}T_{\text{N}_2}$

32.



Infinite number of flasks are connected to one another as shown above. The volumes and pressures in each flask vary as shown. The stopcocks are initially closed. The

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common pressure, when all the stopcocks are opened, is : (Assume constant temperature)

- (A) P (B) $1/2P$
(C) $P/4$ (D) $4/3P$

33. The first ionisation energy of Al is smaller than that of Mg because
(A) the atomic number of Al is greater than that of Mg
(B) the atomic size of Al is less than that of Mg
(C) penetration of s – subshell electrons in case of Mg is greater than that of p – subshell in Al
(D) Mg has incompletely filled s- orbital

34. Element with electronic configuration as $[\text{Ar}]^{18} 3d^5 4s^2$ is placed in
(A) 1st group, s - block
(B) 2nd group, s - block
(C) 5th group, d- block
(D) 7th group , d – block

35. Which is the correct property mentioned
(A) $\text{Fe}^+ < \text{Fe}^{2+} < \text{Fe}^{3+}$ – size
(B) $\text{Fe}^+ < \text{Fe}^{2+} < \text{Fe}^{3+}$ – ionisation energy
(C) $\text{B} < \text{Be} < \text{C}$ – size
(D) $\text{N} < \text{O} < \text{F}$ – ionisation energy

36. Ionic radii is/are

- (A) directly proportional to effective nuclear charge
(B) directly proportional to square of effective nuclear charge
(C) inversely proportional to effective nuclear charge
(D) inversely proportional to square of effective nuclear charge

37. Which of the following atomic orbitals overlapping are not allowed



- (A) all (B) (i) (ii) (iii)
(C) (i) (iii) (v) (D) (ii) only

38. Which of the following is a planar molecule?

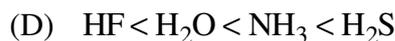
- (A) XeO_2F_2 (B) XeOF_3
(C) XeF_4 (D) XeF_6

39. Which of the following options with respect to increasing bond order is correct?

- (A) $\text{NO} < \text{C}_2 < \text{O}_2^- < \text{B}_2$
(B) $\text{C}_2 < \text{NO} < \text{B}_2 < \text{O}_2^-$
(C) $\text{B}_2 < \text{O}_2^- < \text{NO} < \text{C}_2$
(D) $\text{B}_2 < \text{O}_2^- < \text{C}_2 < \text{NO}$

40. In terms of polar character, which of the following order is correct?

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BIOLOGY

SECTION – III

There are 40 questions in this section. Each question has four options out of which only ONE is correct.

41. ICBN stands for

- (A) International Council for Botanical Nature
- (B) International Code of Botanical Nomenclature
- (C) Indian Code of Botanical Nomenclature
- (D) None of the above

42. Match the following pairs correctly and choose the right combination

Column-I		Column-II	
A.	Escherichia coli	p.	'nif' gene
B.	Rhizobium melilotae	q.	Digest hydrocarbon of crude oil
C.	Bacillus thuringiensis	r.	Production of human insulin
D.	Pseudomonas putida	s.	Biological control of fungal disease
		t.	Bio insecticide

(A) A = r, B = p, C = t, D = s

(B) A = p, B = q, C = r, D = s

(C) A = q, B = r, C = p, D = q

(D) A = r, B = p, C = t, D = q

43. Protista contains

- (A) Euglena, Dinoflagellates and Yeast
- (B) Amoeba, Paramecium, Hydra
- (C) Euglena, Paramecium, Mushroom
- (D) Amoeba, Paramecium, and Dinoflagellates

44. Which one of the following pairs is correctly matched

- (A) Rhizobium – Parasite in the roots of leguminous plants
- (B) Mycorrhizae – Mineral uptake from soil
- (C) Yeast – Production of biogas
- (D) Myxomycetes – The disease ring worm

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45. Choose the correct order of colours with respect to pigments, chlorophyll, phycoerythrin and fucoxanthin

- (A) Green, red and brown
- (B) Brown, green and red
- (C) Red, green and brown
- (D) Green, brown and red

46. Which one of the following is a vascular cryptogam

- (A) Equisetum
- (B) Ginkgo
- (C) Marchantia
- (D) Cedrus

47. Match the following and choose the correct option

A.	Physalia	p.	Sea anemone
B.	Meandrina	q.	Brain coral
C.	Gorgonia	r.	Sea fan
D.	Adamsia	s.	Portuguese man of war

- (A) A-r, B-q; C-p; D-s
- (B) A-s, B-r; C;q D-p
- (C) A-s; B-q; C-r, D-p
- (D) A-q, B-r; C-p; D-s

48. Pheretima is

- (A) Sterile
- (B) Hermaphrodite
- (C) Radially symmetrical
- (D) Dioecious

49. In which one of the following, the genus name, its two characters and its phylum are not correctly matched, whereas the remaining three are correct

	Genus Name		Two characters	Phylum
(a)	Pila	(a)	Body Segmented	Mollusca
		(b)	Moth with Redula	
(b)	Asterias	(a)	Spiny Skinned	Echinodermata
		(b)	Water vascular system	
(c)	Sycon	(a)	Pore bearing	Porifera
		(b)	Canal system	
(d)	Periplaneta	(a)	Jointed appendages	Arthropoda
		(b)	Chitinous exoskeleton	

50. Which is correct for Indian snakes

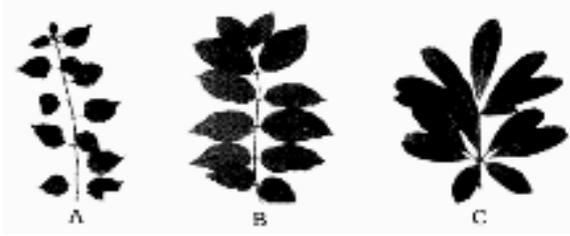
- (A) Only sea snakes are non-poisonous
- (B) Only sea snakes are poisonous
- (C) All water snakes are poisonous
- (D) All sea snakes are poisonous

51. Only poisonous mammal is

- (A) Ornithorhynchus
- (B) Echidna
- (C) Guinea pig
- (D) Snake

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52. Identify the correct types of phyllotaxy which shown in the following figures

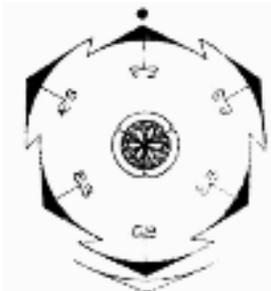


- (A) A–Whorled, B–Alternate, C–Opposite
- (B) A–Alternate, B–Whorled, C–Opposite
- (C) A–Whorled, B–Opposite, C–Alternate
- (D) A–Alternate, B–Opposite, C–Whorled

53. A monocarpic plant is one which

- (A) Has only one carpel
- (B) Flowers once in a life-time
- (C) Produces only one seed
- (D) Produces only one fruit

54.



Plants having the above given floral diagram are

- (A) Leguminous
- (B) Dicots
- (C) Medicinal and perennial
- (D) Having pinnately compound leaves

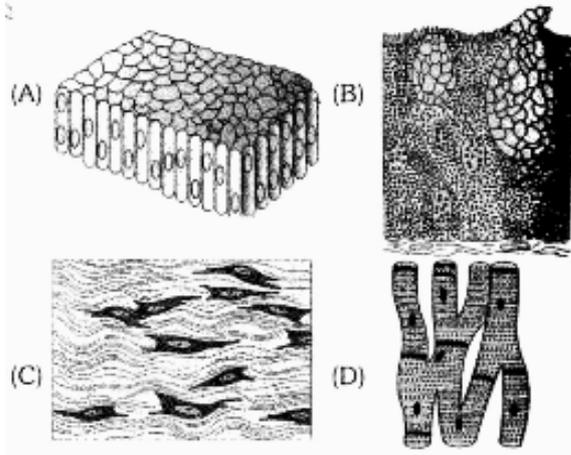
55. Match the following in column I with column II and choose the correct combination

Column I		Column II	
A.	Xylem vessels	p.	Store food materials
B.	Xylem tracheids	q.	Obliterated lumen
C.	Xylem fibre	r.	Perforated plates
D.	Xylem parenchyma	s.	Chisel-like ends

- (A) A–s, B–r, C–q, D–p
- (B) A–r, B–q, C–p, D–s
- (C) A–q, B–p, C–s, D–r
- (D) A–r, B–s, C–q, D–p

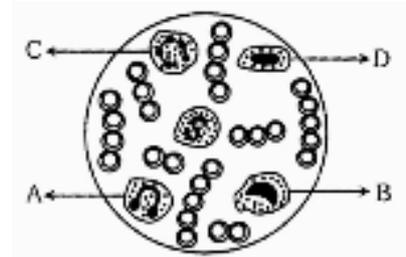
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56. The four sketches (A, B, C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function



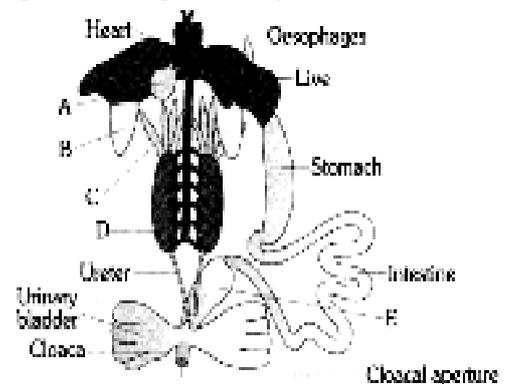
		Tissue	Location	Function
(a)	(B)	Glandular epithelium	Intestine	Secretion
(b)	(C)	Collagen fibres	Cartilage	Attach skeletal muscles to bones
(c)	(D)	Smooth muscle tissue	Heart	Heart contraction
(d)	(A)	Columnar epithelium	Nephron	Secretion and absorption

57. Study the diagram given below and identify the cells labelled as A, B C and D, and choose the correct option



- (A) A = Eosinophil B = Erythrocyte, C = Neutrophil and D = Basophil
- (B) A = Eosinophil, B = Lymphocyte, C = Neutrophil and D = Monocyte
- (C) A = Erythrocyte, B = Basophil, C = Neutrophil and D = Lymphocyte
- (D) A = Eosinophil, B = Monocyte, C = Neutrophil and D = Lymphocyte

58. The given figure is related to diagrammatic representation of internal organs of frog. Identify A to E



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	A	B	C	D	E
(a)	Gall bladder	Lung	Fat bodies	Kidney	Rectum
(b)	Gall bladder	Lung	Testis	Kidney	Rectum
(c)	Gall bladder	Lung	Fat bodies	Testis	Rectum
(d)	Gall bladder	Lung	Ovary	Testis	Rectum

59. Who proposed “fluid mosaic model” for plasma membrane

- (A) C. Cramer and C. Naegeli
- (B) Singer and Nicholson
- (C) Denielli and Davson
- (D) J.D. Robertson

60. Which one of the following pairs is correctly matched

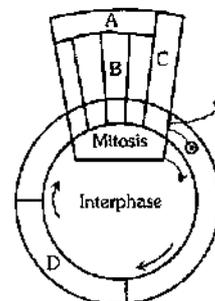
(A)	Microsomes	Participate in the process of photosynthesis
(B)	Lysosomes	Involved in synthesizing amino acids
(C)	Endoplasmic Reticulum	Plays role in the formation of a new nuclear membrane during cell division
(D)	Centrosomes	Provide enzymes required in the digestive process

61. Cholesterol is a

- (A) Phospholipid
- (B) Wax
- (C) Steroid

(D) Triglyceride

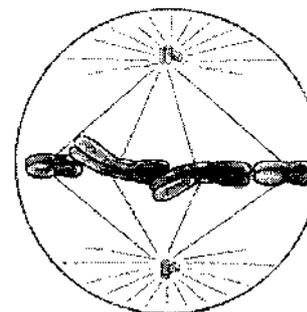
62. Given below is a schematic break-up of the phases/stages of cell cycle



Which one of the following is the correct indication of the stage/phase in the cell cycle

- (A) B-Metaphase
- (B) C-Karyokinesis
- (C) D-Synthetic phase
- (D) A-Cytokinesis

63. Select the correct option with respect to mitosis



(A) Chromosomes move to the spindle equator and get aligned along

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equatorial plate in metaphase

- (B) Chromatids separate but remain in the centre of the cell in anaphase
- (C) Chromatids start moving towards opposite poles in telophase
- (D) Golgi complex and endoplasmic reticulum are still visible at the end of prophase

64. Systema Naturae is concerned with

- (A) Solar system
- (B) Ecosystem
- (C) Classification of plants and animals
- (D) Natural selection

65. Little leaf of brinjal is caused by

- (A) Virus
- (B) Mycoplasma
- (C) Fungus
- (D) Algae

66. The major function of contractile vacuole is

- (A) Excretion
- (B) Circulation
- (C) Osmoregulation
- (D) All the above

67. In majority of lichens, there is association of

- (A) Green algae and ascomycetes
- (B) Green algae and basidiomycetes
- (C) Blue green algae and ascomycetes
- (D) Blue green algae and basidiomycetes

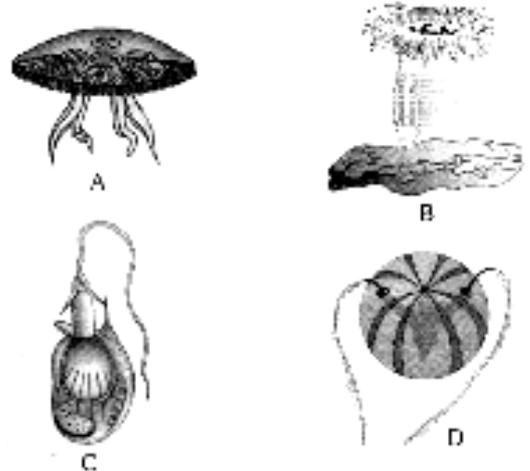
68. Elaters are present in sporogonium of

- (A) Riccia
- (B) Marchantia
- (C) Selaginella
- (D) Sphagnum

69. The number of spores in the sporangium of fern is

- (A) 16
- (B) 32
- (C) 64
- (D) 128

70. Select the right option in which all the following figures are correctly identified



	A	B	C	D
(a)	Adamsia	Aurelia	Pleurobrachia	Cnidoblast
(b)	Cnidoblast	Pleurobrachia	Adamsia	Aurelia
(c)	Aurelia	Adamsia	Cnidoblast	Pleurobrachia
(d)	Pleurobrachia	Cnidoblast	Aurelia	Adamsia

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71. Which one of the following groups of three animals each is correctly matched with their one characteristic morphological feature

Animals		Morphological feature
(A)	Scorpion, Spider, Cockroach	Ventral solid central nervous system
(B)	Cockroach, Locust, Taenia	Metameric segmentation
(C)	Liver fluke, Sea anemone, Sea cucumber	Bilateral symmetry
(D)	Centipede, Prawn, Sea urchin	Jointed appendages

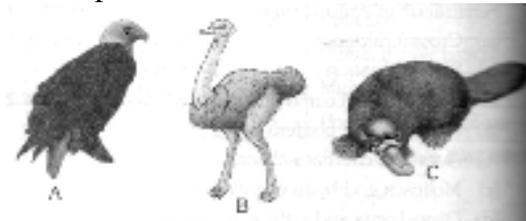
72. Match the columns and choose the correct combination.

A.	Polychaeta	p.	Scorpion
B.	Trematoda	q.	Pila
C.	Arachnida	r.	Liver Fluke
D.	Gastropoda	s.	Nereis
		t.	Star Fish

- (A) A-s, B-r, C-p, D-q
 (B) A-q, B-s, C-t, D-p
 (C) A-r, B-s, C-p, D-t

(D) A-t, B-q, C-s, D-r

73. Identify the name of given animals with their respective classes



- (A) A – Neophron, Aves, B – Struthio, Reptilia, C – Ornithorhynchus, Mammalia
 (B) A – Neophron, Aves; B – Struthio, Aves; C – Ornithorhynchus, Aves
 (C) A – Neophron, Aves; B – Struthio, Mammalia; C – Ornithorhynchus, Mammalia
 (D) A – Neophron, Aves; B – Struthio, Aves; C – Ornithorhynchus, Mammalia

74. Match List I with List II and select the correct option

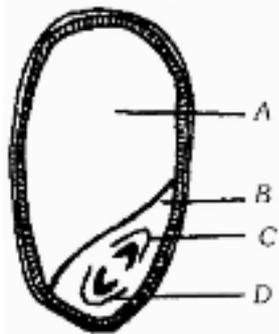
List I		List II	
A.	Spike	p.	Bougainvillea
B.	Capitulum	q.	Coleus
C.	Dichasial cyme	r.	Adhatoda
D.	Multiparous cyme	s.	Zinnia
E.	Verticillaster	t.	Asclepias

- (A) A-r, B-s, C-p, D-t, E-q
 (B) A-r, B-p, C-s, D-t, E-q
 (C) A-q, B-s, C-p, D-t, E-r

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(D) A-s, B-q, C-t, D-p, E-r

75. The diagram represents the L. S of monocot seed. Choose the correct combination of labelling



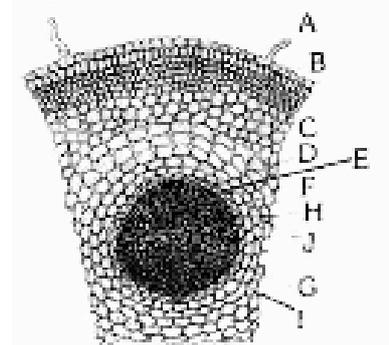
- (A) (A) Alerone layer (B) Scutellum (C) Coleoptile (D) Coleorhiza
- (B) (A) Seed coat (B) Scutellum (C) Coleoptile (D) Coleorhiza
- (C) (A) Epithelium (B) Scutellum (C) Coleoptile (D) Coleorhiza
- (D) (A) Endosperm (B) Scutellum (C) Coleoptile (D) Coleorhiza

76. Cystoliths sometimes deposited in plant cells are crystals of (aggregation of)

- (A) Calcium oxalate
- (B) Calcium carbonate
- (C) Magnesium carbonate
- (D) Glucosides

77. The following diagram illustrates the TS of monocot root in Which certain parts have been indicated by alphabets, choose the right answer in which these alphabets

have been correctly matched with the parts which they indicate



- (A) A = Root hair, B = Cortex, C = Epiblema, D = Pericycle, E = Endodermis, F = Pith, G = Passage cell, H = Phloem, I = Protoxylem, J = Metaxylem
- (B) A = Root hair, B = Epiblema, C = Cortex, D = Endodermis, E = Pericycle, F = Passage cell, G = Phloem, H = Pith, I = Protoxylem, J = Metaxylem
- (C) A = Root hair, B = Epiblema, C = Cortex, D = Endodermis, E = Passage cell, F = Pith, G = Pericycle, H = Metaxylem, I = Phloem, J = Protoxylem
- (D) A = Root hair, B = Epiblema, C = Cortex, D = Endodermis, E = Passage cell, F = Pericycle, G = Pith, H = Phloem, I = Metaxylem, J = Protoxylem

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- 78.** Haemoglobin is a
- (A) Copper containing pigment
 - (B) Iron containing pigment
 - (C) Magnesium containing pigment
 - (D) Calcium containing pigment
- 79.** The area where the medullary sheath is absent in the nerve fibre is called
- (A) Schwann cells
 - (B) Schwann nodes
 - (C) Nissl Granules
 - (D) Node of Ranvier

- 80.** Numerical aperture of microscope lens is expressed by
- (A) Angular aperture only
 - (B) Refractive index only
 - (C) Both angular aperture and refractive index
 - (D) Wave length of the light used

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