1. The choroid layer is thin over the posterior two-thirds of the eye ball, but it becomes thick in the anterior part to form the
1. Iris
2. Cilliary body
3. Pupil
4. Suspensory ligament

2. Eustachian tube connects
1. External ear with middle ear
2. External ear with internal ear
3. Middle ear with pharynx
4. Middle ear with internal ear

3. Thyrotrophic releasing factor (TRF) is secreted by
1. Hypothalamus
2. Adenopophysis
3. Pars intermedia
4. Neurohypophysis

4. Match column-I and column-II, choose the correct combination from the option given

	Column-I		Column-II
(A)	Adhering Junctions	1.	Help to stop substances from leaking across a tissue
(B)	Gap junctions	2.	Perform cementing to keep neighbouring cells together
(C)	Tight junctions	3.	Facilitate the cells to communicate with each other

1. (A)-3, (B)-2, (C)-1
2. (A)-2, (B)-3, (C)-1
3. (A)-2, (B)-1,(C)-3
4. (A)-1, (B)-3, (C)-2

5. The excess of nutrients which are not used immediately are converted into fats and stored in
1. Areolar tissue
2. Adipose tissue
3. Dense regular connective tissue
4. Dense irregular connective tissue

6. Cartilage is present
A. In the tip of nose and middle ear joints
B. Between adjacent bones of vertebral column
C. Between adjacent bones of limbs and hands in adults
1. A,B and C
2. A and B
3. B and C
4. A and C

7. Which factor(s) affects the enzymatic activity?
1. Temperature and pH
2. Change in substrate concentration
3. Binding of specific chemicals that regulates its activity
4. All of the above

8. Enzymes that catalyse removal of groups from substrate by mechanisms other than hydrolysis leaving double bonds belongs to
1. Dehydrogenases
2. Hydrolases
3. Lyases
4. Transferases

9. Identify enzymes (i),(ii),(iii) and (iv) in digestion of carbohydrates
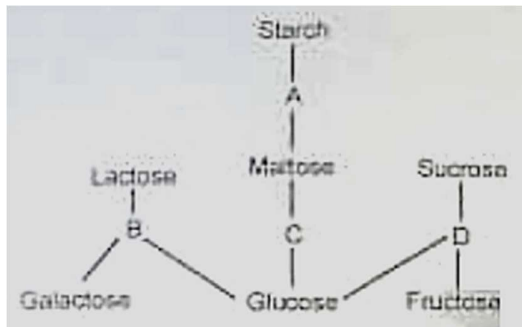
1. A- amylase, B-invertase, C-maltase, D-lactase

2. A-amylase, B-lactase, C-maltase, D-invertase

3. A-amylase, B-maltase, C-lactase, D-invertase

4. A-amylase, B-maltase, C-invertase, D-lactase

10. Haemolytic disease of the newborn (HDN) may occur in the feotus of a second pregnancy if

1. The mother is Rh$^+$ and the baby is Rh$^-$

2. The mother is Rh$^+$ and the baby is Rh$^+$

3. The mother is Rh$^-$ and the baby is Rh$^-$

4. The mother is Rh$^-$ and the baby is Rh$^+$

11. Which of the following sequences best represents the pathway of an action potential through the Heart's conduction system?
(i) Sino-atrial (SA) node
(ii) Purkinje fibres
(iii) Bundle of His
(iv) Atrio-ventricular (AV) node
(v) Right and left bundle branches
1. (i),(iv),(iii),(ii),(v)
2. (iv), (i),(iii),(v),(ii)
3. (iii),(iv),(i),(ii),(v)
4. (i),(iv),(iii),(v),(ii)

12. Select the option having all the correct characteristics

Structure	Percentage	Function
1.	0.3-0.5	Phagocytic
2.	0.5-1.0	Secrete histamine
3.	30-40	Defense against parasites
4.	30-40	Allergic reactions

13. Which one is correct regarding electrocardiograph?
1. P-wave represents the electrical excitation of the ventricle
2. QRS complex represent repolarization of the ventricles
3. T-wave represents repolarization of the atria
4. By counting the number of QRS complexes one can determine the pulse rate

14. Match the vessels in Column-I with appropriate organs if servesin Column-II

	Column-I		Column-II
(A)	Hepatic portal vein	(p)	Heart's blood system
(B)	Pulmonary trunk	(q)	Returns blood to heart from lower limbs
(C)	Coronary circulation	(r)	Carries blood to liver
(D)	Inferior vena cava	(s)	Leads to lungs

1. (A)→(r), (B)→(s),(C)→(p),(D)→(q)
2. (A)→(r),(B)→(q),(C)→(s),(D)→(p)
3. (A)→(s),(B)→(p),(C)→(r),(D)→(q)
4. (A)→(s),(B)→(q),(C)→(p),(D)→(r)

15. Mammalian lungs have numerous alveoli for
1. Increasing volume of inspired air
2. Keeping the lings of proper shape
3. Higher number of muscles to provide greater elasticity
4. Increasing surface area for gaseous diffusion

16. Diabetes insipidus is due to
1. Hyposecretion of vasopressin (ADH)
2. Hypersecretion of insulin
3. Hypersecretion of vasopressin (ADH)
4. None

17. Match the organism in Column-I with its excretory structure in Column-II

	Column-I		Column-II
(A)	Cockroach	(p)	Nephridia
(B)	Earthworm	(q)	Proboscis gland
(C)	Balanoglossus	(r)	Kidney
(D)	Clarias	(s)	Malpighian tubules

1. (A)→(s),(B)→(p),(C)→(q),(D)→(r)
2. (A)→(s),(B)→(p),(C)→(r),(D)→(q)
3. (A)→(q),(B)→(p),(C)→(r), (D)→(s)
4. (A)→(s), (B)→(q),(C)→(r),(D)→(p)

18. The contractile protein of skeletal muscle involving ATPase activity is
1. Tropomyosin
2. Myosin
3. or-Actinin
4. Toponin

19. Which one of the following is the description of a certain part of a normal human skeleton?
1. First vertebra is axis which atriculates with the occipital condyles
2. The 9th and 10th pairs of ribs are called the floating ribs
3. Glenoid cavity is a depression to which the thigh bone atriculates
4. Parietal bone and the temporal bone of the skull are joined by fibrous joint

20. Three of the following pairs of the human skeletal parts are correctly matched with their respective inclusive skeletal category and one pair is not matched. Identify the non-matching pair

	Pairs of skeletal parts	Category
1.	Malleus and stapes	Ear ossicles
2.	Sternum and ribs	Axial skeleton
3.	Clavicle and glenoid cavity	Pelvic girdle
4.	Humerus and ulna	Appendicular skeleton

21. Select the correct statement regarding the specific disorder of muscular or skeletal system
1. Myasthenia gravis- Autoimmune disorder which inhibits sliding of myosin filaments
2. Gout-inflammation of joints due to extra deposition of calcium
3. Muscular dystrophy-Age related shortening of muscles
4. Osteoporosis-Decrease in bone mass and higher chances of fractures with advancing age

22. If Henle's loop were absent from man nephron, which of the following is to be expected?
1. The urine will be more dilute
2. The urine will be more concentrated
3. There will be hardly any change in the quality and quantity of urine formed
4. There will be no urine formation

23. When a person is suffering from poor renal reabsorption, then which of the following will not help in the maintenance of blood volume?
1. Decreased glomerular filtration
2. Increased ADH secretion
3. Decreased arterial pressure in kidney
4. Increased arterial pressure in kidney

24. Due to insufficient filtration in the Bowman's capsule, all are likely to happen except
1. Accumulation of fluid in the body
2. Increase in blood pressure
3. Increase in blood urea level
4. Increase in GFR

25. The process of release of urine in called micturition and the neural mechanisms causing it is called the micturition reflex
(i) Urine formed by the nephron is ultimately carried to the urinary bladder
(ii) This signal is initiated by the stretching of the urinary bladder as it gets filled with urine
(iii) In response, the stretch receptors on the bladder send signals to the CNS
(iv) The CNS passes motor messages to initiated the contraction of smooth muscles of the bladder causing the release of urine
Choose correct option which contain correct order of phenomena of micturition
1. (i),(ii),(iii) and (iv)
2. (ii),(i),(iii) and (iv)
3. (iii),(ii),(i) and (iv)
4. (iv),(ii),(iii) and (i)

26. Match the terms given in Column-I with their physiological processes given in column-II and choose the correct answer

	Column-I		Column-II
(A)	Proximal convoluted tubule	(i)	Formation of concentrated urine
(B)	Distal convoluted tubule	(ii)	Filtration of blood
(C)	Henle's loop	(iii)	Reabsorption of 70-80% of electrolytes
(D)	Counter-current mechanism	(iv)	Ionic balance
(E)	Renal corpuscle	(v)	Maintenance of concentration gradient in medulla

1. (A)-(iii); (B)-(v); (C)-(iii); (D)-(ii); (E)-(i)

2. (A)-(iii); (B)-(iv); (C)-(i);(D)-(v);(E)-(ii)

3. (A)-(i);(B)-(iii); (C)-(ii); (D)-(v);(E)-(iv)

4. (A)-(iii) ; (B)-(i) ; (C)-(iv) ; (D)-(v) ; (E)-(ii)

27. A fall in glomerular filtration rate (GFR) activates
1. Adrenal cortex to release aldosterone.
2. Adrenal medulla to release adrenaline.
3. Posterior pituitary to release vasopressin.
4. Juxta glomerular cells to release rennin.

28. Thrombokinase performs a specific function in human body
Choose the correct option
1. Prothrornbin → Thrornbin
2. Fibrinogen → Fibrin

3. Fibrin   →   Fibrinogen
4. Prothrombin →   Thrombin

29. Partial pressure of CO_2 in alveoli of lungs
1. Equal to that in the deoxygenated blood.
2. More than that in thee deoxygenated blood.
3. Less than that in the deoxygenated blood.
4. More than that of CO_2 in alveoli.

30. T-wave in electrocardiogram represents
1. The return of ventricles from excited to normal state.
2. Depolarisation of ventricles from normal to excited state.
3. Onset of atrial systole.
4. Onset of atrial diastole.

31. Which of the following does not occur in response to decrease in blood volume?
1. Increase in angiotensin II
2. Increase in aldosterone secretion by adrenal cortex
3. Increased tubular reabsorption of sodium
4. Increased secretion of atrial natriuretic peptide from liver

32. Which of the following is not associated with micturition reflex?
1. Relaxation of urethral sphincter
2. Contraction of detrusor muscle
3. Activation of stretch receptors in wall of ureters
4. Neural mechanism govern micturition reflex

33. Mark the incorrect statement w.r.t counter current mechanism
1. Osmolarity of filtrate increases while moving down the descending limb of loop of Henle
2. There will be no urine formation if loop of Henle is absent in mammalian nephrons
3. NaCl and urea maintain the osmolarity gradient in medulla
4. Osmolarity of fluid moving out from the collecting duct is four times that of plasma

34. Heart disorder in which cardiac muscles are suddenly damaged by inadequate supply of blood is
1. Heart failure
2. Cardiac arrest
3. Heart attack
4. Atherosclerosis

35. Read the following statements regarding various steps of urine formation
A. Blood flows through glomerular capillaries under a pressure created due to difference in diameter of afferent and efferent arterioles
B. Filtrate formed after ultrafiltration is isotonic to blood plasma
C. Reabsorption of glucose occurs throughout the tubules of nephron
D. Selective tubular secretion of H+ and K+ ions help in maintaining ionic balance of body
Select the option having only correct statements
1. A and C
2. B,C and D
3. A,B and D
4. C and D

36. The correct sequences of layers in the wall of ailmentary canal from lumen to outside is
1. Serosa→inner circular muscle→ outer longitudinal muscle→ sub-mucosa→ mucosa
2. Mucosa→sub-mucosa→inner circular muscle→ outer longitudinal muscle→serosa
3. Serosa→sub-mucosa→mucosa→inner circular muscle→outer longitudinal muscle
4. Mucosa→serosa→inner circular muscle→outer longitudinal muscle→sub-mucosa

37. Mark the incorrect statement w.r.t humans
1. Jaundice is yellowing skin and eye due to increase in level of bile pigments in blood
2. Fluid from cystic duct is rich in bilirubin, sodium taurocholates, lipase and potassium glycocholate

3. Through caecum, harbours symbiotic microorganisms, no significant digestion occurs in large intestine.
4. Stenson's duct releases secretions of parotid gland and buccal cavity

38. Select the option which is incorrect for enzyme catalase.
1. The cofactor present is inorganic and proteinaceous in nature
2. Haem is the prosthetic group required by the enzyme
3. The cofactor required for optimal activity must be tightly bound to the apoenzyme
4. It catalyses breakdown of hydrogen peroxide to water and oxygen

39. Select the correct statement
1. The base pairs in DNA are stacked 0.34 nm apart
2. The diameter of a right handed helical ds B-DNA molecules is 34 A_o
3. Sugar-phosphate and hydrogen bonds are both present in a single nucleotide such as AMP
4. A and T of one strand compulsorily base pair with G and C respectively, of other strand is DNA

40. Select the correct option that represents the enzyme composition of succus entericus
1. Pepsin, amylase, rennin, lipase
2. Enterocrinin, carboxypeptidase, trypsin, elastase
3. Enterokinase, nucleosidase, dipeptidase, lactase
4. Renin, pepsinogen, trypsinogen, lipase

41. Select the incorrect statement
1. Na+/K+ ATPase is an electrogenic pump that helps to maintain electrochemical ionic gradient across axolemma
2. At rest, axoplasm has lower $Na+$ ions concentration than $K+$ ion concentration
3. Brain stem comprises mid brain and hind brain

4. Thalamus part of hindbrain is responsible for emotions like anger and rage

42. Choose the odd one w.r.t effects of sympathetic nervous system
1. Inhibits secretion of saliva
2. Inhibits secretion of gastric juice
3. Inhibits secretion of pancreatic juice
4. Promotes secretion of intestinal juice

43. Part of brain that deals with a strange mix of signals about smell and converts information from short term to long term memory is
1. Amygdala
2. Corpora quadrigemina
3. Hypothalamus
4. Hippocampus

44. Which one of the following sets of animals belong to a single taxonomic group?
1. Cuttle fish, jellifish, silverfish, dogfish starfish
2. Bat,pigeon, butterfly
3. Monkey, chimpanzee, man
4. Silkworm, tapeworm, earthworm

45. Select the correct statement about class-Aves
1. They are warm blooded (homoiothermous) animals and are able to maintain a constant body temperature
2. Respiration occurs through lungs and air sacs connected to lungs for supplement respiration
3. They are oviparous with separate sexes, internal fertilisation and direct development
4. All of the above

46. What is true about cork cambium?
1. It is extrastelar cambium in dicot stem.
2. In dicot roots it arises from the cells of cortex region.
3. It is also known as phellogen.
4. Both 1 and 3

47. Read the following statements w.r.t. pericycle and choose the suitable option
(1) It is the outermost portion of stele, that may be paranchymatous or sclerenchymatous.
(2) It is absent in monocot stems.
(3) It is always single layered.
1. Only (1) is correct
2. Only (2) is incorrect
3. Only (3) is incorrect
4. Both (1) (2) are incorrect

48. State True (T) or False (F) to the given statements and select the correct option
    (A)   Annual rings are distinct in plants growing in temperate regions.
    (B)   Lenticels occur in most woody trees and permit the exchange of gases.
    (C)   Due to stellar secondary growth, central cylinder of wood surrounded by secondary phloem is formed.
    (D)   The cells of endodermis opposite to protoxylem divide to give rise vascular cambium in dicot roots.

	(A)	(B)	(C)	(D)
1.	T	T	F	F
2.	T	T	T	F
3.	T	F	T	F
4.	F	F	T	T

49. Read the following statements about dicot stem and choose the correct option.
(1) Vascular bundles are arranged in a ring.
(2) Vascular bundles are conjoint, collateral and open type.
(3) Endarch type of arrangement of secondary xylem.
1. Only (2) is correct
2. Only (3) is incorrect
3. Both (1) and (2) are incorrect
4. All (1), (2) and (3) are correct

50. What is incorrect for companion cell?
1. It is specialized parenchymatous cell.
2. It helps in maintaining the pressure gradient in the sieve tubes.
3. It does not retain nucleus throughout the life.
4. It is absent in gymnosperms.

51. State True (T) or False (F) to the given statements and select the correct option
    (A)   All tissue layers exterior to the vascular cambium constitute bark.
    (B)   Root hypodermis is sclerenchymatous.
    (C)   Ground tissue of leaves is called mesophyll.
    (D)   Due to presence of casparian strips, endodermis is impervious to water.

	(A)	(B)	(C)	(D)
1.	T	F	F	T
2.	T	F	T	T
3.	F	T	T	F
4.	T	F	T	F

52. Which of the following characters is/are related to isobilateral leaf?
(1) Stomata are present on both surfaces.
(2) Mesophyll is differentiated into palisade and spongy parenchyma.
(3) Sub-stomatal cavity is present below the stoma of the abaxial epidermis.
1. Only (1)
2. Only (3)
3. Only (1) and (3)
4. (1), (2) and (3)

53. Which of the following floral features is not represented by symbols in a floral formula of a plant family?
1. Relative position of ovary w.r.t. other parts.
2. Adhesion of stamens.
3. Aestivation of calyx and corolla.
4. Symmetry of flower.

54. Select the incorrect match

1.	Green photosynthetic petiole	-	Australian Acacia

2.	Leaflets attached at tip of petiole	-	Silk cotton
3.	Papillonaceous corolla	-	Bean
4.	Epiphyllous stamens	-	Brinjal

55. Which of the given feature is not related to mustard?
1. Superior ovary.
2. Variable length of filaments of stamens.
3. Parietal placentation.
4. Opposite phyllotaxy.

56. Cymose inflorescence is dissimilar to racemose inflorescence in
1. Having limited growth of the main inflorescence axis.
2. Having young flowers at top.
3. Showing centriperal manner of opening of flowers.
4. Having acropetal arrangement of flowers.

57. Read the following characters and mark the correct ones for family Fabaceae.
    (1)   Flowers are arranged in a cropetal manner on floral axis.
    (2)   Flowers with radial symmetry.
    (3)   Hypogynous flower.
    (4)   Albuminous seeds.
    (5)   Monocarpellary ovary.
1. Only (1) and (3)
2. Only (1), (3), (4) and (5)
3. Only (1), (3) and (5)
4. Only (1) and (2)

58. Which of the following statements is not true for runner?
1. Internodes are longer.
2. Helps plants to spread to new niches.
3. Roots are present at nodes.
4. Found in plants like grasses, strawberry and jasmine.

59. State True (T) or False (F) to the given statements and select the correct option
    (A)   Abundance of lichens in any area indicates that the area is highly polluted.
    (B)   Mycobiont partner of lichens is always heterotrophic.
    (C)   Body of lichens is made up of phycobionts only.

	(A)	(B)	(C)
1.	T	T	F
2.	F	T	F
3.	F	F	F
4.	T	F	F

60. Which of the given statement is not true for viruses?
1. They are nucleoproteins where protein is infectious in nature.
2. They can be crystallized and crystals consist largely of proteins.
3. Virus means venom or poisonous fluid.
4. A virus can never have both DNA and RNA as its genetic material.

61. Mark the correct statement for Albugo.
1. Causes white rust in members of Barassicaceae.
2. Plasmogamy occurs by gametangial copulation.
3. Cell wall is made up of fungal cellulose.
4. Mycelium is coenocytic and septate.

62. Organisms responsible for causing 'red tide' are also characterized by
1. Presence of stiff cellulosic plates.
2. Presence of N_2 fixing heterocyst.
3. Presence of two longitudinal flagella.
4. Filamentous body made up of trichomes.

63. How many of the following organisms possess membrane bound cell organelles and autotrophic mode of nutrition?
[Nitrobacter, Chromatium, Methanococcus, Nostoc, Euglena, Gonyaulax, Paramodecium, Yeast, Puccinia]

1. 5
2. 4
3. 2
4. 6

64. Group of organisms in which cell wall forms two thin overlapping shells are
1. Responsible for bioluminescence.
2. Chief producers of ocean.
3. Prokaryotes.
4. Heterotrophs.

65. According to mass flow hypothesis
(1) Sucrose is moved into the companion cells and then into the sieve tube by passive transport.
(2) Inside the phloem, an osmotic pressure gradient is generated that facilitates the mass movement in the phloem.
(3) Water in the adjacent xylem moves into the phloem by active process.
1. (1) and (3) are correct.
2. (2) and (3) are incorrect.
3. (1) and (3) are incorrect.
4. (1) and (2) are correct.

66. Select the incorrect statements
(1) Older dying leaves export most of their mineral content to younger leaves.
(2) Sulphur and calcium and frequently remobilized from senescing parts.
(3) Ions are absorbed from the soil by both passive and active transport.
(4) A plant loses only half as much water as a plant for the same amount of fixed.
1. (1), (2) and (3)
2. Only (1) and (3)
3. Only (2) and (4)
4. All except (3)

67. Coralloid roots of gymnosperms are/have
1. Irregular and possess large number of roots hairs.
2. Symbiotic association with Rhizobium.
3. Symbiotic association with - fixing

cyanobacteria.
4. VAM

68. In pteridophytes, gametophyte that develops in the homosporous species is usually
1. Monoecious and has events, precursor to the seed habit.
2. Dioecious and does not lead to seed habit.
3. Monoecious and does not lead to seed habit.
4. Dioecious and has events, precursor to the seed habit.

69. Read the following statements and select the option with correct statements
(1) In Wolfia, the highly reduced female gametophyte present within ovule, is embryo sac.
(2) The ploidy level of endosperm in Cycas and Eucalyptus is triploid.
(3) Azolla is a water fern.
(4) Majority of the red algae are marine with greater abundance in the warmer areas.
1. (1) and (2) only
2. (2) and (3) only
3. (1), (2) and (3)
4. (1), (3) and (4)

70. Match the classes of pteridophyte given in column-I with their respective members given in column-II

Column-I	Column-II
(A) Psilopsida	(i) *Selaginella*
(B) Lycopsida	(ii) *Adiantum*
(C) Pteropsida	(iii) *Psilotum*
(D) Sphenopsida	(iv) *Equisetum*

Select the correct answer from the following
1.   (A) – (iii), (B) – (i), (C) – (iv), (D) – (ii)
2.   (A) – (i), (B) – (iii), (C) – (ii), (D) – (iv)
3.   (A) – (iii), (B) – (i), (C) – (ii), (D) – (iv)
4.   (A) – (i), (B) – (iv), (C) – (iii), (D) – (ii)

71. Read the following statements and select the incorrect ones

(1)   Mosses have an elaborate mechanism of spore dispersal.

(2)   In liverworts, the haploid free living sporophyte is formed by spore germination.

(3)   Vegetative reproduction in *Polytrichum* occurs by budding in the secondary protenema.

(4)   *Marchantia* is a heterosporous bryophyte.

(5)   Growth of bog moss ultimately fills ponds and lakes with soil

1.   (1), (2) and (3)
2.   (4) and (5) only
3.   (2) and (4) only
4.   All except (1)

72. The members of phaeophyceae are characterized by all, except
1. Presence of chlorophyll a,c and focuxanthin pigments.
2. Production of pear-shaped and biflagellated asexual spores.
3. Production of pyriform gametes that bear laterally attached flagella.
4. Their occurrence, mostly in fresh water habitats.

73. Which of the following characters, are defining features of all living organisms?
(A)   Growth from inside
(B)   Sexual reproduction
(C)   Metabolism
(D)   Response to stimuli
(E)   Cellular organisation
1.   Only (C), (D) and (E)
2.   Only (A) and (B)
3.   Only (B), (C) and (D)
4.   All except (B)

74. A taxonomic aid which gives actual account of habitat and distribution of various plants of given area, is
1. Manual
2. Flora
3. Monograph

4. Catalogue

75. "The synaptonemal complex is formed during __A__ stage and dissolves during __B__ stage".
    Complete the above statement by choosing the correct option for A and B

	A	B
1.	Diplotene	Diakinesis
2.	Leptotene	Zygotene
3.	Zygotene	Diplotene
4.	Pachytene	Diplotene

76. Chromosomes appear like a 'ball of wool' in
1. Prophase
2. Telophase
3. Anaphase
4. Metaphase

77. Which one of the following features differentiates phase from phase?
1. Synthesis of proteins.
2. Duplication of double membrane bound cell organelles.
3. Duplication of single membrane bound cell organelles.
4. Synthesis of RNA.

78. Endoplasmic reticulum which is free of ribosomes is involved in all the given functions, except
1. Synthesis of enzyme precursor for lysosomes.
2. Detoxificatin of drugs.
3. Uptake and release of $Ca2+$ ions during muscle contraction.
4. Passing of products of RER to Golgi apparatus.

79. A membraneless cell organelle which is not found in higher plants is/has
1. 9+2 arrangement of microtubules.
2. A role in formation of flagella in prokaryotes.
3. composed of rRNA and proteins.

4. Involved in the formation of spindle fibres during cell division in animals.

80. Enzymes and electron carriers for the formation of cellular energy are present in the mitochondria at
1. Outer membrane only.
2. Inner membrane only.
3. Both outer and inner membrane.
4. Mitochondrial matrix only.

81. Endoplasmic reticulum plays a role in origin of __A__, which are lined by __B__ and contains a fine tubule called __C__.
Select the option that correctly fills the blanks A,B and C

	A	B	C
1.	Lysosome	Plasma membrane	Golgi body
2.	Cytoskeleton	Vacuole	Desmotubule
3.	Plasmodesmata	Plasma membrane	Desmotubule
4.	Plasmodesmata	Cell wall	Vacuole

82. Select the correct statement w.r.t. axoneme of eukaryotic flagella.
1. It is composed of 9 peripheral triplet microfibrils of tubulin proteins.
2. It does not have covering of plasma membrane.
3. Central tubules are enclosed by a central sheath.
4. It gives rise to spindle apparatus during cell division.

83. Nucleolus is
1. Bounded by a single membrane.
2. Always one per cell.

3. Present inside mitochondria.
4. The site for rRNA synthesis

84. Select the features which are common for both ER and Golgi apparatus
(A)   Both are sites for synthesis of lipids and steroidal hormone
(B)   Both are composed of cisternae, tubules and vasicles.
(C)   Both are parts of endomembrane system
(D)   Both help in formation of plasma membrane during cytokinesis.
1.   Only (B)
2.   Only (B) and (C)
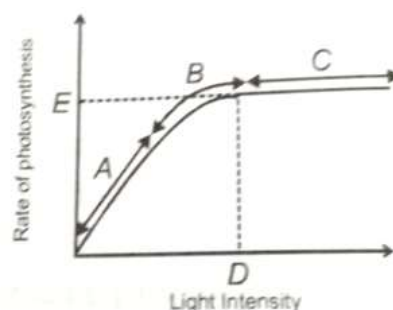3.   Only (A) and (D)
4.   All except (D)

85. What is the main arena of all cellular activities of a cell?
1. Cell wall
2. Cell membrane
3. Nucleus
4. Cytoplasm

86. When solute increases then water potential would
1. Increase
2. Decrease
3. Remain same
4. First increase then decrease

87. Choose the correct labelling for given figure

1. D-saturation point, E-Maximum photosynthesis
2. A-achieved at high light intensity
3. D-10% of total sunlight, E-compensation point
4. A-Light saturation at 10% of total sunlight

88. The three boxes in this diagram represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products
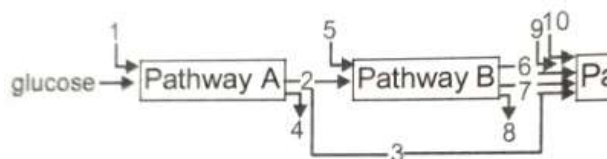
Arrows numbered 4,8 and 12 can all be

1. ATP

2. H_2O

3. FAD^+ or $FADH_2$

4. NADH

89. Match the following

	Column I		Column II
a.	Auxin	(i)	Root hair formation
b.	Cytokinin	(ii)	Seed development
c.	Ethylene	(iii)	Xylem differentiation
d.	ABA	(iv)	Nutrient mobilisation

1. a(iv), b(ii), c(iii), d(i)
2. a(ii), b(iii), c(i), d(iv)
3. a(i), b(iii), c(ii), d(iv)
4. a(iii), b(iv), c(i), d(ii)

90. (a) Moderate decrease or increase of micronutrients causes deficiency and toxicity symptoms respectively.
(b) Excess of manganese causes toxicity of iron, calcium and molybdenum
(c) A macronutrient is said to be toxic when present below a critical concentration
1. Only (a) is correct
2. Only (b) is correct
3. (b) & (c) are correct
4. (a) & (c) are correct

91. Which of the following number contains only three significant figures?

1. 4.25000

2. 0.00350

3. 0.04290

4. 4.2×10^{10}

92. 6.3 g of a dibasic acid $H_2C_2O_4.xH_2O$ in 500 ml solution is 0.2 N. What is the value of x?

1. 1

2. 2

3. 3

4. 4

93. 10 g of a silver coin when dissolved completely in excess of conc. $HNO_3$3 gives 8.5 g of silver nitrate. The percentage purity of the coin is
1. 25%
2. 54%
3. 67%
4. 100%

94. A metal oxide contains 40% oxygen by weight. Its equivalent weight is
1. 12

2. 20
3. 40
4. 60

95. For a subatomic particle, the uncertainty in position is same as that of uncertainty in its momentum. The least uncertainty in its velocity can be given as

1. $\Delta V = \dfrac{h}{4\pi m^2}$

2. $\Delta V = \dfrac{1}{2\pi}\sqrt{\dfrac{h}{m}}$

3. $\Delta V = \dfrac{h}{2\pi m}$

4. $\Delta V = \dfrac{1}{2m}\sqrt{\dfrac{h}{\pi}}$

96. The ratio of magnitudes of potential energy to that of kinetic energy of an electron in the 5th shell of hydrogen atom is

1. 1 : 1

2. 1 : 5

3. 5 : 1

4. 2 : 1

97. Which of the following notation represents a 3dorbital?

1. Ψ_{300}

2. Ψ_{320}

3. Ψ_{311}

4. Ψ_{333}

98. Which of the following electronic transition in hydrogen atom will emit the light of maximum wavelength?

1. $n_3 \rightarrow n_2$

2. $n_7 \rightarrow n_6$

3. $n_2 \rightarrow n_1$

4. $n_5 \rightarrow n_4$

99. Who gave the 'Law of triads' for classification of elements?
1. Newland
2. Doebereiner
3. Lother Meyer
4. Chancourtois

100. An element with atomic number 123 will have the symbol
1. Unb
2. Ntq
3. Qph
4. Ubt

101. The period and group of an element with Z = 35 are respectively
1. 3, 5
2. 4, 17
3. 4, 7
4. 3, 15

102. Which of the following element of third period is expected to have the positive electron gain enthalpy?
1. Na
2. Al
3. Cl
4. Ar

103. Which of the following species shows deviation from Octet rule?

1. CO_3^{2-}

2. H_2SO_3

3. PCl_3

4. O_3

104. Which of the following species has bent T-shape?

1. ICl_4^-

2. PCl_3

3. BrF_3

4. I_3^-

105. The correct decreasing order of ionic character is

1. $LiI > LiBr > LiCl > LiF$

2. $NaCl > NaBr > NaI > NaF$

3. $CsI > RbI > KI > NaI$

4. $LiCl > NaCl > KCl > CsCl$

106. Which of the following species is diamagnetic?

1. O_2

2. O_2^{2-}

3. O_2^+

4. O_2^-

107. Which of the following gases is expected to have the largest value of van der Waal's constant 'a'?

1. N_2

2. CH_4

3. CO_2

4. SO_2

108. A mixture of CO & CO_2 has a density of 1.5 gL^{-1} at 20°C and 740 mm Hg. The mole fraction of CO in the mixture is around

1. 0.65

2. 0.56

3. 0.43

4. 1

109. If the temperature of a gas is increased by four times, then its rate of diffusion
1. Increases four times
2. Increases two times
3. Increases sixteen times
4. Remains the same

110. Which of the following expression correctly represents the kinetic gas equation?

1. $PV = \frac{2}{3}mu^2$

2. $PV = \frac{1}{3}mNu^2$

3. $PV = \frac{2}{3}mRT$

4. $PV = \frac{4}{5}mN^2 u$

111. Which of the following pair correctly represents intensive property?
1. Entropy, Gibb's energy
2. Enthalpy, Heat capacity
3. Electrode potential, Vapour pressure
4. Resistance, Conductance

112. Which of the following is an endothermic process?
1. Enthalpy of freezing
2. Enthalpy of atomization
3. Enthalpy of hydration
4. Enthalpy of neutralization

113. At 298 K, the enthalpy of fusion of sodium metal is 2.6 kJ mol^{-1} and enthalpy of

condensation of sodium vapours is −98 kJ mol⁻¹. The enthalpy of sublimation of sodium metal is

1. 100.6 kJ mol⁻¹

2. 254.8 kJ mol⁻¹

3. −95.4 kJ mol⁻¹

4. −37.6 kJ mol⁻¹

114. Which of the following is always true for a spontaneous process?

1. $\Delta S_{system} > 0$
2. $\Delta H_{system} < 0$
3. $\Delta H_{universe} = 0$
4. $\Delta S_{surroundings} < 0$

115. The difference between the heat of formation of ammonia at constant pressure and constant volume at room temperature is

1. −2.47 kJ mol⁻¹

2. −35.8 kJ mol⁻¹

3. 5.6 kJ mol⁻¹

4. 1.5 kJ mol⁻¹

116. In which of the following solutions AgCl has minimum solubility?

1. 10^{-4} M $CaCl_2$
2. Water
3. 10^{-4} M HCl
4. 10^{-5} M NaCl

117. Which of the following species does not have a conjugate base?

1. H_3PO_3

2. $H_2PO_2^-$

3. HSO_4^-

4. H_3O^+

118. A sulphuric acid solution has pH = 0. Its molarity is
1. 1M
2. M/2
3. M/10
4. cannot be determined

119. When 0.01 mole of HCl is added to a buffer solution, its pH changes from 4.5 to 4.3. The buffer capacity of the buffer solution is
1. 1
2. 0.05
3. 0.2
4. 0.002

120. Which of the following is/are incorrect for orthohydrogen?
1. Nuclei spins are in same direction
2. A sample of dihydrogen at room temperature contains 75% ortho-hydrogen
3. It is possible to obtain pure ortho-hydrogen at low temperature
4. All of these

121. Ordinary water contains hydrogen in all three isotopic forms. If ordinary water is subjected to electrolysis, then the gas which is most readily evolved at cathode is

1. H_2
2. D_2
3. T_2
4. All are evolved at the same time

122. Consider the following reaction sequence

$$CaCO_3 \xrightarrow{\Delta} CO_2 + A$$
$$(A) \xrightarrow[coke]{\Delta} B + CO$$
$$B \xrightarrow{H_2O} C + Slaked\ lime$$
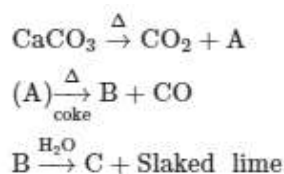
The substance (C) is:

1. $Ca(HCO_3)_2$
2. CaC_2
3. C_2H_2
4. C_3H_4

123. A compound 'X' on heating at 100°C gives metaboric acid. 'X' can be obtained by acidifying an aqueous solution of $Na_2[B_4O_5(OH)_4].8H_2O$. The hybridisation of the central atom in the compound X is

1. sp^2

2. dsp^2

3. sp^3d

4. sp

124. Which of the following group 13 element has the smaller atomic radius than aluminum?
1. Ga
2. In
3. Tl
4. All of these

125. Which of the following species exist?

1. $[SiF_6]^{2-}$
2. $[SiCl_6]^{2-}$
3. $[SiBr_6]^{2-}$
4. $[SiI_6]^{2-}$

126. Which of the following acid can attack Silica?

1. HCl

2. H_2SO_4

3. HF

4. H_3PO_4

127. Which of the following functional group does not show metamerism?
1. Secondary amine
2. Ketones
3. Thioethers
4. Thiols

128. Which of the following reagent is used for testing phosphorous in qualitative analysis of organic compounds?

1. $Na_2[Fe(CN)_5NO]$

2. $(NH_4)_2MoO_4$

3. $(CH_3COO)_2Pb$

4. $Na_4[Fe(CN)_6]$
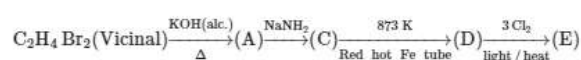
129. Which of the following alkene has the least negative enthalpy of hydrogenation?

1. $(CH_3)_2\,C = C(CH_3)_2$

2. $(CH_3)_2\,C = CHCH_3$

3. $(CH_3)_2C = CH_2$

4. $CH_3CH = CH_2$

130. The polymer divinyl acetylene is obtained from the monomer.

1. C_2H_2

2. C_3H_6

3. C_6H_6

4. C_4H_4

131. Consider the following reaction sequence.

$$C_2H_4\,Br_2(\text{Vicinal}) \xrightarrow[\Delta]{KOH(\text{alc.})} (A) \xrightarrow{NaNH_2} (C) \xrightarrow[\text{Red hot Fe tube}]{873\ K} (D) \xrightarrow[\text{light / heat}]{3\ Cl_2} (E)$$

The end-product (E) is

1. $C_6H_6Cl_6$
2. C_6Cl_6
3. C_6H_5Cl
4. $C_6H_{13}Cl_6$

132. Which of the following group when attached to benzene ring is moderately deactivating?

1. $-C_2H_5$

2. $-OCH_3$

3. $-NHCOCH_3$

4. $-Br$

133. $CH_3 - CH = CH - CH_3 \xrightarrow[H^+]{K_2Cr_2O_7} Product$

The product obtained is a/an
1. Ketone
2. Aldehyde
3. Cycloalkane
4. Carboxylic acid

134. Which of the following is a possible product in pyrolysis of n-hexane?

1. C_6H_{12}
2. C_2H_6
3. C_3H_6
4. All of these

135. Which of the following is a secondary pollutant?

1. CO
2. SO_3
3. NO
4. CO_2

136. In a straight line motion if v = 8 – 4t m/s then maximum displacement occurs at time -

1. 4 s
2. 2 s
3. 1 s
4. 3 s

137. A ball is falling freely strikes to ground with velocity 60 m/s. Height fallen in last one second before hitting the ground is
1. 55 m
2. 70 m
3. 60 m
4. 80 m

138. A projectile is thrown with velocity vector $\vec{u} = (30\hat{i} + 40\hat{j})$ m/s where $\hat{i}$ is unit vector in east and $\hat{j}$ is unit vector upward when projectile is moving at right angles to its direction of projection, its velocity vector is

1. $(30\hat{i} - 40\hat{j})$

2. $(-30\hat{i} + 40\hat{j})$

3. $\left(30\hat{i} + \frac{45}{2}\hat{j}\right)$

4. $(\hat{i} + 3\hat{j})$

139. From the roof of a train moving with constant velocity 20 m/s a person throws a ball with speed 30 m/s upward relative to himself. When ball is at highest point, velocity of ball with respect to a person on ground is
1. 20 m/s
2. 30 m/s
3. $\sqrt{1300}$ m/s
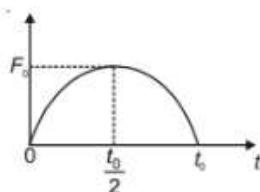4. $\sqrt{500}$ m/s

140. A particle is moving on a circle of radius 2 m, with frequency 6 rpm which is constant. The average velocity in 5 seconds will be

1. Zero

2. 0.4 m/s

3. 0.8 m/s

4. 1 m/s

141. A one-dimensional force is applied on particle. The force is varying with the time as shown in graph. The shape of curve is semicircle. Impulse of this force in time t_0 is
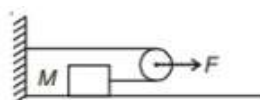

1. $\frac{\pi t_0^2}{2}$

2. $\frac{\pi F_0^2}{8}$

3. $\frac{\pi F_0 t_0}{4}$

4. $\frac{\pi F_0 t_0}{8}$

142. In the figure shown, pulley and string are massless and smooth. Acceleration of block of mass M is

1. $\frac{F}{2M}$
2. $\frac{F}{4M}$
3. Zero
4. $\frac{F}{M}$

143. A solid cylinder of mass M is released from rest on an inclined rough plane making an angle θ from horizontal. The cylinder rolls without slipping. Friction force required for rolling is-

1. $\frac{2}{3}Mg\ sin\theta$

2. $\frac{Mg\ sin\theta}{3}$

3. $\frac{Mg\ sin\theta}{2}$

4. $Mg\ sin\theta$

144. A rigid body has moment of inertia 12 kgm^2 about a fixed axis and the body is rotating about it, such that angular displacement $\theta = \left(2t - \frac{t^3}{3}\right)$ rad at time t second. Kinetic energy of body at t = 3 second

1. Zero

2. 15 J

3. 20 J

4. 30 J

145. A solid sphere is rolling on a fixed surface. Total kinetic energy of the sphere is 140 J. Its translational kinetic energy is-

1. 140 J

2. 40 J

3. 100 J

4. 70 J

146. A body of mass m is raised from the surface of earth to a height equal to radius (R) of earth. If acceleration due to gravity on the surface of earth is g. Then gain of its potential energy is

1. mgR

2. $\frac{-mgR}{2}$

3. $-mgR$

4. $\frac{mgR}{2}$

147. A particle of mass m_1 moving with some velocity collides with a stationary particle of mass m_2 head on elastically. After the collision two particles move with equal speed, then m_2/m_1

1. 3

2. 2

3. 4

4. 5

148. A planet whose density is double of earth and radius is half of earth, will produce gravitational field on its surface (g = acceleration due to gravity at surface of earth)

1. g

2. 2g

3. g/2

4. 3g

149. At certain height above the earth, gravitational field is g/4. (R = Radius of earth) What minimum speed should be given here to a particle so that it starts revolving in circular path around earth?

1. $\sqrt{gR}$

2. $\sqrt{2gR}$

3. $\sqrt{\frac{gR}{2}}$

4. $\sqrt{5gR}$

150. A spring has lengths L_1 and L_2 when forces in it are F_1 and F_2 respectively. The work done needed to increase spring's length from L_1 to L_2 is

1. $\frac{(F_1 + F_2)(L_2 - L_1)}{2}$

2. $\frac{(F_1 - F_2)(L_2 - L_1)}{2}$

3. $[F_1^2 + F_2^2]^{\frac{1}{2}} \left[\frac{L_2 - L_1}{2}\right]$

4. $\frac{(F_1 + F_2)(L_1 + L_2)}{2}$

151. A particle starting from rest is moving on a straight line under the force of constant power. The force on the particle at time t will be proportional to

1. $t^{-1/2}$

2. $t^{3/2}$

3. $t^{5/2}$

4. t^{-2}

152. Two horizontal pipes have radii in ratio 1 : 2 and lengths in ratio 1 : 2. Same viscous fluid flows at same pressure difference in both the pipes. The flow rates are in the ratio

1. 1 : 2

2. 1 : 4

3. 1 : 8

4. 1 : 16

153. An U-tube is held vertical and contains mercury (ρ = 13.6 g/cc). Water is poured into one of its limbs such that at equilibrium length of water inside the limb is 27.2 cm. Rise of mercury level in the other limb is

1. 0.5 cm

2. 2 cm

3. 1 cm

4. 1.5 cm

154. If a frictionless and bottomless tunnel is dug along a diameter of earth and a ball is dropped in it, then motion of the ball is

1. Periodic

2. Oscillatory

3. Simple harmonic

4. All of these

155. Practically range of Poisson's ratio σ is

1. 0.5 to 1

2. –1 to 0.5

3. 0 to 0.5

4. –0.5 to 0

156. In a circular motion speed increases at constant rate 4 m/s^2. At time t = 0 particle is at rest. If radius is R, then centripetal acceleration at time t is

1. $\frac{16t}{R}$

2. $\frac{16t^2}{R}$

3. $\frac{16}{R}$

4. $\frac{4}{R}$

157. A body executes S.H.M of period 12 seconds. Time taken by the body to cover half the amplitude from mean position is

1. 3/2 s

2. 3 s

3. 1 s

4. π/6 s

158. If the volume of diatomic gas increases by 2% in its adiabatic expansion, then percentage decrease in pressure

1. 4%

2. 6%

3. 2.8%

4. 3.2%

159. The degree of freedom per molecule for a gas at an average is 8. If the gas performs 100 J of work when it expands under constant pressure, then amount of heat absorbed by gas

1. 500 J

2. 600 J

3. 20 J

4. 400 J

160. Which of the following thermodynamic process is involved in conversion of water into steam?

1. Isochoric

2. Adiabatic

3. Cyclic

4. Isothermal

161. The pressure in monoatomic gas increases linearly from 4 atm to 8 atm. When its volume increases from 0.2 m^3 to 0.5 m^3, then increase in internal energy

1. 480 kJ

2. 550 kJ

3. 200 kJ

4. 100 kJ

162. In the thermodynamic process shown in figure, the work done by the system along A →B → C is 50 J and change in internal energy during C → A is 30 J, then heat supplied during A → B → C is

1. 50 J

2. 20 J

3. 10 J

4. 80 J

163. A Carnot engine having an efficiency of η=1/10 as heat engine is used as a refrigerator. If the work done on the system is 10 J, then the amount of energy absorbed from the sink at lower temperature is
1. 100 J

2. 99 J

3. 90 J

4. 1 J

164. A body takes 10 minutes to cool from 50°C to 40°C. If temperature of surroundings is 20°C, temperature of body in next 10 minutes is

1. 39°C

2. 30°C

3. 34°C

4. 25°C

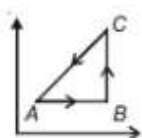165. Two rods of lengths d_1 and d_2 and coefficients of thermal conductivities k_1 and k_2 are kept touching each other in series. Both have same area of cross-section. The equivalent thermal conductivity is

1. $k_1 + k_2$

2. $k_1 d_1 + k_2 d_2$

3. $\frac{k_1 d_1 + k_2 d_2}{(k_1 + k_2)}$

4. $\frac{(d_1 + d_2)}{\left(\frac{d_1}{k_1} + \frac{d_2}{k_2}\right)}$

166. Which of the following equation is correct for adiabatic process?

1. PV^γ = Constant

2. $TV^{\gamma-1}$ = Constant

3. $T^\gamma P^{1-\gamma}$ = Constant

4. All of these

167. Equal moles of monoatomic and diatomic gases are mixed, γ for mixture is (γ=C_p/C_v)

1. 1.5

2. 1

3. 2

4. 1.67

168. 10 g of ice at 0°C is added to 10 g of water at 50°C, final temperature of mixture

1. −10°C

2. −5°C

3. 0°C

4. 10°C

169. A man is travelling along a straight line joining two sources, each emits 500 vibrations/second. Speed of man such that he may hear 8 beats/second is (speed of sound is 330 m/s)

1. 2.64 m/s
2. 3.86 m/s
3. 4.62 m/s
4. 6.24 m/s

170. What is sound level for intensity of 10^{-6} W/m²?

1. 50 dB

2. 60 dB

3. 70 dB

4. 80 dB

171. A pipe open at both the ends produces a fundamental note of frequency 200 Hz.
If 3/4th of its length is dipped in water, then fundamental frequency is

1. 100 Hz

2. 200 Hz

3. 50 Hz

4. 400 Hz

172. An organ pipe has resonant frequencies as 150 Hz, 450 Hz, 750 Hz, then its fundamental frequency

1. 100 Hz
2. 300 Hz
3. 150 Hz
4. 450 Hz

173. A rod of length 5 m is made of material of Young's modulus 10^6 N/m² and density 1500 kg/m³. If it is suspended vertically, then extension in the rod due to its own weight is nearly.

1. 19 cm
2. 29 cm
3. 23 cm
4. 20 cm

174. An ice block of volume $32\pi/3$ cm³ is placed in gravity free space. When ice completely melts, then its surface area - (Neglect difference in density of ice and water)

1. 4π cm²

2. 8π cm²

3. 16π cm²

4. π cm²

175. The height of water level in a tank is 100 cm. A hole is made at a depth 25 cm from upper water level. The range of water stream emerging out of the hole will be

1. 50√3 cm

2. 300√2 cm

3. 100√3 cm

4. 200√3 cm

176. Dimension of gravitational constant (G) in terms of speed (V), mass (M) and length (L) is

1. $V^2M^1L^{-1}$
2. $V^{-2}M^1L^{-1}$
3. $V^2M^{-1}L^1$
4. $V^0M^1L^{-1}$

177. A river is flowing from west to east at a speed of 5 m/minute. In what direction should a man on south bank of the river should put his effort with velocity 10 m/minute to cross the river along the shortest path?

1. 30° West of North
2. 30° North of West
3. 60° West of North
4. 45° North of West

178. A particle is executing simple harmonic motion, whose displacement is represented by y = 0.5 m sin 314 t. Frequency of the particle is

1. 100 Hz
2. 25 Hz
3. 50 Hz
4. 10 Hz

179. A particle starts from origin of co-ordinates with velocity v along x-axis from time t = 0 and moves in x-y plane with constant acceleration α-directed in the y-direction. The equation of trajectory is y = βx². Its velocity component (v) in x-direction

1. $\sqrt{\frac{2\alpha}{\beta}}$

2. $\sqrt{\frac{\alpha}{2\beta}}$

3. $\sqrt{\frac{\alpha}{\beta}}$

4. $\sqrt{\frac{4\alpha}{\beta}}$

180. Momentum of a particle at time t is $\vec{p} = (1 - \cos t)\hat{\imath} + \sin t\hat{\jmath}$. Power acting on the particle at time t is proportional to

1. Zero
2. sint
3. sin2t
4. cos2t