Talent Search Exam. 2015

for XI Medical

TEST CODE **1105**

BOOKLET **D**

Duration : 3 Hours **Max. Marks : 300**

Please read the instructions carefully. You are alloted 5 minutes specifically for this purpose.

INSTRUCTIONS

A. General :

1. This booklet is your question paper containing **100 Questions**. The booklet has **16 pages**.

2. The question paper contains blank space for your rough work. No additional sheets will be provided for rough work.

3. It is mandatory to use **Blue or Black Ball Point Pen** to darken to appropriate circle in the answer sheet.

4. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are not allowed to be carried inside the examination hall.

5. Fill in the boxes provided below on this page and also write your Name and Roll Number in the space provided.

6. Do not use white-fluid or any other rubbing material on answer sheet. Before handing over the answer sheet to the invigilator, candidate should check that **Roll No, Test code and Book Code** have been filled and marked correctly. Immediately after the prescribed examination time is over, the **Answer sheet is to be returned to the invigilator.**

B. Filling the Answer Sheet :

7. On **Side-1** of Answer Sheet write your name, Enrollment Number and Name of the centre in the respective boxes. **Do not write anything on Side-2.**

8. Put your signature space provided on the Answer Sheet affirming that you have verifed this.

9. All question carry **+3 Marks** for Right Answer and **-1** for Wrong Answer.

PROCEDURE OF FILLING UP THE ANSWERS IN ANSWER SHEET

Wrong Filling	Right Filling
A B C D Tick mark	B C D Fully darken with Pen
A B C D Cross mark	B C D Fully darken with Pen
A B C D Half filled or semi dark	B C D Fully darken with Pen
A B C D Light filled	B C D Fully darken with Pen

Name of the candidate (In Capital Letters)

Enrollment Number

I have read all the instruction and shall abide by them.

.....

(Signature of the candidate)

I have verified all the information filled in by the candidate.

.....

(Signature of the Invigilator)

PART-I (BIOLOGY)

1. Match the following columns.

Column I	Column II
A. Father of Taxonomy	1. Hooker
B. Father of Zoology	2. Carolus Linnaeus
C. Father of Medicine	3. Aristotle
D. Father of Biology	4. Huxley
E. Concept of Genus	5. Hippocrates
F. Father of Neotaxonomy	6. Ernst Mayr
G. Darwin of 20th century	7. Julian Huxley

Codes

	A	B	C	D	E	F	G
(a)	2	3	6	1	6	1	5
(b)	2	3	5	1	1	4	6
(c)	2	3	3	5	4	1	6
(d)	2	3	6	1	6	1	5

2. Why hierarchical taxonomic system is used?
   (a) As each higher taxonomic category contains its below groups groups/categories
   (b) It is helpful to established classifications
   (c) All taxonomic categories reflect common habitats
   (d) Taxonomic group shows similar characters and have no evolutionary relationship

3. **Assertion (A)** Museums are places/institution where preserved plant, animals, artistic and educational material are exhibited to public.
   Reason (R) Museums are of different kinds, like art, history, science and general museum which exhibit their material to public awareness.
   (a) Both A and R are true and R is the correct explanation of A
   (b) Both A and R are true, but R is not the correct explanation of A
   (c) A is true, but R is false
   (d) A is false, but R is true

4. According to five kingdom system of classification, bacteria belongs to
   (a) Protista (b) Monera
   (c) Plantae (d) Archaea

5. Kingdom-Monera consists of
   (a) unicellular eukaryotes
   (b) multicellular eukaryotes
   (c) bacteria
   (d) Both (a) and (c)

6. What is the prime source of taxonomic studies?
   (a) Collection of actual specimens of organisms species
   (b) Identification of actual specimen of organism species
   (c) Both (a) and (b)
   (d) None of the above

7. A place where dried, pressed and preserved plant specimens are kept.
   (a) Herbarium (b) Museum
   (c) Botanical garden (d) Both (a) and (c)

8. ....A....is a collection of pressed, dried and preserved plants....B....labelled arranged
   A and B in the above statement refers to
   (a) A-Herbarium; B-mounted on thin film
   (b) A-Herbarium; B-mounted on a paper sheet
   (c) A-Museum; B-mounted on a iron sheet
   (d) A-Garden; B-mounted on a paper sheet

9. Match the following and choose the correct option:

A. Family	(i) tuberosum
B. Kingdom	(ii) Polymoniales
C. Order	(iii) Solanum
D. Species	(iv) Plantae
E. Genus	(v) Solanacea

   Options
   (a) (i) - D, (ii) - C, (iii) - E, (iv) - B, (v) - A
   (b) (i) - E, (ii) - D, (iii) - B, (iv) - A, (v) - C
   (c) (i) - D, (ii) - E, (iii) - B, (iv) - A, (v) - C
   (d) (i) - E, (ii) - C, (iii) - B, (iv) - A, (v) - D

10. Microscopic aquatic organisms lacking locomotory ability and drifting with water currents are
    (a) Plankton (b) Nekton
    (c) Pleuston (d) Saston

11. Which of the following require an invertebrate intermediate host?
    I. Dugesia II. Schistosoma
    II. Echinococcus IV. Ancylostoma
    V. Wuchereria
    (a) II and V (b) III and V
    (c) I and IV (d) III and IV

12. An acoelomate animal with bilateral symmetry is:
    (a) Hydra (b) Obelia
    (c) Physalia (d) Liver fluke

13. Female Ascaris differs from the male in having :

(a) curved tail (b) pineal setae
(c) longer body (d) none of these

14. Gonads of Obelia occur :
(a) on blastocyst
(b) in hydrula stage
(c) in radial canals of medusa
(d) in bases of tentacles of medusa

15. Body wall of Hydra forms from embryonic :
(a) ectoderm and endoderm
(b) endoderm and mesoderm
(c) ectoderm and mesoderm
(d) ectoderm, endoderm and mesoderm

16. Which of these phenomena is found in Hydra?
(a) Metamerism (b) Metabolism
(c) Metamorphosis (d) Sexual dimorphism

17. Larva of jellyfish (Aurelia) :
(a) Polyp (b) Ephyra
(c) Medusa (d) Blastula

18. Germinal Epithelium of ovary is formed of :-
(a) Columnar Epithelium
(b) Squamous Epithelium
(c) Cuboidal Epithelium
(d) Stratified Epithelium

19. Basement membrane is absent in :-
(a) Transitional Epithelium
(b) Sq. Epithelium
(c) Columnar Epithelium
(d) Simple cuboidal Epithelium

20. Sweat glands are :-
(a) Merocrine (b) Endocrine
(c) Holocrine (d) None

21. Active Mammary glands are :-
(a) Compound tubulo alveolar
(b) Coupound tubular
(c) Compound Alveolar
(d) Simple alveolar

22. Plasma cell is :-
(a) Modified B - lymphocytes of blood
(b) Produces antigen
(c) Produce Heparin, Histamine, serotonin
(d) Produces matrix & Fibres

23. Neuroglia is :-
(a) Connective tissue of liver
(b) Connective tissue of spleen
(c) Connective tissue of brain
(d) Connective tissue of Thyroid

24. Sprain of body is due to pulling of :-
(a) Muscles (b) Ligaments
(c) Tendon (d) Nerves

25. The normal Albumin / Globulin ratio in blood is:-
(a) 2 : 1 (b) 1 : 2
(c) 1 : 4 (d) 1 : 5

26. Namatoblasts are formed by :
(a) Nerve cells (b) glands cells
(c) interstitial cells (d) meso-epithelial cells

27. Which of the following is not found in vertebrates?
(a) Body scales (b) Cnidoblasts
(c) Gill opening (d) Bilateral symmertry

28. Hypnotoxin is a poisonous fluid produced by:
(a) Ascaris (b) Ants
(c) Parasitic protozoa (d) Nematocysts

29. Provirus is:
(a) a free virus
(b) a free DNA
(c) primitive virus
(d) integrated viral genome

30. In retroviruses, RNA dependent DNA polymerase synthesizes:
(a) DNA (b) RNA
(c) RNA-DNA (d) None of these

31. Edible part of Mushroom is:
(a) basidiocarp (b) basidospores
(c) fungal hyphae (d) primary mycelium

32. Green algae conains :
(a) Chlorophyll a and b (b) Starch
(c) Carotenoid (d) All of the above

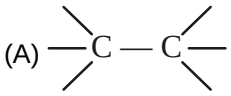
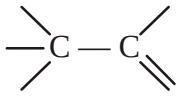
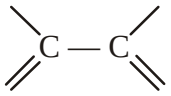
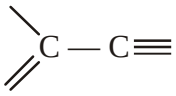
33. To get ample supply of carbohydrates, one should eat:
(a) Carrot (b) Meat
(c) Grams (d) Rice

34. Cellulose is:
(a) Heptose polysaccharide
(b) Pentosan polysaccharide
(c) Hetero polysaccharide
(d) Hexose polysaccharide

35. Glycogen is related to:
(a) Glucose (b) Starch
(c) Lactose (d) Ribose sugar

PART-II (CHEMISTRY)

36. The correct order of ionisation energy of Al, K, Fe, Mg is
(A) K < Al < Mg < Fe (B) K < Mg < Al < Fe
(C) Mg < K < Al < Fe (D) Mg < Fe < Al < K

37. In which of following type of bond, C–C bond distance will be minimum
(A)  (B)  (C)  (D) 

38. Which of following is most unstable species.
(A) Li^- (B) N^- (C) C^- (D) O^-

39. The value of **'x',** if hydrated salt $Na_2CO_3.xH_2O$ undergo 63% loss in mass on heating and becomes anhydrous, is
(A) 8 (B) 9 (C) 10 (D) 12

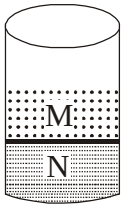
40. Match the column and select the correct option given below.

	Column I		**Column II**
(A)	$H_2C = C = CHF$	(P)	Nonpolar and planar
(B)	$B_3N_3H_6$	(Q)	Nodal planes of π-bonds are lying in the molecular plane.
(C)	XeO_3F_2	(R)	Nonpolar and nonplanar
		(S)	Polar and nonplanar

(A) A $\rightarrow$ Q, B $\rightarrow$ PS, C $\rightarrow$ R (B) A $\rightarrow$ R, B $\rightarrow$ PQ, C $\rightarrow$ S
(C) A $\rightarrow$ S, B $\rightarrow$ PQ, C $\rightarrow$ R (D) A $\rightarrow$ P, B $\rightarrow$ RS, C $\rightarrow$ Q

41. For an electron present in which of following orbital, (n + *l* + m + s) value is maximum, considering maximum possible values for m and minimum possible values of 's' (whenever applicable).
(A) 3p (B) 5p (C) 5s (D) 4d

42. Two liquids 'A' (Molecular mass = 20) and 'B' (Molecular mass = 40) are partially miscible. When 1 mol of A and 3 mol of B are shaken together and allowed to settle, two layer 'M' and 'N' are formed as shown in diagram.

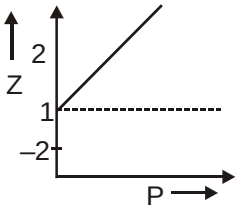


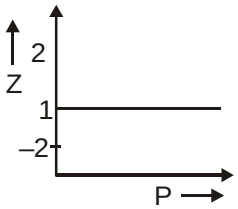
Layer 'M' contains 0.2 mole fraction of 'A' and layer 'N' contains 0.6 mole fraction of A. Calculate the ratio of masses of layer M to layer N.
(A) 9 (B) 90 (C) 99 (D) 19

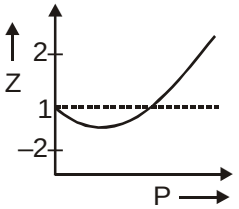
43. For the reaction, $C_3H_6(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$ at constant temperature, $\Delta H - \Delta E$ is
(A) – RT (B) RT (C) – 3RT (D) + 3RT

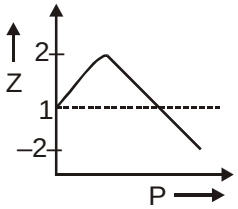
44. Under similar conditions, which of the following gas will have same value of u_{rms} as CO_2?
(A) NO (B) C_3H_8 (C) CO (D) N_2

45. Which of the following represents a plot of compressibility factor Z vs P at room temperature for helium?

(A) 

(B) 

(C) 

(D) 

46. The equilibrium constant for the reaction $H_2 + I_2 \rightleftharpoons 2HI$ is 49 at a certain temperature. The equilibrium constant for the reaction, $HI \rightleftharpoons \frac{1}{2}H_2 + \frac{1}{2}I_2$ will be
(A) 49 (B) 7 (C) $\frac{1}{7}$ (D) $\frac{1}{49}$

Paragraph for Question Nos. 47 to 49

pH is a scale for measuring acidity of a solution.
Mathematically, $pH = -\log [H^+] = -\log [H_3O^+]$, for pure water $[H^+] = [OH^-] = 1 \times 10^{-7}$ at 25°C
pH = 7 for pure water at 25°C
pH > 7 for basic solution
pH < 7 for acidic solution
on increasing temperature pH of solution decreases.

47. If water is heated upto 100°C then which of the following statement is correct?
(A) Water is acidic at 100°C (B) Water is basic at 100°C
(C) Water is neutral at 100°C (D) pH of water is 0 at 100°C

48. Select the correct statement for
A. Solution of 10^{-6} M HCl
B. Solution of 10^{-6} M CH_3COOH
(A) pH of solution A > pH of solution B (B) pH of solution A = pH of solution B
(C) pH of solution A < pH of solution B (D) B is more stronger than A

49. pH of 0.02 M KOH solution is
(A) 12 (B) 2 (C) 11.7 (D) 1.3

50. Which of the following species is most stable?

(A) $P-NO_2C_6H_4-\overset{\oplus}{C}H_2$

(B) $C_6H_5\overset{\oplus}{C}H_2$

(C) $P-Cl-C_6H_4-\overset{\oplus}{C}H_2$

(D) $P-H_3CO-C_6H_4-\overset{\oplus}{C}H_2$

Paragraph for Question Nos. 51 to 53

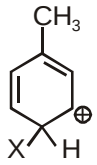
A covalent bond between two atoms can be broken in two ways.

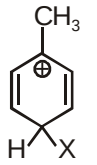
(a) Homolytic cleavage $R-X \longrightarrow R^{o} + X^{o}$

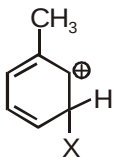
(b) Heterolytic cleavage $R-X \longrightarrow :R^{\ominus} + X^{\oplus}$ or $R^{\oplus} + :X^{-}$

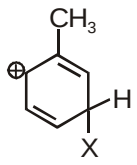
In first cleavage each atom separates with one electron leading to the formation of highly reactive intermediates called free radical. In the second type of fission one atom may hold on both electrons leaving none for other resulting in a negative and a positive ion (or ion pair)

51. Which of the following carbonation is expected to be most stable?

(A) 

(B) 

(C) 

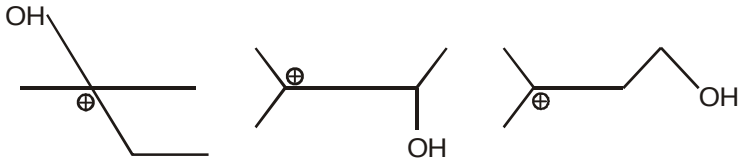
(D) 

52. Among the following compound which has the most acidic α-Hydrogen?

(A) CH_3-CHO (B) CH_3COCH_3

(C) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2CHO$ (D) $CH_3-COCH_2CO_2CH_3$

53. Arrange the carbocation in decreasing order of stability



(I) (II) (III)

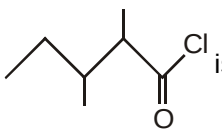
(A) I > II > III (B) I > III > II (C) II > III > I (D) III > II > I

54. Which is the strongest carboxylic acid among the following?

(A) Cl_3CCO_2H (B) Br_3CCOOH (C) F_3CCOOH (D) $Cl_2CHCOOH$

55. The bond between carbon atoms 1 and 2 in $N\overset{1}{C}-\overset{2}{C}H=CH_2$ involves the hybridised carbons

(A) sp^2 & sp^2 (B) sp^3 & sp (C) sp & sp^2 (D) sp & sp^3

56. The IUPAC name of  is

(A) 3, 4 dimethyl pentanoyl chloride
(B) 1-chloro-1-oxo-2, 3 dimethyl pentane
(C) 2-ethyl-3-methyl butanoyl chloride
(D) 2, 3-dimethyl pentanoyl chloride

57. Homolytic fission of C–C bond in ethane gives an intermediate in which carbon is
(A) sp^3 – hybridised
(B) sp^2 – hybridised
(C) sp – hybridised
(D) sp^3d – hybridised

58. Match the following and select the correct option given below.

	Column I		**Column II**
(A)	Acid	(P)	pH < 7
(B)	Base	(Q)	pH > 7
(C)	Acidic buffer	(R)	$CH_3COOH + CH_3COONa$
(D)	Basic buffer	(S)	$NH_4OH + NH_4Cl$

(A) A → P, B → Q, C → PR, D → QS
(B) A → R, B → PQ, C → S, D → PS
(C) A → S, B → PQ, C → R, D → RS
(D) A → P, B → RS, C → Q, D → PR

59. Match the following and select the correct option given below.

	Column I		**Column II**
(A)	$H_2\underline{S}O_4$	(P)	Oxidation number of underlined atom = +6
(B)	$K\underline{M}nO_4$	(Q)	Oxidising agent
(C)	$H\underline{N}O_2$	(R)	Reducing agent
(D)	$K_2\underline{Cr}_2O_7$	(S)	Oxidation number of underlined atom = +7

(A) A → P, B → PQ, C → PS, D → QR
(B) A → PQ, B → SQ, C → QR, D → PQ
(C) A → QS, B → PR, C → R, D → RS
(D) A → P, B → RS, C → Q, D → PR

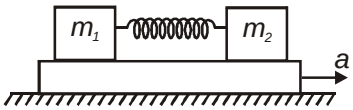
60. Match the following and select the correct option given below.

	Column I		**Column II (Favourable conditions for formation of products)**
(A)	Formation of $NO_2(g)$ $NO(g) + O_3(g) \rightleftharpoons NO_2(g) + O_2(g)$; ΔH = (–ve)	(P)	Increase in temperature
(B)	Oxidation of $NH_3(g)$ $4NH_3(g) + 5O_2(g) \rightleftharpoons 4NO(g) + 6H_2O(g)$; ΔH = (–)ve	(Q)	Decrease in temperature
(C)	Dissociation of $N_2O_4(g)$ $N_2O_4(g) \rightleftharpoons 2NO_2(g)$; ΔH = (+)ve	(R)	Decrease in pressure
(D)	Oxidation of nitrogen $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$; ΔH = (+)ve	(S)	Addition of inert gas at constant pressure

(A) A → PRS, B → PQ, C → PS, D → Q
(B) A → PR, B → SP, C → QRS, D → R
(C) A → Q, B → QRS, C → PRS, D → P
(D) A → PQS, B → RS, C → QS, D → S

PART-III (PHYSICS)

61. Two block of masses m_1 and m_2 are connected with a massless unstretched spring and placed over a plank moving wiht an acceleration 'a' as shown in figure. The coefficient of friction between the blocks and platform is μ.



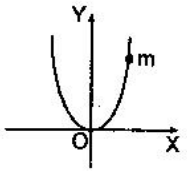
(A) Spring will be stretched if a > μg

(B) Spring will be commpressed if a $\leq \mu$g

(C) Spring will neither be compressed nor be stretched for a $\leq \mu$g

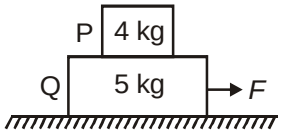
(D) Spring will be in its natural length under all conditions

62. A bead of mass m is located on a parabolic wire with its axis vertical and vertex directed towards downward as in figure and whose equation is $x^2 = ay$. If the coefficient of friction is m, the highest distance above the x=axis at which the particle will be in equilibrium is



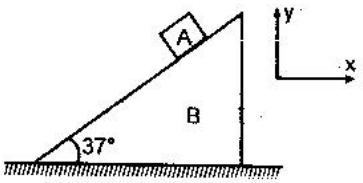
(A) μa (B) $\mu^2 a$ (C) $\frac{1}{4}\mu^2 a$ (D) $\frac{1}{2}\mu a$

63. The coefficient of friction between 4 kg and 5 kg blocks is 0.2 and between 5 kg block and ground is 0.1 respectively. Choose the correct statement :



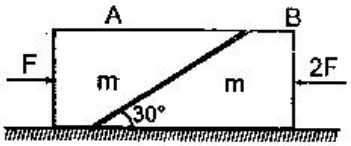
(A) Minimum force needed to cause system to move is 17 N
(B) When force is 4N static friction at all surfaces is 4N to keep system at rest
(C) Maximum acceleration of 4 kg block is 2 m/s^2
(D) Slipping between 4kg and 5 kg blocks start when F is 17N

64. In the figure shown the acceleration of A is, $\bar{a}_A = 15\,\hat{i} + 15\,\hat{j}$ then the acceleration of B is : (A remains in contact with B)



(A) $6\,\hat{i}$ (B) $15\,\hat{i}$ (C) $-10\,\hat{i}$ (D) $-5\,\hat{i}$

65. Two blocks 'A' and 'B' each of mass 'm' are placed on a smooth horizontal surface. Two horizontal force F and 2F are applied on both the blocks 'A' and 'B' respectively as shown in figure. The block A does not slide on block B. Then the normal reaction acting between the two block is:



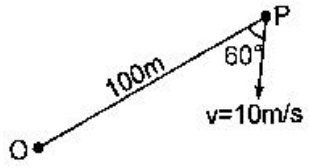
(A) F (B) F/2 (C) $\frac{F}{\sqrt{3}}$ (D) 3F

66. A train is standing on a platform, a man inside a compartment of a train drops a stone. At the same instant train starts to move with constant acceleration. The path of the particle as seen by the person who drops the stone is :
(A) Parabola
(B) Straight line for sometime & parabola for the remaining time
(C) Straight line
(D) Variable path that cannot be defined

67. A man crosses the river perpendicular to river flow in time t seconds and travels an equal distance down the stream in T seconds. The ratio of man's speed in still water to the speed of river water will be:

(A) $\frac{t^2 - T^2}{t^2 + T^2}$ (B) $\frac{T^2 - t^2}{T^2 + t^2}$ (C) $\frac{t^2 + T^2}{t^2 - T^2}$ (D) $\frac{T^2 + t^2}{T^2 - t^2}$

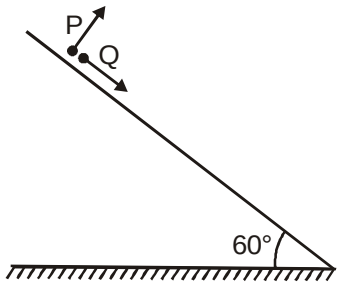
68. P is a point moving with constant speed 10 m/s such that its velocity vector always maintains an angle 60° with line OP as shown in figure (O is a fixed point in space). The initial distance between O and P is 100 m. After what time shall P reach O.



(A) 10 sec. (B) 15 sec. (C) 20 sec. (D) $20\sqrt{3}$ sec.

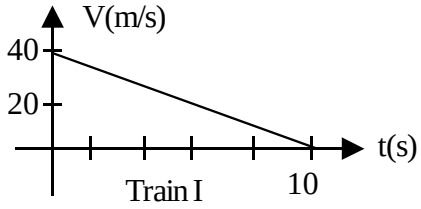
69. Consider a boy on a trolley who throws a ball with speed 20 m/s at an angle 37° with respect to trolley in direction of motion of trolley which moves horizontally with speed 10 m/s then what will be maximum distance travelled by ball parallel to road:
(A) 20.2 m (B) 12 m (C) 31.2 m (D) 62.4 m

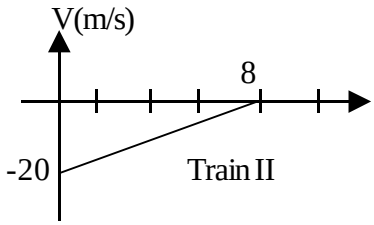
70. A particle P is projected from a point on the surface of smooth inclined plane (see figure). Simultaneously another particle Q is released on teh smooth inclined plane from the same position. P and Q collide on the inclined plane after t = 4 second. The speed of projection of P is :



(A) 5 m/s (B) 10 m/s (C) 15 m/s (D) 20 m/s

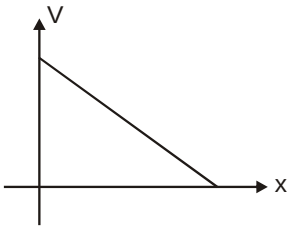
71. Two trains, which are moving along different tracks in opposite directions, are put on the same track due to a mistake. Their drivers, on noticing the mistake, start slowing down the trains when the trains are 300m apart. Graphs given below show their velocities as function of time as the trains slow down. The separation between the trains when both have stopped, is:

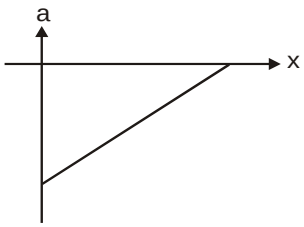


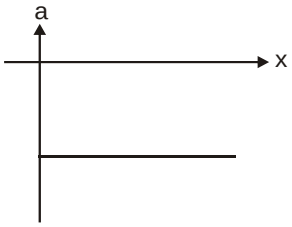


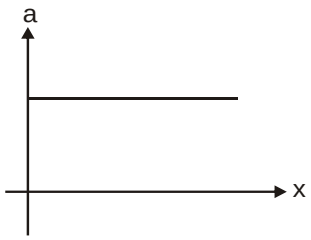
(A) 120 m (B) 280 m (C) 60 m (D) 20 m

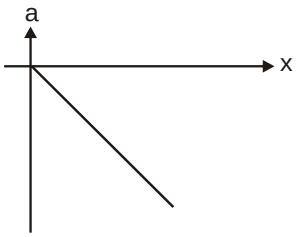
72. A particle moves along x-axis with initial position x = 0. Its velocity varies with x-coordinate as shown in graph. The acceleration 'a' of this particle varies with x as :



(A)


(B)


(C)


(D)


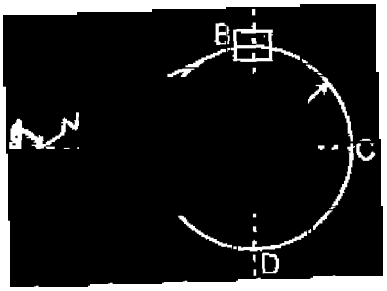
73. Work done by static friction on an object
(A) May be positive (B) Must be negative
(C) Must be zero (D) None of these

74. Of the sentences

(i) Internal forces acting on the system cannot change, $\frac{1}{2}mv^2_{cm}$, where m is the total mass of the system.

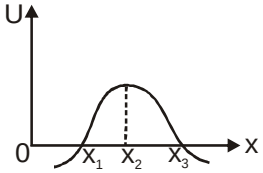
(ii) Internal force acting on a system cannot change kinetic energy of system with respect to centre of mass
(A) Both (i) and (ii) are correct (B) Only (i) is correct
(C) Only (i) is correct (D) Both (i) and (ii) are wrong

75. A collar 'B' of mass 2 kg is constrained to move along a horizontal smooth and fixed circular track of radius 5 m. The spring lying in the plane of the circular track and having spring constant 200 N/m is undeformed when the collar is at 'A'. If the collar starts from rest at 'B', the normal reaction exerted by the track on the collar when it passes through 'A' is



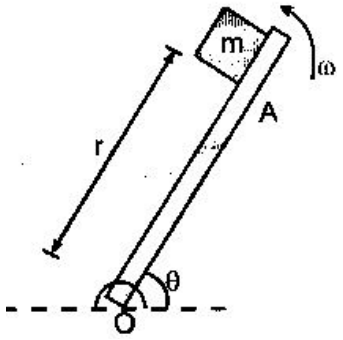
(A) 360 N (B) 720 N (C) 1440 N (D) 2880 N

76. In the figure shown the potential energy U of a particle is plotted against its position 'x' from origin. Then which of the following statement is correct. A particle at:



(A) x_1 is in stable equilirium (B) x_2 is in stable equilirium
(C) x_3 is in stable equilirium (D) None of these

77. The member OA rotates about a horizontal axis through O with a constant counter closkwise velocity ω = 3 rad/sec As it passes the position θ = 0, a small mass m is placed upon it at a radial distance r = 0.5 m. If the mass is observed to slip at θ = 37°, the coefficient of friction between the mass & the member is _____.



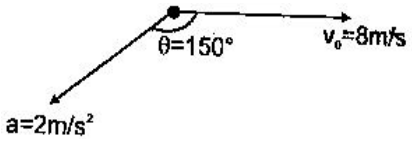
(A) $\frac{3}{16}$ (B) $\frac{9}{16}$ (C) $\frac{4}{9}$ (D) $\frac{5}{9}$

78. Two particles A & B seperated by a distance 2 R are moving counter clockwise along the same circular path of radius R each with uniform speed v. At time t = 0, A is given a tangential acceleration of magnitude a = $\frac{72\ v^2}{25\ \pi R}$.

(A) The time lapse for the two bodies to collide is $\frac{6\pi R}{5V}$ (B) The angle covered by A is $\frac{11\pi}{6}$

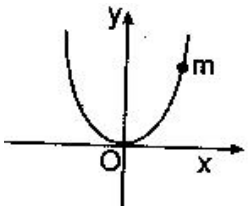
(C) Angular velocity of A is $\frac{11V}{5R}$ (D) Radial acceleration of A is $\frac{289V^2}{5R}$

79. The figure shows the velocity and acceleration of a point like body at the initial moment of its motion. The acceleration vector of the body remains constant. The minimum radius of culvature of trajectory of the body is



(A) 2 m (B) 4 m (C) 8 m (D) 16 m

80. A bead of mass m is located on a parabolic wire with its axis vertical and vertex at the origin as shown in figure and whose equation is $x^2 = 4ay$. The wire frame is fixed and the bead can slide on it without friction. The bead is released from the point y = 4a on the wire frame from rest. The tangential acceleration of the bead when it reaches te position given by y = a is :

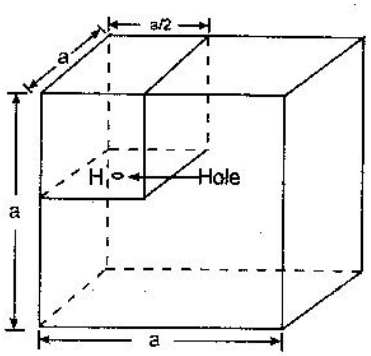


(A) $\frac{g}{2}$ (B) $\frac{\sqrt{3}g}{2}$ (C) $\frac{g}{\sqrt{2}}$ (D) $\frac{g}{\sqrt{5}}$

81. Two particles A and B start moving due to their mutual interaction only. If at any time 't', $\vec{a}_A$ & $\vec{a}_B$ are their respective accelerations, $\vec{v}_A$ and $\vec{v}_B$ are their respective velocities and upto that time W_A and W_B are the work done on A & B respectively by the mutual force, m_A and m_B are their masses respectively, then which of the following is always correct.

(A) $\vec{v}_A + \vec{v}_B = 0$ (B) $m_A\vec{v}_A + m_B\vec{v}_B = 0$ (C) $W_A + W_B = 0$ (D) $\vec{a}_A + \vec{a}_B = 0$

82. The figure shows a hollow cube of side 'a' of volume V. There is a small chamber of volume $\frac{V}{4}$ in the cube as shown. This chamber is completely filled by m kg of water. Water leaks through a hole H. Then the work done by gravity in this process assuming that the complete water finally at the bottom of the cube is:

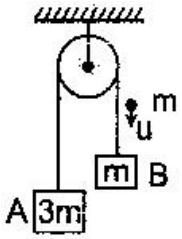


(A) $\frac{1}{2}$ mg a (B) $\frac{3}{8}$mg a (C) $\frac{5}{8}$mg a (D) $\frac{1}{8}$mg a

83. Three balls A, B and C ($m_A = m_C = 4m_B$) are placed on a smooth horizontal surface. Ball B collides with ball C with an initial velocity *v* as shown in figure. Total number of collisions between the balls will be : (All collisions are elastic)

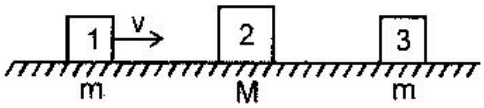
(A) One (B) Two (C) Three (D) Four

84. A system of two blocks A and B are connected by an inextensible massless string as shown in the figure. The pulley is massless and frictionless. Initially the system is at rest when, a bullet of mass 'm' moving with a velocity 'u' as shown hits the block 'B' and gets embedded into it. The impulse imparted by tension force to the block of mass 3m is:



(A) $\frac{5mu}{4}$ (B) $\frac{4mu}{5}$ (C) $\frac{2mu}{5}$ (D) $\frac{3mu}{5}$

85. Three blocks are placed on smooth horizontal surface and lie on same horizontal straight line. Block 1 and block 3 have mass m each and block 2 has mass M (M > m). Block 2 and block 3 are initially stationary, while block 1 is initially moving towards block 2 with speed v as shown. Assume that all collisions are headon and perfectly elastic. What value of $\frac{M}{m}$ ensures that block 1 and blockk 3 have the same final speed?



(A) 5 + $\sqrt{2}$ (B) 5 - $\sqrt{2}$ (C) 2 + $\sqrt{5}$ (D) 3 + $\sqrt{5}$

PART-IV (REASONING)

86. If a standard-sized cigaratte can be rolled out of 6 standard-sized cigaratte butts (filters). How many cigarattes will a person be able to smoke if he has 200 cigarattes.

(a) 200 (b) 239

(c) 233 (d) 238

87. Suppose a clock strikes as many no. of gongs as is the time for eg. - 1 gong at 1 O'clock, 2 gongs at 2 O'clock and so on. If this same clock takes 7 seconds to strike 7 O'clock. How long will the clock take to strike 10 O'clock?

(a) $\frac{21}{2}$ seconds (b) 10 seconds

(c) 7 seconds (d) $\frac{35}{3}$ seconds

88. A woman drives her husband every morning to Howrah station and picks him up from the station and takes him home. She picks him up at 5 p.m. one day the man was let off at work an hour earlier and he arrived at the station at 4 p.m. He started walking home and met his wife enroute to the station and got into the car. They arrived 10 min. earliear. How long did the man walk before he was picked up by his wife?

(a) 55 min. (b) 50 min.

(c) 65 min. (d) 60 min.

89. Rohit said to Mayank that he was ten years old two days back and next year he will be thirteen. How old is Rohit?

(a) 10 (b) 11

(c) 12 (d) 13

90. A cement block balances evenly on the scales with three quarters of a kg. and three quarters of a block. What is the weight of the whole block.

(a) 1 kg. (b) 2 kg.

(c) 2.5 kg. (d) 3 kg.

91. While in San Francisco some time back, I hired a car to drive over the Golden Gate bridge. I started in the afternoon when there was no traffic rush. So I could drive at a speed of 40 miles an hour. While returning, however, I got caught in the traffic rush and I could only manage to drive at a speed of 25 miles an hour.

What was my average speed for the round trip?

(a) $\frac{65}{2}$ (b) 65

(c) $\frac{205}{13}$ (d) $\frac{400}{13}$

92. One morning I was on my way to the market and met a man who had 4 wives. Each of the wives had 4 bags, containing 4 dogs and each dog had 4 puppies. Talking all things into consideration, how many were going to the market?

(a) 2^8 (b) 2^4

(c) 2^2 (d) 2^0

93. Mammu wears socks of two different colours-white and brown. She keeps them all in the same drawer in a state of complete disorder.

She has altogether 20 white socks and 20 brown socks in the drawer. Supposing she has to take out the socks in the dark, how many must she take out to be sure that she has a matching pair?

(a) $2^4 + 4$ (b) $2^4 + 5$

(c) $2^0 + 1$ (d) $2^1 + 1$

94. Here is an ancient problem from Bhaskaracharya's Lilavati :

A beautiful maiden, with beaming eyes, asks me which is the number that, multiplied by 3, then increased by three-fourths of the product, divided by 7, diminished by one-third of the quotient, multiplied by itself, diminished by 52, the square root found, addition of 8, division by 10 gives the number 2?

Well, it sounds complicated, doesn't it? No, not if how to go about it.

(a) 28 (b) 32

(c) 34 (d) 26

95. Two trains, a passenger train and a goods train, are running in the same direction on parallel railway tracks. The passenger train takes three times as long to pass the goods train-even when they are going in the opposite directions.

If the trains run at uniform speeds, how many times faster than the goods train is the passenger train moving?

(a) Half (b) Twice

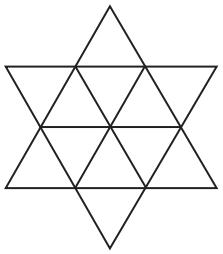
(c) Thrice (d) One and a half

96. If 5 tyres were used on a car which has travelled 20,000 miles, how many miles did each tyre sustain, if all the tyres were used equally in sustaining this mileage?

(a) 16,000 (b) 4,000

(c) 20,000 (d) 8,000

97. How many triangles, of any size, are there in this star.



(a) 18 (b) 12

(c) 20 (d) 16

98. In a school there were 100 lockers. One day the principal asked 100 boys to come to the locker-room. Initially all the lockers were closed. He told the 1st boy to open all the lockers. He told the 2nd boy to work on every 2nd locker and said that if the locker is closed, open it and if the locker is open, close it. He called 3rd boy and told him the same thing as 2nd boy except to work on every 3rd locker. He called 4th boy and told him to work on every 4th locker and so on. At the end, how many lockers will remain closed.

(a) 9 (b) 10

(c) 90 (d) 91

99. A man bought two machines for his factory. After some time he decided to sell them each for 600 Rs. Making a loss of 20% on one of them and a profit of 20% on the other. How did the transaction affected him?

(a) + 50 Rs. (b) -50 Rs.

(c) 0 Rs. (d) Can't Say

100. Fifty minutes ago if it was four times as many minutes past three O'clock, how many minutes is it to six O'clock?

(a) 26 min. (b) 34 min.

(c) 44 min. (d) 50 min.

❑ ❑ ❑