



# towards competition !! Towards competition !! Goal talent search exam 2023-24

CLASS - 12<sup>th</sup> (PCB / PCM)

PRACTICE PAPER

Time : 2.00 Hrs. Max. Marks : 400



## INSTRUCTIONS

- 🖏 This paper has 100 questions. All questions are compulsory.
- In this paper Question of Biology is from 71 to 100 which is only for PCB group and in same way Math from 71 to 100 for PCM group. You have to attempt only one segment as per your group.
- $\stackrel{\text{\tiny (b)}}{\to}$  The maximum marks for each question is 4.
- ♥ 1 mark will be deducted against each negative response from the total marks.
- $\resize$  Use of calculator, slide rule, graph paper & trigonometric tables is **NOT PERMITTED.**

Name of the Candidate : \_\_\_\_\_

Class : \_

Roll No. : \_\_\_\_

Exam Centre : \_\_\_\_\_

## GOAL TALENT SEARCH EXAM : 2023-24

## [Time: 2.00 Hours] CLASS: XII (PCB / PCM) Practice Paper

01. The Electric field at a point is :

(Choose correct statements)

- (a) always continuous.
- (b) continuous if there is no charge at that point.
- (c) discontinuous only if there is a negative charge at the point.
- (d) discontinuous if there is a charge at the point.
- (1) (a) only (2) (b) and (c) only
- (3) (b) and (d) only (4) (b), (c) and (d)
- 02. Two identical thin rings, each of radius R are coaxially placed at separation R.  $Q_1 & Q_2$  are uniformly distributed over these ring. What is the work done in moving a charge q from centre of ring having charge  $Q_1$  to other ring :

(1) 
$$\frac{K(Q_2 - Q_1)q}{\sqrt{2R}}$$
 (2)  $\frac{K(\sqrt{2} - 1)(Q_2 - Q_1)q}{\sqrt{2R}}$   
(3) Zero (4)  $\frac{(Q_2 - Q_1)}{\sqrt{2R^2}}$ 

03. Calculate potential on the axis of a ring at a distance, 2R, due to charge Q uniformly distributed along the ring of radius R.

(1) 
$$\frac{Q}{2\pi \epsilon_0 R}$$
 (2)  $\frac{Q}{4\sqrt{5\pi \epsilon_0 R}}$   
(3)  $\frac{Q}{2\sqrt{3\pi \epsilon_0 R}}$  (4)  $\frac{Q}{2\sqrt{5\pi \epsilon_0 R}}$ 

- 04. A carbon resistor  $(47 \pm 4.7)$  k $\Omega$  is to be marked with rings of different colours for its identification. The colour code sequence will be
  - (1) Violet Yellow Orange Silver
  - (2) Yellow Violet Orange Silver
  - (3) Yellow Green Violet Gold
  - (4) Green Orange Violet Gold
- 05. Which of the following statements is false :
  - (1) Krichhoff's second law represents energy conservation
  - (2) Wheatstone bridge is the most sensitive when all the four resistance are of the same order of magnitude
  - (3) In a balanced wheatstone bridge if the cell and the galvanometer are exchanged, the null point is disturbed
  - (4) A rheostat can be used as a potential divider

06. The resistance of a galvanometer is  $50 \Omega$  and it shows full scale deflection for a current of 1mA. to convert it into a voltmeter to measure 1V and as well as 10 V (refer circuit diagram) the resistances  $R_1$  and  $R_2$  respectively are

Full Marks : 400



(1) 950  $\Omega$  and 9150  $\Omega$  (2) 900  $\Omega$  and 9950  $\Omega$ 

(3) 900  $\Omega$  and 9900  $\Omega$  (4) 950  $\Omega$  and 9000  $\Omega$ 

- 07. An electron is moving in a circular path under the influence of a transverse magnetic field of  $3.57 \times 10^{-2}$  T. If the value of e/m is  $1.76 \times 10^{11}$  C/kg, the frequency of revolution of the electron is
  - (1) 6.82 MHz (2) 1 GHz
  - (3) 100 MHz (4) 62.8 MHz
- 08. The force between two parallel current carrying wires is independent of
  - (1) Their distance of separation
  - (2) The length of the wires
  - (3) The magnitude of currents
  - (4) The radii of the wires
- 09. Two magnets are held together in a vibration magnetometer and are allowed to oscillate in the earth's magnetic field. With like poles together, 12 oscillations per minute are made but for unlike poles together only 4 oscillations per minute are executed. The ratio of their magnetic moments is

 $(1) \ 3:1 \qquad (2) \ 1:3 \qquad (3) \ 3:5 \qquad (4) \ 5:4$ 

- 10. The materials suitable for making electromagnets should have
  - (1) High retentivity and high coercivity
  - (2) Low retentivity and low coercivity
  - (3) High retentivity and low coercivity
  - (4) Low retentivity and high coercivity
- 11. A coil of resistance  $400 \Omega$  is placed in a magnetic field. If the magnetic flux  $\phi$  (Wb) linked with the coil varies with time t (sec) as  $\phi = 50t^2 + 4$ . The current in the coil at t = 2 sec is

(1) 0.5 A (2) 0.1 A (3) 2 A (4) 1 A

- 12. A particle is thrown vertically upward. Its velocity at half of the height is 10 m/s, then the maximum height attained by it (g = 10 m/s<sup>2</sup>)
  (1) 8 m (2) 20 m (3) 10 m (4) 16 m
  - (1) 8 m (2) 20 m (3) 10 m (4) 16 m

13. What is the frequency of power in an AC circuit connected to a capacitor ?

(Given f = 50 Hz, V = 220 V)

(1) 50 Hz (2) 100 Hz (3) zero (4) 25 Hz

 The quality factor of LCR circuit having resistance (R) and inductance (L) at resonance frequency (ω) is given by

(1) 
$$\frac{\omega L}{R}$$
 (2)  $\frac{R}{\omega L}$  (3)  $\left(\frac{\omega L}{R}\right)^{1/2}$  (4)  $\left(\frac{\omega L}{R}\right)^2$ 

15. Which of the following components of an LCR circuit, with a.c. supply, dissipates energy

(1) L (2) R

- (3) C (4) All of these
- 16. Same current is flowing in two a.c. circuit. First contains only inductance and second contains only capacitance. If frequency of a.c. is increased for both, the current will
  - (1) Increase in first circuit and decrease in second
  - (2) Increase in both circuits
  - (3) Decrease in both circuits
  - (4) Decrease in first circuit and increase in second
- 17. The de-Brogile wavelength of a neutron in thermal equilibrium with heavy water at a temperature T (Kelvin) and mass m, is

(1) 
$$\frac{h}{\sqrt{mkT}}$$
 (2)  $\frac{h}{\sqrt{3mkT}}$  (3)  $\frac{2h}{\sqrt{3mkT}}$  (4)  $\frac{2h}{\sqrt{mkT}}$ 

18. The surface of a metal is illuminated with the light of 400 nm. The kinetic energy of the ejected photoelectrons was found to be 1.68 eV. The work function of the metal is (hc = 1240 eV.nm)

(1) 3.09 eV (2) 1.41 eV (3) 1.51 eV (4) 1.68 eV

19. The wavelength  $\lambda_e$  of an electron and  $\lambda_p$  of a photon of same energy E are related by :

1) 
$$\lambda_{p} > \lambda_{e}^{2}$$
 (2)  $\lambda_{p}^{2} < \lambda_{e}$  (3)  $\lambda_{p}^{2} = \lambda_{e}$  (4)  $\lambda_{p} = \lambda_{e}^{2}$ 

20. If an electron in hydrogen atom jumps from an orbit of level n = 3 to an orbit of level n = 2, the emitted radiation has a frequency (R = Rydberg constant, C = velocity of light)

RC	5RC	3RC	8RC
$(1) \frac{1}{25}$	$(2) \overline{36}$	(3) - 27	(4)

21. A rocket of initial mass 1500 kg ejects gas at a constant rate of 10 kg/s with a relative speed of 5 km/s. What is the acceleration of the rocket 50 seconds after the blast, neglecting gravity ?

(1)  $10 \text{ m/s}^2$  (2)  $25 \text{ m/s}^2$ 

(3)  $50 \text{ m/s}^2$  (4)  $100 \text{ m/s}^2$ 

22. The half life of a radioactive isotope X is 50 years. It decays to another element Y which is stable. The two elements X and Y were found to be in the ratio of 1 : 16 in a sample of a given rock. The age of the rock was estimated to be

(1) 100 years	(2) 150 years
(3) 200 years	(4) 250 years

23. Two bodies of masses 2 kg and 4 kg are moving with velocities 20 ms<sup>-1</sup> and 10 ms<sup>-1</sup> towards each other due to mutual gravitational attraction. What is the velocity of their centre of mass?

(1)  $5 \text{ ms}^{-1}$  (2)  $6 \text{ ms}^{-1}$  (3)  $8 \text{ ms}^{-1}$  (4) zero

24. Consider the junction diode as ideal. The value of current flowing through AB is :

 $\begin{array}{c|c} A \\ +6 \end{array} \qquad 0.5 k\Omega \\ -4V \\ -4V \end{array}$ 

25. A convex mirror of focal length f forms an image

which is  $\frac{1}{n}$  times the object. The distance of the object from the mirror is

(1) 
$$(n-1)f$$
 (2)  $\left(\frac{n-1}{n}\right)f$  (3)  $\left(\frac{n+1}{n}\right)f$  (4)  $(n+1)f$ 

26. A ray of light is incident at an angle i from denser to rare medium. The reflected and the refracted rays are mutually perpendicular. The angle of reflection and the angle of refraction are respectively r and r', then the critical angle will be



- (1)  $\sin^{-1} (\sin r)$  (2)  $\sin^{-1} (\tan r')$
- (3)  $\sin^{-1}$  (tan i) (4)  $\sin^{-1}$  (sin i)
- 27. For an angle of incidence  $\theta$  on an equilateral prism of refractive index  $\sqrt{3}$ , the ray refracted is parallel to the base inside the prism. The value of  $\theta$  is

(1)  $30^{\circ}$  (2)  $45^{\circ}$  (3)  $60^{\circ}$  (4)  $75^{\circ}$ 

28. A non-uniform thin rod of length L is placed along X-axis as such its one of ends is at the origin. The linear mass density of rod is  $l = l_0 x$ . The distance of centre of mass of rod from the origin is

(1) 
$$\frac{L}{2}$$
 (2)  $\frac{2L}{3}$  (3)  $\frac{L}{4}$  (4)  $\frac{L}{5}$ 

29. The interference pattern is obtained with two coherent light sources of intensity ratio n. In

> the interference pattern, the ratio  $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be

(1)  $\frac{2\sqrt{n}}{(n+1)^2}$  (2)  $\frac{\sqrt{n}}{n+1}$  (3)  $\frac{2\sqrt{n}}{n+1}$  (4)  $\frac{\sqrt{n}}{(n+1)^2}$ 

- 30. 22320 cal of heat is supplied to 100 g of ice at  $0^{\circ}$ C. If the latent heat of fusion of ice is 80 cal g<sup>-1</sup> and latent heat of vaporization of water is 540 cal  $g^{-1}$ , the final amount of water thus obtained and its temperature respectively are : (2) 100 g, 90° C (1) 8g, 100° C
  - (3) 92 g, 100° C (4) 80 g, 100° C
- If avogadro number (N<sub>A</sub>) is change from  $6.022 \times 10^{23}$  mol<sup>-1</sup> to  $6.022 \times 10^{20}$  mol<sup>-1</sup>, this 31. would be change :
  - (1) the mass of one mole of carbon
  - (2) the ratio of chemical species to each other in a balanced equation
  - (3) the ratio of elements to each other in compound
  - (4) the definition of mass in units of gram
- 32. Calculate the energy in joule corresponding to light of wavelength 45 nm: (Planck's constant  $h = 6.63 \times 10^{-34}$  Js; speed of light  $c = 3 \times 10^8$  ms<sup>-1</sup>)
  - (1)  $4.42 \times 10^{-15}$ (2)  $4.42 \times 10^{-18}$ (4)  $6.67 \times 10^{11}$ (3)  $6.67 \times 10^{15}$
- What is the density of N<sub>2</sub> gas at 227°C and 5.00 atm. pressure (R =  $0.082 \text{ L} \text{ atm } \text{K}^{-1} \text{ mol}^{-1}$ ) 33.
  - (1) 1.40 g/mL(2) 2.81 g/mL
  - (4) 0.29 g/mL (3) 3.41 g/mL
- The correct thermodynamic conditions for the 34. spontaneous reaction at all temperatures is :
  - (1)  $\Delta H < 0$  and  $\Delta S > 0$  (2)  $\Delta H < 0$  and  $\Delta S < 0$
  - (3)  $\Delta H = 0$  and  $\Delta S = 0$  (4)  $\Delta H > 0$  and  $\Delta S < 0$
- 35. equilibrium The constant

 $N_{2(g)} + O_{2(g)} \implies 2NO_{(g)}$  is K, the equilibrium

constant for  $1/2 N_{2(g)} + 1/2O_{2(g)} \iff NO_{(g)}$ will be:

will be :

- (2) K (1) 1/2 K
- (4)  $K^{1/2}$ (3)  $K^2$
- The values of  $K_{sp}$  of CaCO<sub>3</sub> and CaC<sub>2</sub>O<sub>4</sub> are 4.7 × 10<sup>-9</sup> and 1.3 × 10<sup>-9</sup> respectively at 25°C. If 36. the mixture of these two is washed with water, what is the concentration of  $Ca^{2+}$  ions in water?

(1)  $5.831 \times 10^{-5}$  M (2)  $6.856 \times 10^{-5}$  M

(3) 3.606 × 10<sup>-5</sup> M (4)  $7.746 \times 10^{-5}$  M

- 37. AB is an ionic solid. If the ratio of ionic radius of  $A^+$  and  $B^-$  is 0.52, what is the coordination number of B<sup>-</sup>?
  - (1) 2(2) 3 (3) 6 (4) 8
- 38. The number of atoms in 50 g of an FCC crystal with density  $d = 10 \text{ gcm}^{-3}$  and cell edge of 200 pm is equal to :
  - (1)  $3 \times 10^{25}$ (2)  $5 \times 10^{24}$
  - (3)  $1.25 \times 10^{24}$ (4)  $2.5 \times 10^{24}$
- 39. The system that forms maximum boiling azeotrope is :
  - (1) Carbon disulphide acetone
  - (2) Benzene toluene
  - (3) Acetone chloroform
  - (4) n hexane n heptane
- 40. If 1 g of solute (molar mass =  $50 \text{ g mol}^{-1}$ ) is dissolved in 50 g of solvent and the elevation in boiling point is 1 K. The molal elevation constant of the solvent is :

What will be the degree of dissociation of 0.1 M 41. Mg(NO<sub>3</sub>)<sub>2</sub> solution if Van't Hoff factor is 2.74?

 $E_{Cu^{2+}/Cu}^{0} = +0.34 V$ , what will be reduction 42.

potential at pH = 14 for same couple. Given K<sub>sp</sub> of  $Cu(OH)_2 = 10^{-19}$ :

- (1) -0.22 V (2) -0.71 V (3) +0.22 V (4) +0.71 V
- 43. When an electric current is passed through acidulated water, 112 mL of hydrogen gas at STP collects at the cathode in 965 second. The current passed, in ampere is :
  - (1) 1.0(2) 0.5(3) 0.1 (4) 2.0
- For the reaction;  $2NO + Br_2 \implies 2NOBr$ ; the 44. mechanism is given in two steps
  - (I) NO + Br<sub>2</sub>  $\xrightarrow{\text{Fast}}$  NOBr<sub>2</sub>

(II)  $\text{NOBr}_2 + \text{NO} \xrightarrow{\text{Slow}} 2\text{NOBr}$ 

The rate expression for the reaction is :

(1)  $r = K[NO]^2[Br_2]$ (2)  $r = K[NO][Br_2]$ 

- (3)  $r = K[NO] [Br_2]^2$ (4)  $r = K[NOBr_2]$
- 45. At the equilibrium position in the process of adsorption :
  - (1)  $\Delta H > 0$ (2)  $\Delta H = T\Delta S$ (3)  $\Delta H > T\Delta S$ (4)  $\Delta H < T\Delta S$

- 46. Ellingham diagram represents change of :
  - (1)  $\Delta G^{o}$  with temperature
  - (2)  $\Delta H$  with pressure
  - (3)  $\Delta G^{o}$  with pressure
  - (4)  $\Delta G^{o} T\Delta S^{o}$  with temperature
- $IBr_7$  cannot exist but  $IF_7$  exist. This fact can be 47. explained in the basis of :
  - (1) Electronegativities
  - (2) Electron affinities
  - (3) Ratio of radii of atoms
  - (4) Reducing abilities
- Which of the following is correct about V group 48. Hydrides (from ammonia to Bismuthine)?
  - (1) Their thermal stability gradually increase
  - (2) Their ease of preparation gradually increase
  - (3) The electron pair donating nature gradually decrease
  - (4) The bond energies gradually increase
- Maximum oxidation state is shown by : 49.
  - (3) Cr (4) Co (1) Os (2) Mn
- 50. The complex  $[Co(NH_3)_4(SCN)_2]Cl$  exhibits the isomerism which are :
  - (1) Linkage, ionization and geometrical
  - (2) Linkage, ionization and hydrate
  - (3) Ionization, geometrical and coordination
  - (4) Linkage, geometrical and polymerization
- The complex,  $[Ni(CN)_4]^{2-}$ , is diamagnetic in 51. nature, its geometry is :
  - (1) Tetrahedral (2) Square planar
  - (4) Unpredictable (3) Octahedral
- Which of the following alkyl halides on reaction 52. with aq. KOH forms d/l mixture ?

(1) 
$$CH_3 - C_2H_5$$
 (2)  $CH_3 - C_2H_2 - Br$   
 $C_2H_5$  (2)  $CH_3 - C_2H_2 - Br$   
 $CH_3$  (3)  $CH_3 - C_2 - CH_2 - Br$  (4)  $H_5C_2 - C_2 - CH_2 - Br$   
 $CH_2D$  (4)  $CH_3 - C_2 - CH_2 - Br$ 

- Of the following, which is an  $S_N$ 1 reaction ? 53.
  - (1)  $(CH_3)_3CBr + H_2O \longrightarrow$
  - (2)  $CH_3CH_2CH_2Cl + I^- \longrightarrow$
  - (3)  $(CH_3)_3CBr + CN^- \longrightarrow$
  - (4)  $CH_3CHBrCH_3 + \overline{O}H$  (alc.) —

54. Correct acidic order of acidity is :



Which of the following is not the product of acid 55.



- 57. Which of the following compound on treatment with  $\text{LiAlH}_4$  will give a product that will give positive iodoform test ?
  - (1)  $CH_3CH_2CHO$
  - (2)  $CH_3CH_2CO_2CH_3$
  - (3)  $CH_3CH_2CN$
  - (4) CH<sub>3</sub>COCH<sub>3</sub>
- 58. The strongest base in aqueous solution among the following amines is :
  - (1) N-N-diethylethanamine
  - (2) N-ethylanamine
  - (3) N-methyl methanamine
  - (4) Ethanamine
- 59. Following reaction sequence is given :

$$A \xrightarrow{Br_2/} B \xrightarrow{NaNO_2/} C \xrightarrow{H_3PO_2/} H_{2O} D$$

'D' is 1, 3, 5-tibromobenzene

Then, what is A :

(1)

- (2) Phenol
- (3) Aniline (4) None of these
- 60. Which one of the following is an example of copolymer?
  - (1) Buna S

(3) PVC

- (2) Teflon (4) Polypropylene
- 61. Seven candidates were present in an interview. No two of them got equal marks. A scored more than B, and G scored more than A. Either D scored the highest and B or F scored the least, or alternately C scored the highest and E got the least.

If G ranked fifth, which of the following must be true?

- (1) C was ranked second
- (2) D was ranked first
- (3) E was ranked third
- (4) B was ranked fourth
- 62. Six students including P are sitting on two benches in two rows, three in each as the following:

Q is the neighbour of U, and R is the neighbour of T. S is second to the left of U. R is sitting diagonally opposite to S. T is not at the end of any row. Who is facing Q?

- (1) T (2) S
- (3) Q (4) R

- 63. If 'M × N' means 'M is the daughter of N', 'M + N' means 'M is the father of N; M + N' means 'M is the mother of N' and 'M N' means 'M is the brother of N', then in the expression 'P  $\div$  Q + R T × K' how is P related to K?
  - (1) Mother-in-law (2) Sister-in-law
  - (3) Aunt (4) Daughter-in-law
- 64. How many 5's are there in the following sequence such that the sum of the two immediately following digits is greater than the sum of the two immediately preceding digits?

3 7 6 5 <mark>8 3 2 4 5 5 4 8 7 9 1 5 3</mark> 4 8 7 5 9 8 7 6 4

(1) One	(2) Two
(3) Three	(4) Four

65. Find the missing number from the options which will replace the question mark (?) in the given patterns.



66. Choose the figure from the options which will continue the series.







67. Choose the correct water image of the given combination.

## V A Y U 8 4 3 6

- (1) VAYU8763 (5) VAYU8436
- (3) VAYU8436 (4) VAYU84E6
- 68. M is to the South-West of N, O is to the East of M and South-East of N and P is to the North of O on the line with MN. In which direction of N is P located?
  - (1) South(3) North-East
- (2) South-West
- (4) North

69. The sheet of paper shown in Fig. (X) is to be folded to form a box. Choose from the boxes P, Q, R and S that are similar to the box so formed.



- RNA polymerase III in eukaryotes doesn't 76. transcribe
  - (1) mRNA (2) tRNA
  - (3) 5srRNA (4) SnRNAs
- 77. (i) Sweet potato and potato are examples of analogy
  - (ii) The essence of Darwinian theory about natural selection is branching descent only
  - (iii)Lemur show convergent evolution with Numbat
  - (iv) Jawless fish probably evolved around 350 mya (v) Ice age was around 75000–1,0000 years
  - How many statement are incorrect.

OH

(1) 1 (4) 5 (2) 2(3) 3

correct

- statement about figure.
- (1) its receptors present in Gastrointestinal tract.
- (2) Extracted from latex of poppy plant.
- (3) Structure of Cannabinoid molecules.
- (4) Structure of Morphine.

## Which is not a variety of Okra?

- (1) Pusa Sawani
- (2) Pusa A-4
- (3) Pusa Swarnim
- (4) All of the above



Correct statement about figure.

- (1) Bacteriophase infect bacteria
- (2) Rhinovirus cause common cold
- (3) Adenovirus cause respiratory infection
- (4) Colonies of bacteria growing in petri dish
- 81. rop in pBR 322.
  - (1) Codes for the proteins involved in the replication of plasmid.
  - (2) Codes for the proteins involved in the transcription of DNA
  - (3) Both (1) and (2)
  - (4) Site for tetracycline

- 82. Ecology is a thread that
  - (1) Gives holistic perspective to biology
  - (2) Gives ridiculous perspective to biology
  - (3) Gives unauthorised perspective to biology
  - (4) Gives Irrelevant perspective to biology
- 83. Smoking is associated with increase incidence of cancers-
  - (1) Lung
  - (3) Urinary bladder (4) All of the above

(2) Throat

- 84. Study of insulin like growth factor can be done by using.
  - (1) Transgenic animals
  - (2) Intergenic animals
  - (3) Intragenic animals
  - (4) Interspecific animals
- 85. Present population density is 2 million, birth rate is 10.5 and death rate is 10. Find the population density 2 years before (supposed growth exponential)-
  - (1) 735760 Approx
- (2) 535760 Approx
- (3) 635760 Approx
  (4) 435760 Approx
  86. \_\_\_\_\_\_\_ is potent force for organic evolution according to Darwin
  - (1) Intraspecific competition
  - (2) Interspecific competition
  - (3) Both (1) and (2)
  - (4) Intergeneric competition
- 87. In aquatic ecosystem \_\_\_\_\_a \_\_\_\_ is major conduit for energy flow and in terrestrial ecosystem \_\_\_\_b \_\_\_\_ is major conduit for energy flow.

- (1) Grazing food chain,
- Grazing food chain Detritus food chain

(b)

(2) Detritus food chain, De

(a)

- (3) Grazing food chain, Detritus food chain
- (4) Detritus food chain, Grazing food chain
- 88. Which of the following cell organelles were discovered after the introduction of electron microscope?
  - (1) Mitochondria
  - (2) Endoplasmic Reticulum
  - (3) Ribosomes
  - (4) Both 2 and 3
- 89. Haryana kisan welfare-
  - (1) created by Ramesh Chandra Dagar
  - (2) presently has membership of 5000 farmers
  - (3) both (1) and (2)
  - (4) created by Ahmed Khan

- 90. Under unfavourable condition Amoeba undergoes
  - (1) Encystation
  - (2) Sporulation
  - (3) Fragmentation
  - (4) Pseudopodia formation
- 91. Brunner's gland is present in
  - (1) liver (2) duodenum
  - (3) oesophagus (4) stomach
- 92. Drone in honeybees
  - (1) is produced by parthenocarpy
  - (2) is haploid
  - (3) has mother, both grand father but no father
  - (4) All of the above
- 93. Two friends are eating together on a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of
  - (1) epiglottis (2) diaphragm
  - (3) neck
- 94. Embryological support for evolution was disapproved by-

(4) tongue

- (1) Karl Ernst Von Baer (2) Ernst Mayer
- (3) Ernst Hackel (4) All of the above
- 95. Niche is comprised by
  - (1) invariable defined range of conditions that each organism can tolerate
  - (2) diversity in resources that each organism utilizes
  - (3) Functional role that each organism plays
  - (4) All of the above
- 96/ Which organisms do not grow in polluted areas
  - (1) Lichens
  - (2) Virus
  - (3) Algal
  - (4) None of the above
- 97. Threonine is not coded by-

(1) ACU	(2) AAU
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- (3) ACC (4) ACG
- 98. Which one is incorrect
  - (1) IVF In Vivo Fertilization
  - (2) GIFT Gamete Intrafallopian Transfer
  - (3) AI Artificial Insemination
  - (4) ICSI Intra Cytoplasmic Sperm Injection
- 99. Photosynthesis is a
  - (1) Exothermic process (2) Exergonic process
  - (3) Anabolic process (4) Catabolic process



Identify option that match with labelled parts and its function.

- (1) A Acrosome Helps in enzyme secretion that helps in fertilization of ovum.
- (2) B Middle piece Contains an elongated haploid nucleus
- (3) C Head– possesses numerous mitochondria which produce energy for movement
- (4) D Tail helps in motility

## THIS SEGMENT IS ONLY FOR PCM GROUP STUDENTS

71. Let  $f(x) = \log\left(\frac{1+x}{1-x}\right)$  and  $g(x) = \frac{3x+x^3}{1+3x^2}$  then, f(g(x)) =

(2) 3f(x)

(2) 2xyz

- (1) 2f(x)
- (1) 21(x)
- (3)  $[f(x)]^3$  (4) none of these
- 72. Set A has three elements and set B four elements. The number of injections that can be defined from A to B is
  - (1) 22 (2) 24

(3) 29 (4) none of these

- 73. If  $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \pi$ , then value of x + y + z =
  - (1) xyz

(3)  $\frac{1}{xyz}$ 

(4) none of these

74. If  $a \le \sin^{-1}x + \cos^{-1}x + \tan^{-1}x \le b$  then (1) a = 0, b = 0 (2)  $a = 0, b = \pi$ 

(3)  $a = 0, \beta = \frac{\pi}{2}$  (4) none

- 75. Let A, B, C, D be the matrices of order  $2 \times 3$ ,  $3 \times 4$ ,  $4 \times 4$ ,  $4 \times 2$  respectively. Let  $x = (\alpha AB \gamma C^2D)^3$  where  $\alpha$  and  $\gamma$  are scalars. Let  $|x| = k |ABC^2D|^3$  then k =(1)  $\alpha\gamma$  (2)  $\alpha^3\gamma^3$ 
  - (3)  $\alpha^{6}\gamma^{6}$  (4) none of these

76. If  $c_{ij}$  is the co-factor of the element  $a_{ij}$  of the



80.  $\int \cos(\log x) dx = f(x) + c$ , where c is an arbitrary constant. Here f(x) =

- (1)  $x[\cos(\log x) + \sin(\log x)]$
- (2) x[cos(log x) sin(log x)]
- (3)  $\frac{x}{2}[\cos(\log x) + \sin(\log x)]$
- (4)  $\frac{x}{2}[\cos(\log x) \sin(\log x)]$
- 81. The figure shows as triangle AOB and the parabola  $y = x^2$ . The ratio of the area of the triangle AOB to the area of the region AOB of the parabola  $y = x^2$  is equal to





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- 82. The area in the first quadrant between  $x^2 + y^2 = \pi^2$  and  $y = \sin x$  is—
  - (1)  $\frac{\pi^3 8}{4}$ (2)  $\frac{\pi^3}{4}$ (4)  $\frac{\pi^3 - 8}{2}$ (3)  $\frac{\pi^3 - 16}{4}$
- 83. The differential equation representing the family of curves  $y^2 = 2c(x + \sqrt{c})$ , where c is a positive parameter, is of \_\_\_\_\_.
  - (1) order 1, degree 2 (2) order 1, degree 3
  - (3) order 2, degree 3 (4) order 1, degree 1
- 84. If m and n denote respectively the order and degree of differential equation

$$\left[a + \left(\frac{dy}{dx}\right)^6\right]^{7/5} = b\frac{d^2y}{dx^2}$$

then the value of (m, n) will be

(1) (1,7) (2) (1,6) (3) (2,5)(4) (2, 6)

Let a = -i - k, b = -i + j and c = i + 2j + 3k be 85.

> three given vectors. If  $\mathbf{r}$  is a vector such that  $\rightarrow \rightarrow$  $\mathbf{r} \times \mathbf{b} = \mathbf{c} \times \mathbf{b}$  and  $\mathbf{r} \cdot \mathbf{a} = 0$  then the value of

 $\overrightarrow{r \cdot b}^{is}$ 

(3) 9 (1) 3(4) 12 (2) 6

86. Three non-zero vectors  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  are related

as  $\overrightarrow{c} = 2$  a and  $\overrightarrow{b} = -5$  c then the angle between

(3) 90°

(4) 180°

- $\rightarrow \rightarrow$  a and b is —
- $(1) 0^{\circ}$ (2) 45°
- 87. A line makes the same angle  $\theta$  with each of the x and z axis. If it makes the angle  $\beta$  with y-axis such that  $\sin^2\beta = 3\sin^2\theta$ , then  $\cos^2\theta$  equals

(1) 
$$\frac{3}{5}$$
 (2)  $\frac{1}{2}$  (3)  $\frac{2}{5}$  (4)  $\frac{2}{3}$ 

The cosine of the angle between any two 88. diagonals of a cube is-

(1) 
$$\frac{1}{3}$$
 (2)  $\frac{1}{2}$  (3)  $\frac{2}{3}$  (4)  $\frac{1}{\sqrt{3}}$ 

89. Consider the linear programming problem max. Z = 4x + v

Subject to  $x + y \le 50$ ;  $x + y \ge 100$ ;  $x, y \ge 0$ 

The max. value of z is

(3) 100 (4) does not exist  
If 
$$P(A) = \frac{1}{4}$$
,  $P(B) = \frac{1}{5}$  and  $P(AB) = \frac{1}{8}$  then  $P\left(\frac{A^{C}}{B^{C}}\right) =$   
(1)  $\frac{21}{32}$  (2)  $\frac{25}{32}$  (3)  $\frac{27}{32}$  (4)  $\frac{29}{32}$   
The derivative of  $\sin^{-1}\left(\frac{2x}{1+x^{2}}\right)$  w.r.t.  
 $\cos^{-1}\left(\frac{1-x^{2}}{1+x^{2}}\right)$  is --  
(1) 1 (2)1/2  
(3) -1 (4) none of these  
The point on the curve  $y = x^{2} - x - 8$  at which the  
tangent is parallel to x-axis is--  
(1)  $\left(\frac{1}{2}, \frac{33}{4}\right)$  (2)  $\left(\frac{1}{2}, -\frac{33}{4}\right)$   
(3)  $\left(\frac{1}{4}, \frac{33}{2}\right)$  (4) none of these

t.

(2) 50

$$D3. The value of \int \frac{\tan(\sin^{-1} x)}{\sqrt{1-x^2}} dx$$

(1) 0

90.

91.

92.

(1)  $\log |\sec(\sin^{-1}x)|$  (2)  $\log(\sin^{-1}x)$  $(3) \log \sec x$ (4) none of these

4. If 
$$\int_{a}^{b} \frac{x^{n}}{x^{n} + (16 - x)^{n}} dx = 6$$
, then :

- (1)  $a = 3, b = 2, n \in \mathbb{R}$
- (2)  $a = 2, b = 14, n \in R$
- (3)  $a = 7, b = 118, n \in \mathbb{R}$
- (4) none of these
- The area of the region bounded by the curve 95.

y = sin x between the ordinates x = 0, x =  $\frac{\pi}{2}$  and x-axis is

- (1) 1 sq. unit (2) 3 sq. unit
- (3) 11 sq. unit (4) none of these

96. If 
$$A = \begin{pmatrix} 1 & 5 \\ 0 & 2 \end{pmatrix}$$
, then  
(1)  $A^2 - 2A + 2I = 0$  (2)  $A^2 - 3A + 2I = 0$   
(3)  $A^2 - 5A + 2I = 0$  (4)  $2A^2 - A + I = 0$ 

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97. If a, b, c are distinct positive real number then

a b c the value of the determinant  $\begin{vmatrix} b & c & a \\ c & a & b \end{vmatrix}$  is (1) < 0(2) > 0 (3) 0 (4) ≥0 98.  $\int \cos^3 x \cdot e^{\log \sin x} dx = \int \cos^3 x \sin x \, dx =$ (1)  $\frac{\cos^4 x}{4x} + c$  (2)  $-\frac{\cos^4 x}{4x} + c$ (3)  $-\frac{\cos^4 x}{4} + c$ 

99. If  $\begin{vmatrix} a \\ a \end{vmatrix} = 3$ ,  $\begin{vmatrix} b \\ b \end{vmatrix} = 4$ , then the value of  $\alpha$  for which  $\overrightarrow{a}_{a+\alpha} \overrightarrow{b}$  is perpendicular to  $\overrightarrow{a}_{-\alpha} \overrightarrow{b}$ , is (1)  $\frac{2}{3}$  (2)  $\frac{3}{4}$  (3)  $\frac{5}{8}$  (4) none of these 100. If  $\tan^{-1}\left(\frac{x+1}{x-1}\right) + \tan^{-1}\left(\frac{x-1}{x}\right) = \tan^{-1}(-7)$ , then x = (1)  $\frac{1}{2}$ Education a logation of the lo (2) 2

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(4)	22	(2) (3)	63 63	(1)	14. 72	(2)	73	(2)	
(2)	33. 34	(0)	64	(3)	74	(0) (1)	74	(1)	
(3)	35.	(4)	65.	(3)	75.	(4)	75.	(3)	
(4)	36.	(4)	66.	(2)	76.	(1)	76.	(2)	
(2)	37.	(3)	67.	(2)	77.	(2)	77.	(2)	
(4)	38.	(4)	68.	(3)	78.	(3)	78.	(2)	$\sim \sim \sim$
(4)	39.	(3)	69.	(2)	79.	(3)	79.	(4)	
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(1)	41.	(2)			81.	(1)	81.	(2)	
(3)	42.	(1)			82.	(1)	82.	(1)	
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(2)	47.	(3)			87.	(3)	87.	(1)	
(2)	48.	(3)			88.	(4)	88.	(1)	
(1)	49.	(1)			89.	(3)	89.	(4)	
(2)	50.	(1)			90.	(1)	90.	(3)	
$(\mathbf{c})$	51.	(2)		Ø	91.	(2)	91.	(1)	
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(3)	56				96	(1)	96.	(2)	
(3)	57.	(4)	$\mathbf{\mathbf{N}}$		97.	(2)	97.	(1)	
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	3)         (4)         (2)         (4)         (2)         (1)         (3)         (2)         (1)         (2)         (1)         (2)         (1)         (2)         (1)         (2)         (3)         (3)         (1)         (3)         (3)         (3)         (3)         (3)         (3)         (3)         (2)	(3)       35.         (4)       36.         (2)       37.         (4)       38.         (4)       39.         (2)       40.         (1)       41.         (3)       42.         (2)       43.         (1)       44.         (2)       43.         (1)       44.         (2)       45.         (4)       46.         (2)       47.         (2)       48.         (1)       49.         (2)       50.         (3)       51.         (3)       52.         (4)       53.         (3)       54.         (1)       55.         (3)       56.         (3)       57.         (2)       58	(3) <b>35.</b> (4) $(4)$ <b>36.</b> (4) $(2)$ <b>37.</b> (3) $(4)$ <b>38.</b> (4) $(4)$ <b>39.</b> (3) $(4)$ <b>39.</b> (3) $(2)$ <b>40.</b> (3) $(1)$ <b>41.</b> (2) $(3)$ <b>42.</b> (1) $(2)$ <b>43.</b> (1) $(1)$ <b>44.</b> (1) $(2)$ <b>43.</b> (1) $(2)$ <b>45.</b> (2) $(4)$ <b>46.</b> (1) $(2)$ <b>47.</b> (3) $(2)$ <b>48.</b> (3) $(1)$ <b>49.</b> (1) $(2)$ <b>50.</b> (1) $(3)$ <b>51.</b> (2) $(3)$ <b>54.</b> (1) $(3)$ <b>54.</b> (1) $(3)$ <b>56.</b> (2) $(3)$ <b>57.</b> (4) $(2)$ <b>58.</b> (2)	3)       35. $(4)$ 65.         (4)       36. $(4)$ 66.         (2)       37. $(3)$ 67.         (4)       38. $(4)$ 68.         (4)       39. $(3)$ 69.         (2)       40. $(3)$ 70.         (1)       41. $(2)$ 43. $(1)$ (2)       43. $(1)$ 1         (2)       43. $(1)$ 1         (2)       43. $(1)$ 1         (2)       45. $(2)$ 44.         (1)       44. $(1)$ 1         (2)       47. $(3)$ 1         (2)       48. $(3)$ 1         (2)       48. $(3)$ 1         (3)       51. $(2)$ 53.       1         (3)       54. $(1)$ 1       1         (3)       56. $(2)$ (3)       57. $(4)$	(3)       35.       (4)       65.       (5)         (4)       36.       (4)       66.       (2)         (2)       37.       (3)       67.       (2)         (4)       38.       (4)       68.       (3)         (4)       39.       (3)       69.       (2)         (4)       39.       (3)       69.       (2)         (2)       40.       (3)       70.       (3)         (1)       41.       (2)       (3)       70.       (3)         (1)       41.       (2)       (3)       70.       (3)         (1)       44.       (1)       (1)       (1)       (1)         (2)       45.       (2)       (2)       (4)       (3)         (2)       45.       (2)       (4)       (3)       (1)         (2)       48.       (3)       (3)       (3)       (4)       (3)         (3)       51.       (2)       (4)       (2)       (3)       (2)         (3)       54.       (1)       (3)       (2)       (3)       (2)         (3)       56.       (2)       (3)       (2)	(3) $35.$ $(4)$ $65.$ $(3)$ $75.$ $(4)$ $36.$ $(4)$ $66.$ $(2)$ $76.$ $(2)$ $37.$ $(3)$ $67.$ $(2)$ $77.$ $(4)$ $38.$ $(4)$ $68.$ $(3)$ $78.$ $(4)$ $39.$ $(3)$ $69.$ $(2)$ $79.$ $(2)$ $40.$ $(3)$ $70.$ $(3)$ $80.$ $(1)$ $41.$ $(2)$ $81.$ $81.$ $(3)$ $42.$ $(1)$ $82.$ $(2)$ $43.$ $(1)$ $83.$ $(1)$ $44.$ $(1)$ $84.$ $(2)$ $45.$ $(2)$ $85.$ $(4)$ $46.$ $(1)$ $86.$ $(2)$ $48.$ $(3)$ $87.$ $(2)$ $48.$ $(3)$ $89.$ $(1)$ $49.$ $(1)$ $89.$ $(2)$ $50.$ $(1)$ $90.$ $(3)$ $51.$ $(2)$ $91.$ $(3)$ $54.$ $(1)$ $93.$ $(3)$ $54.$ $(1)$ $94.$ $(1)$ $55.$ $(4)$ $95.$ $(3)$ $56.$ $(2)$ $96.$ $(3)$ $57.$ $(4)$ $97.$ $(2)$ $58.$ $(2)$ $98.$	(3)35.(4)65.(3)75.(4)(4)36.(4)66.(2)76.(1)(2)37.(3)67.(2)77.(2)(4)38.(4)68.(3)78.(3)(4)39.(3)69.(2)79.(3)(2)40.(3)70.(3)80.(3)(1)41.(2)81.(1)(3)42.(1)82.(1)(2)43.(1)83.(4)(1)44.(1)84.(1)(2)45.(2)85.(1)(4)46.(1)86.(2)(2)47.(3)87.(3)(2)48.(3)88.(4)(1)49.(1)89.(3)(2)50.(1)90.(1)(3)51.(2)91.(2)(3)52.(4)92.(2)(3)54.(1)95.(4)(3)56.(2)96.(1)(3)57.(4)97.(2)(3)57.(4)97.(2)(2)58.(2)98.(1)	3)35.(4)65.(5)75.(4)75.(4)36.(4)66.(2)76.(1)76.(2)37.(3)67.(2)77.(2)77.(4)38.(4)68.(3)78.(3)78.(4)39.(3)69.(2)79.(3)79.(2)40.(3)70.(3)80.(3)80.(1)41.(2)81.(1)81.81.(3)42.(1)82.(1)82.(2)43.(1)83.(4)83.(1)44.(1)84.83.(4)(2)45.(2)85.(1)(4)46.(1)86.(2)(2)48.(3)87.(3)51.(2)91.(2)50.(1)90.(3)51.(2)91.(3)52.(4)92.(4)53.(1)94.(1)55.(4)95.(3)56.(2)96.(1)55.(4)97.(2)58.(2)98.	3)35.(4)65.(5)75.(4)75.(3)(4)36.(4)66.(2)76.(1)76.(2)(2)37.(3)67.(2)77.(2)77.(2)(4)39.(3)69.(2)79.(3)79.(4)(2)40.(3)70.(3)80.(3)80.(3)(1)41.(2)81.(1)81.(2)(3)42.(1)83.(4)83.(2)(3)42.(1)83.(4)83.(2)(1)44.(1)83.(4)84.(3)(2)45.(2)85.(1)85.(3)(2)45.(2)85.(1)85.(3)(2)48.(3)87.(3)87.(1)(2)48.(3)88.(4)88.(1)(2)48.(3)91.(2)91.(1)(3)51.(2)93.(1)93.(1)(3)52.(4)92.(2)92.(2)(3)54.(1)94.(1)94.(2)(3)56.(2)96.(1)96.(2)(3)57.(4)97.(2)97.(1)(3)58.(2)98.(1)98.(3)

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