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GOAL TALENT SEARCH EXAM

2023-24

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CLASS 12th PCB/PCM

MAIN-EXAM

TIME : 2.00 Hrs. | Max. Marks : 400

DON'T OPEN THE SEAL WITHOUT INSTRUCTION

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.
- The maximum marks for each question is 4.
- 1 mark will be deducted against each negative response from the total marks.
- Use of calculator, slide rule, graph paper & trigonometric tables is **NOT PERMITTED.**

Name of the Candidate : _____

Class : _____

Roll No. : _____

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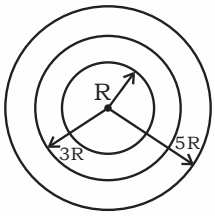
GOAL TALENT SEARCH EXAM : 24.12.2023

[Time : 2.00 Hours] **CLASS : XII MAIN EXAM (PCB / PCM)** **Full Marks : 400**

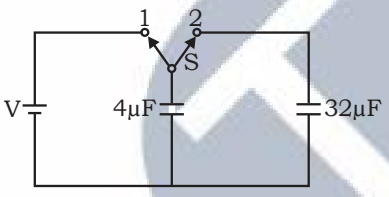
01. Three concentric metallic spherical shells of radii R, 3R, 5R are given charges Q_1, Q_2, Q_3, respectively. It is found that the surface charge densities on the outer surface of the shells are equal. Then, the ratio of the charges given to the shells $Q_1 : Q_2 : Q_3$ is :



(1) 1 : 6 : 18 (2) 1 : 9 : 27

(3) 1 : 6 : 15 (4) 1 : 8 : 16

02. A capacitor of 4 μF is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is :



(1) 89% (2) 94% (3) 83% (4) 76%

03. The n rows each containing m cells in series are joined in parallel. Maximum current is taken from this combination across an external resistance of 2Ω resistance. If the total number of cells used are 200 and internal resistance of each cell is 0.25Ω, then :

(1) m = 50, n = 4 (2) m = 40, n = 5

(3) m = 100, n = 2 (4) m = 20, n = 10

04. The acceleration of an electron at a certain moment in a magnetic field $\vec{B} = \hat{i} + 2\hat{j} - 3\hat{k}$ is $\vec{a} = x\hat{i} + 3\hat{j} + \hat{k}$. The value of x is :

(1) $\frac{3}{2}$ (2) 2 (3) –4 (4) –3

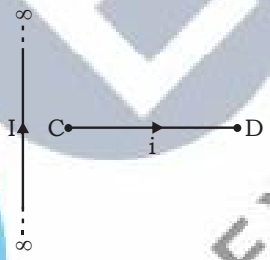
05. A bar magnet has a coercivity 6×10^3 Am^{-1}. It is desired to demagnetise it by inserting it inside a solenoid 20 cm long and having 120 turns. The current by the solenoid should be :

(1) 20 A (2) 5 A (3) 10 A (4) 30 A

06. A wire of length $2l$ metre carrying a current of I ampere is bent in the form of a circle. Its magnitude of magnetic moment will be :

(1) $\frac{l^2 I}{\pi}$ (2) $\frac{l^2 I}{8\pi}$ (3) $\frac{l^2 I}{4\pi}$ (4) $\frac{2l^2 I}{\pi}$

07. Wire CD carrying i is placed under the influence of infinite long current carrying wire shown :



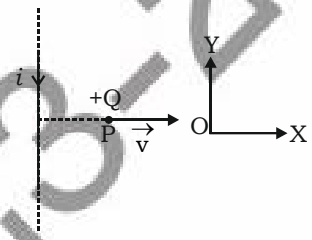
(1) CD will move downward without any rotation.

(2) CD will move upward without any rotation.

(3) CD will move upward with clockwise rotation.

(4) CD will move upward with anti-clockwise.

08. A very long straight wire carries a current i. At the instant when a charge +Q at point P has velocity, as shown, the magnetic force on the charge is :



(1) opposite to OX (2) opposite to OY

(3) along OX (4) along OY

09. A thin wire of length 3m is perpendicular to the xy-plane. It is moved with velocity $\vec{v} = 3\hat{i} + 2\hat{j} + 4\hat{k}$ m/s through a region of magnetic induction $\vec{B} = (2\hat{i} + \hat{j})$ Wb/m^2. Then potential difference induced between the ends of the wire :

(1) 3 volt (2) 1.5 volt (3) 6 volt (4) 9 volt

10. A direct current of 20 A is superimposed on an alternating current i = 80 cos ωt (A) flowing through a wire. The effective value of the resulting current will be :

(1) $60\sqrt{2}$ A (2) $50\sqrt{2}$ A (3) 30 A (4) 60 A

11. A series resonant L-C-R circuit has a quality factor (Q-factor) 0.6. If R = 2.5kΩ, C = 4μF, then the value of inductance L is :

(1) 4.5 H (2) 2.25 H (3) 9 H (4) 6 H

12. The oscillating electric and magnetic field vectors of an electromagnetic wave are oriented along :

(1) mutually perpendicular directions and differ in phase by 90°

(2) mutually perpendicular directions and are in phase

(3) the same direction and are in phase

(4) the same direction but differ in phase by 180°

13. The mutual inductance M_{21} of coil 2 with respect to coil 1 :

I. increases when they are brought nearer.

II. depends on the current passing through the coils.

III. increases when one of them is rotated about an axis.

IV. is the same as M_{12} of coil 1 with respect to coil 2.

Which of the above given statements are correct?

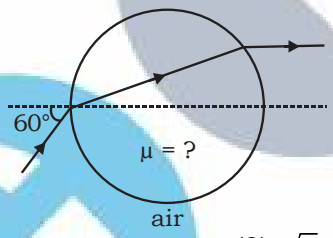
(1) Only IV is correct.

(2) I and III are correct.

(3) I, III and IV are correct.

(4) I and IV are correct.

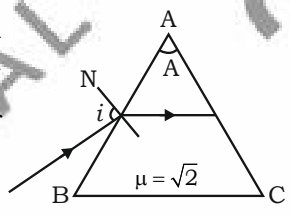
14. Find the refractive index μ of glass sphere if emergent ray is horizontal.



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

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

15. What should be the minimum value of prism angle A, so that ray will not come out from AC surface for any value of angle incidence i ?



(1) 60° (2) 75° (3) 90° (4) All

16. A ray of unpolarised light is incident on a glass plate at the polarising angle θ°. Then :

(1) the reflected and transmitted both rays will be partially polarised.

(2) the reflected ray will be partially polarised and the transmitted ray will be completely polarised.

(3) the reflected ray will be completely polarised and the transmitted ray will be partially polarised.

(4) the reflected ray and the transmitted ray both will be completely polarised.

17. On introducing a thin mica sheet of thickness 6×10^{-6} m and refractive index 1.5 in the path of one of the waves, central bright maxima shifts by n fringes. Wavelength of the wave used is 6000 Å, then n is :

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

18. Electrons of mass m with de-Broglie wavelength λ fall on the target in an X-ray tube. The cut-off wavelength (λ_0) of the emitted X-ray is :

(1) $\frac{mc\lambda^2}{2h}$ (2) $\frac{m^2c^2\lambda^3}{2h^2}$

(3) $\frac{2m\lambda^2}{ch}$ (4) $\frac{2mc\lambda^2}{h}$

19. The energy of a hydrogen atom in the ground state −13.6 eV. The energy of a He^+ ion in the second excited state will be :

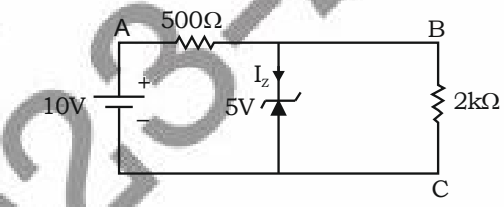
(1) −6.04 eV (2) −13.6 eV

(3) −27.2 eV (4) −9.8 eV

20. Mass number of two elements are 27 and 8. Then ratio of their nuclear density will be :

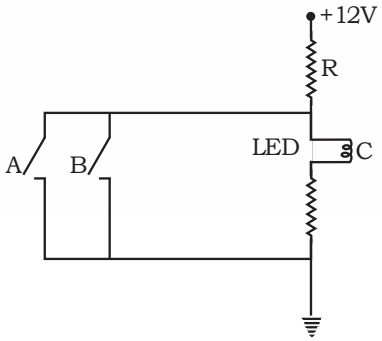
(1) 3 : 2 (2) 2 : 3 (3) 1 : 1 (4) 9 : $2\sqrt{2}$

21. The current flowing through the Zener diode in figure is :



(1) 7.5 mA (2) 25 mA (3) 2.5 mA (4) 5 mA

22. Correct Boolean operation represented by the circuit diagram drawn is :



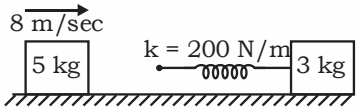
(1) OR gate (2) AND gate

(3) NAND gate (4) NOR gate

23. Position of particle moving along x-axis is given as $x = (t-4)^2$, where x is in meter and t is in seconds. Distance covered by the particle in 8 seconds :

(1) 16 m (2) 32 m (3) 64 m (4) 24 m

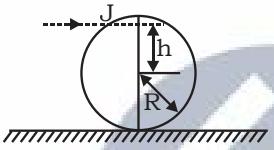
24. A 3 kg block attached with spring of spring constant k = 200 N/m is placed at rest now a 5 kg block moving with speed 8 m/sec strike with spring attached with 3 kg block then speed of both block at the time of maximum compression of spring will be :



(1) 3.5 m/s (2) 6 m/s

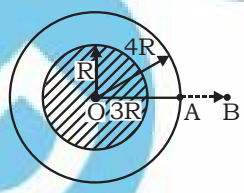
(3) 5 m/s (4) 2.5 m/s

25. A hollow sphere rests on a horizontal surface. A horizontal impulse is applied at height h from centre. The sphere starts rolling just after the application of impulse. The ratio $\frac{R}{h}$ will be :



(1) $\frac{3}{2}$ (2) $\frac{5}{3}$ (3) $\frac{7}{10}$ (4) $\frac{4}{3}$

26. A solid sphere of mass 2M is a placed inside a hollow concentrically sphere of radius 4R and mass M then work done to move mass m_0 from point A to B (at a distance 5R from centre) will be :



(1) $\frac{17\,GMm_0}{60R}$ (2) $\frac{13\,GMm_0}{40R}$

(3) $\frac{11\,GMm_0}{40R}$ (4) $\frac{3\,GMm_0}{20R}$

27. A tank is filled with water of density 10^3 kg/m^3 and oil of density 0.8×10^3 kg/m^3. The height of water layer is 2m and that of the oil layer is 5m. The velocity of efflux from an opening in the bottom of the tank is :

(1) 9 m/s (2) 11 m/s

(3) 13 m/s (4) 15 m/s

28. A beaker contains 300 gm of water. The heat capacity of the beaker is equal to that of 60 gm of water. The initial temperature of water in the beaker is 27°C. If 720 gm of hot water at 96°C is poured in it, the final temperature (neglecting radiation loss) will be nearest to :

(1) 78 °C (2) 81 °C (3) 73 °C (4) 69 °C

29. Two closed-end pipes, when sounded together produce 6 beats per second (in fundamental mode). If their lengths are in the ratio 102 : 101, then fundamental notes (in Hz) produced by them are :

(1) 606 Hz, 612 Hz (2) 303 Hz, 309 Hz

(3) 600 Hz, 606 Hz (4) 300 Hz, 306 Hz

30. A uniform rope of length L and mass m hangs vertically from a rigid support. A block of mass 3m is attached to the free end of the rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio λ_2/λ_1 is :

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

31. Which one of the following is the lightest ?

(1) 0.2 mole of hydrogen gas

(2) 6.023×10^{22} molecules of nitrogen

(3) 0.1 g of silver

(4) 0.1 mole of oxygen gas

32. The electronic configuration of four elements are given below. Which elements does not belong to the same family as others ?

(1) $[Xe]4f^{14}5d^{10}6s^2$

(2) $[Kr]4d^{10}5s^2$

(3) $[Ne]3s^23p^5$

(4) $[Ar]3d^{10}4s^2$

33. Which is not the correct order for the stated property ?

(1) Ba > Sr > Mg ; atomic radius

(2) F > O > N ; first ionization enthalpy

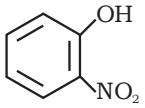
(3) Cl > F > I ; electron affinity

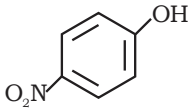
(4) O > Se > Te ; electronegativity

34. According to MO theory which of the following lists ranks the nitrogen spacies in terms of decreasing bond order ?

(1) $N_2^{2-} > N_2^- > N_2$ (2) $N_2 > N_2^- > N_2^{-2}$

(3) $N_2^- > N_2^{2-} > N_2$ (4) $N_2^- > N_2 > N_2^{2-}$

35. The vapour pressure of  is higher than

 due to :

(1) dipole moment
(2) dipole-dipole interaction
(3) H-bonding
(4) lattice structure

36. The following two reactions are known :

$Fe_2O_3(s) + 3CO(g) \longrightarrow 2Fe(s) + 3CO_2(g)$; $\Delta H = -26.8$ kJ

$FeO(s) + CO(g) \longrightarrow Fe(s) + CO_2(g)$; $\Delta H = -16.5$ kJ

The value of ΔH for the following reaction

$Fe_2O_3(s) + CO(g) \longrightarrow 2FeO(s) + CO_2(g)$ is :

(1) +6.2 kJ (2) +10.3 kJ
(3) –43.3 kJ (4) –10.3 kJ

37. Equilibrium constant (K) for the reaction :

$Ni(s) + 4CO(g) \rightleftharpoons Ni(CO)_4(g)$ can be written in terms of :

I. $Ni(s) + 2CO_2(g) + 2C(s) \rightleftharpoons Ni(CO)_4(g)$;

equilibrium constant = K_1.

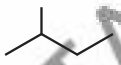
II. $CO_2(g) + C(s) \rightleftharpoons 2CO(g)$;

equilibrium constant = K_2.

What is the relation between K, K_1 and K_2 ?

(1) $K = (K_1)/(K_2)^2$ (2) $K = (K_1 \cdot K_2)$
(3) $K = (K_1)(K_2)^2$ (4) $K = K_1/K_2$

38. Which of the following compound can be best prepared by Wurtz reaction ?

(1)  (2) 

(3)  (4) 

39. Complete the following reactions :

(i) $C_2H_5I + H_2 \xrightarrow[C_2H_5OH]{Zn-Cu} X$

(ii) $CH_3COONa + H_2O \xrightarrow{Electrolysis} Y$

(iii) $CH_3CH_2CH_2CH_2CH_2CH_3 \xrightarrow[773\ K]{Cr_2O_3/Al_2O_3} Z$

(1) $X = C_2H_6$, $Y = C_2H_6$, $Z = C_6H_6$
(2) $X = CH_4$, $Y = CH_3COOH$, $Z = CH_3CH_3$
(3) $X = C_2H_6$, $Y = CH_4$, $Z = C_4H_{10}$
(4) $X = C_2H_6$, $Y = CH_4$, $Z = C_5H_{10}$

40. Which one of the following exhibits geometrical isomerism ?

(1) 1, 2-Dibromopropene
(2) 2, 3-Dimethylbut-2-ene
(3) 2, 3-Dibromobut-2-ene
(4) Both '1' and '3'

41. Consider the following four electrodes :

P = Cu^{2+} (0.0001 M)/Cu(s)

Q = Cu^{2+} (0.1 M)/Cu(s)

R = Cu^{2+} (0.01 M)/Cu(s)

S = Cu^{2+}(0.001 M)/Cu(s)

If the standard reduction potential of Cu^{2+}/Cu is +0.34 V, the reduction potentials in volts of the above electrodes follow the order.

(1) P > S > R > Q (2) S > R > Q > P
(3) R > S > Q > P (4) Q > R > S > P

42. During the kinetic study of the reaction, $2A + B \rightarrow C + D$, following results were obtained:

Run	[A](mol L^{-1})	[B](mol L^{-1})	Initial rate of formation of D (mol L^{-1} min^{-1})
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Based on the above data which one of the following is correct ?

(1) rate = $k[A]^2[B]$ (2) rate = $k[A][B]$
(3) rate = $k[A]^2[B]^2$ (4) rate = $k[A][B]^2$

43. Which one of the following does not correctly represent the correct order of the property indicated against it ?

(1) Ti < V < Cr < Mn : increasing number of oxidation states
(2) $Ti^{3+} < V^{3+} < Cr^{3+} < Sc^{3+}$: increasing magnetic moment
(3) $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in aqueous solution
(4) Ti < V < Cr < Mn : increasing melting point

44. The amount of solute (molar mass 60 g mol^{-1}) that must be added to 180 g of water so that the vapour pressure of water is lowered by 10% is :

(1) 30 g (2) 66 g (3) 120 g (4) 12 g

45. Which of the following is paramagnetic ?

(1) $[Fe(CN)_6]^{4-}$ (2) $[Ni(CO)_4]$
(3) $[Ni(CN)_4]^{2-}$ (4) $[CoF_6]^{3-}$

46. Decreasing order of reactivity of hydrogen halide acid in the conversion of ROH → RX is :

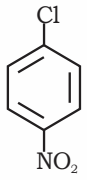
(1) HCl > HBr > HI > HF

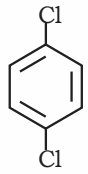
(2) HI > HBr > HCl > HF

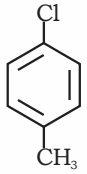
(3) HF > HCl > HBr > HI

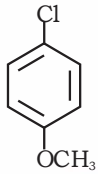
(4) HF > HBr > HI > HCl

47. Which one of the following undergoes nucleophilic aromatic substitution at the fastest rate ?

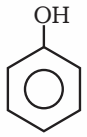
(1) 

(2) 

(3) 

(4) 

48. The correct increasing order of acidic strength of the following is :

I. 

II. 

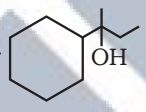
III. 

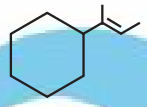
(1) I < II < III

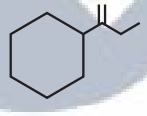
(2) II < I < III

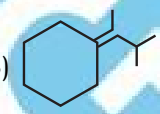
(3) II < III < I

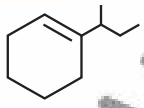
(4) I < III < II

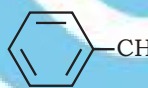
49. Which of the following is not the product of acid catalysed dehydration of  ?

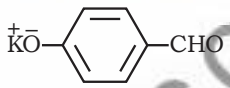
(1) 

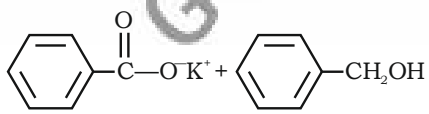
(2) 

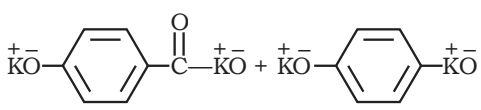
(3) 

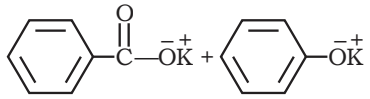
(4) 

50. Which products is formed when the compound  is treated with concentrated aqueous KOH solution ?

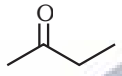
(1) 

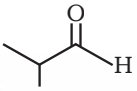
(2) 

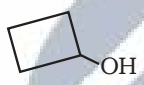
(3) 

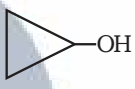
(4) 

51. Compound 'X' C_4H_8O which gives 2, 4-DNP derivative and positive iodoform test is :

(1) 

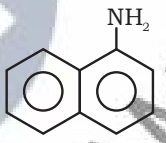
(2) 

(3) 

(4) 

52. Which will go for diazotisation ?

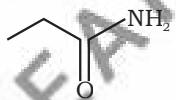
(1) $C_6H_5NH_2$

(2) 

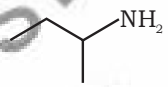
(3) 

(4) All of the above

53. Which one among the following is expected to form a secondary alcohol on treatment with Nitrous acid ?

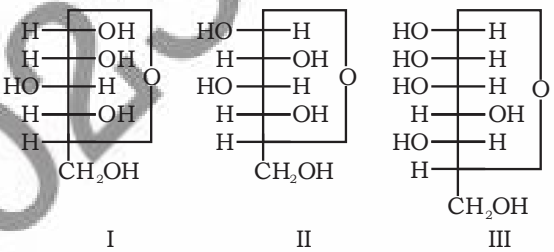
(1) 

(2) 

(3) 

(4) 

54. The cyclic structures of monosaccharides are given below which of these are anomers ?



I II III

(1) I and II

(2) II and III

(3) I and III

(4) III is anomer of I and II

55. Hydrolysis of sucrose with dilute aqueous sulphuric acid yields :

(1) 1:1 D (+)-Glucose; D-(-)-fructose

(2) 1:2 D-(+)-Glucose; D-(-)-fructose

(3) 1:1 D-(-)-Glucose; D-(+)-fructose

(4) 1:2 D-(-) Glucose; D-(+)-fructose

56. How many gram of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3. The concentrated acid is 70% HNO_3?

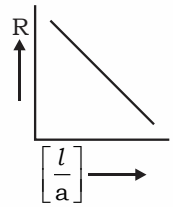
(1) 45.0 g conc. HNO_3

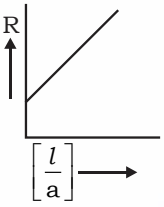
(2) 90.0 g conc. HNO_3

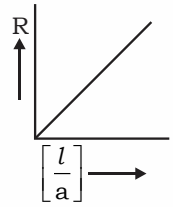
(3) 70.0 g conc. HNO_3

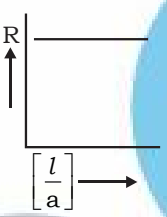
(4) 50.0 g conc. HNO_3

57. Variation of resistance (R) with increase in cell constant (l/a) gives graph of the type

(1) 

(2) 

(3) 

(4) 

58. For a reaction of the type $X \underset{k_2}{\overset{k_1}{\rightleftharpoons}} Y$, $[X]_0$ is the concentration of X at time t = 0 and [X] is the concentration of X at time t = t

Thus, correct rate expression is :

(1) $\frac{-d[X]}{dt} = k_1 [X]_0 - (k_1 + k_2)[X]$

(2) $\frac{-d[X]}{dt} = (k_1 + k_2)[X] - k_2[X]_0$

(3) $\frac{-d[X]}{dt} = (k_1 + k_2)[X]_0 - k_2[X]$

(4) $\frac{-d[X]}{dt} = (k_1 - k_2)[X] - k_2[X]_0$

59. Consider the following statements.

Statement I : CrO_3 is an acidic oxide.

Statement II : CrO_3 liberates CO_2 with Na_2CO_3.

(1) Both **Statement I** and **II** are correct.

(2) Only **Statement I** is correct.

(3) Only **Statement II** is correct.

(4) Both **Statements I** and **II** are incorrect.

60. Match the complex species given in Column I with the possible isomerism given in Column II and assign the correct code.

Column I (Complex species)	**Column II** (Isomerism)
(a) $[Co(NH_3)_4Cl_2]^+$	(i) Optical
(b) *cis* - $[Co(en)_2Cl_2]^+$	(ii) Ionisation
(c) $[Co(NH_3)_5(NO_2)]Cl_2$	(iii) Coordination
(d) $[Co(NH_3)_6][Cr(CN)_6]$	(iv) Geometrical

(1) (a-i), (b-ii), (c-iii), (d-iv)

(2) (a-iv), (b-i), (c-ii), (d-iii)

(3) (a-iv), (b-iii), (c-ii), (d-i)

(4) (a-ii), (b-iii), (c-i), (d-iv)

61. In a certain code 'bi nie pie' means, 'some good jokes', 'nie bat lik' means 'some real storeis' and 'pie lik tol' means many good stories'. What is the code for 'jokes'?

(1) bi (2) nie

(3) pie (4) None of these

62. 'Japan' is related to 'Diet', in the same way as 'Iran' is related to :

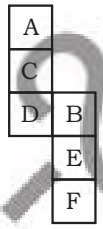
(1) Majilis (2) Congress

(3) Sansad (4) None of these

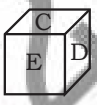
63. Choose the term which is different from others.

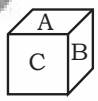
(1) PRTV (2) CEGI (3) ACFH (4) JLNP

64. From amongst he four given alternatives, choose the cube that can be formed by folding the given set (X).



(X)

(1) 

(2) 

(3) 

(4) 

65. What will come in place of question mark

(1) 1 (2) 8 (3) 6 (4) 16

66. A is taller than E, B is taller than D, F is taller than C, D is taller than A and E is taller than F, then who is the tallest among them ?

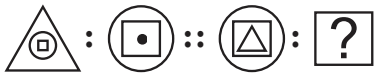
(1) D (2) B (3) E (4) F

67. Which figure best represents the relationship amongst Editor, Newspaper and Journalist ?

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

68. Choose the figure which will complete the second pair, in the same way as the first pair.

Problem Figures

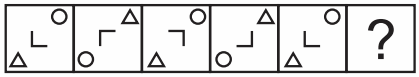


Answer Figures

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

69. Choose the figure which will complete the following series.

Problem Figures



Answer Figures

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

70. Choose the correct water image of the figure (X) from amongst the four alterantive (1), (2), (3) and (4) given along with it.


(X)

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

THIS SEGMENT IS ONLY FOR PCB GROUP STUDENTS

71. In which of the following animals, digestive tract has additional chambers like gizzard and crop ?

(1) Frog & *Columba*

(2) *Crocodilus* & *Felis*

(3) *Pavo* & *Struthio*

(4) *Macaca* & *Neophron*

72. Ligation of foreign DNA at which of the following site will result in loss of ampicillin resistance of PBR322

(1) Pst I or Pvu I (2) BamHI

(3) EcoRI (4) Pvu II & Cla I

73. During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out

(1) Histone protein (2) Phospholipid

(3) Deoxy ribonucleic acid (4) Ribonucleic acid

74. **Statement-I :** Restriction endonucleases cut the DNA site.

Statement-II : Restriction endonucleases recognise specific sequence to cut DNA known as palindromic nucleotide sequence.

In the light of the above statements choose the most appropriate answer from the options given below :

(1) Both statement (I) and (II) are incorrect.

(2) Both statement (I) and (II) are correct.

(3) Only statement (I) is correct.

(4) Only statement (II) is incorrect.

75. From the group of organisms given below, select the correct option representing descending order of diversity -

(a) Invertebrate (b) Bird

(c) Plant (d) Amphibia

Choose the correct answer from the options given below :

(1) a > b > c > d (2) d > a > b > c

(3) b > c > d > a (4) a > c > b > d

76. Match the column I and Column-II

Column-I	**Column-II**
(A) Zoological park	(i) Khasi Hills in meghalaya
(B) Amazon forest	(ii) Endemism
(C) Sacred groves	(iii) Ex-situ conservation
(D) Hot spot	(iv) Release of large quantity of oxygen

Select the correct answer :

	A	B	C	D
(1)	(ii)	(iii)	(iv)	(i)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(iii)	(iv)	(ii)	(i)
(4)	(i)	(ii)	(iii)	(iv)

77. Identify the correct statements :

(A) The detritus food chain begins with detritus that is dead organic matter

(B) Earthworm break down detritus into smaller particles by a process called catabolism.

(C) Detritivores perform fragmentation.

(D) Water soluble inorganic nutrients go down into the soil and get precpitated by a process called leaching.

Choose the correct answer from the option given below :

(1) A, B & D (2) A, B & C

(3) B, C & D (4) A, C & D

78. **Statement (I) :** Air current carry the pollens grains to the mouth of the archegonia where the male gametes are discharged and pollen tubes is not formed.

Statment (II) : In gymnosperm, the pollen grain are released from the microsporangium and carried by air current.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both statement (I) and (II) are correct.

(2) Only statement (I) is correct

(3) Only statement (II) is correct

(4) Both statement (I) and (II) are incorrect

79. Select the incorrect option regarding apomixis :

(1) Apomixis is a form of asexual reproduction that mimics sexual reproduction

(2) Apomixis is a form of sexual reproduction that mimics asexual reproduction

(3) Diploid egg cell is formed without reduction division and develops into the embryo without fertilisation

(4) Both (1) and (3)

80. How many of the following statement/s is/are not incorrect for a polygenic inheritance ?

(I) Controlled by three (or) more genes.

(II) It is influenced by the environment.

(III) They show uniformity.

(IV) In polygenic inheritance phenotypes reflects the contribution of each allele.

(1) I, II and III (2) II, III and IV

(3) I, II and IV (4) I, III and IV

81. Which of the given is not among the salient features of HGP ?

(1) Average gene size is 3000 bases

(2) Less than 2% of genome code for protein

(3) Chromosome 1 has most genes that is 2968

(4) Human genome contains about 3614.7bp

82. Identify the incorrectly matched pair.

Organism	Length of DNA

(1) *Escherichia coli* — 4.6×10^6 base pairs

(2) Bacteriophage $\phi 174$ — 5638 base pairs

(3) Human beings (2n) — 6.6×10^9 base pairs

(4) Bacteriophage Lambda — 48502 base pairs.

83. Which one of the following pairs of codon are correctly matched with their function of the signal for several amino acid.

(1) UGA, UAG — Stop

(2) GCU, GUU — Alanine

(3) UUA, UCA — Leucine

(4) ACG, AUG — Start/methionine

84. Which of the following is not true for RNA polymerase ?

(1) It does not follow the rule of complimentarity

(2) It binds to promoter for initiation in transcription

(3) template dependent mode of action

(4) It uses nucleotide diphosphate as substrate

85. Choose the incorrect term with respect to Taylor's experiment

(1) Used heavy nitrogen

(2) Used roots of *Viccia faba*

(3) Proved DNA in chromosome replicate semi-conservatively

(4) Utilised radioactive thymidine

86. Which of the following is not correct for the law of dominance given by Mendel ?

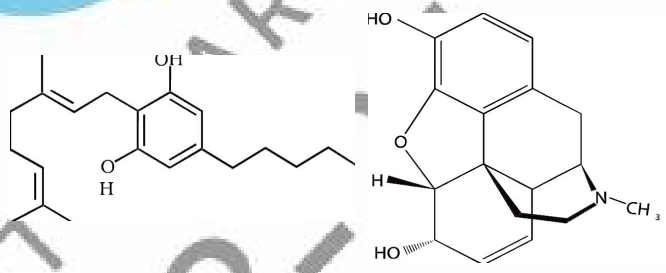
(1) factors occur in pair

(2) characters are controlled by discrete units called factors

(3) The alleles show blending at the time of fertilization

(4) In a dissimilar pair of factors one member of the pair dominates the other

87. Select the correct function/properties of the diagram given below :



(i) (ii)

(1) (i) → morphine; (ii) → receptors present in brain

(2) (i) → morphine; (ii) → obtained from infloresences of *Cannabis sativa*

(3) (i) → receptor present in brain; (ii) effect on cardiovascular system.

(4) (i) → effect on cardiovascular system; (ii) very effective sedative and painkiller

88. (a) Pathogen enter the small intestine through contaminated food, water

(b) migrate to other organs through blood

(c) sustained high fever, weakness; stomach pain, constipation, headache loss of appetite are some of the common symptom of this disease.

All of the above statement are related with

(1) pneumonia (2) malaria

(3) typhoid (4) common cold

89. Identify the microorganism which is responsible for the large holes in 'swiss cheese'

(1) *Trichoderma polysporum*

(2) *Aspergillus niger*

(3) *Saccharomyces cerevisiae*

(4) *Propionibacterium sharmanii*

90. Select the correct sequence regarding human reproduction :

(1) primary spermatocyte → secondary spermatocyte → spermatogonia

(2) primary oocyte → secondary oocyte → ovum

(3) mammary alveolus → Nipple → lactiferous duct → Ampulla

(4) Infundibulum → fimbriae → Ampulla → Isthmus

91. Select the incorrect statement regarding menstrual hygiene.

(1) Use sanitary napkins or clean homemade pads

(2) Change sanitary napkins or home made pads after every 4-5 days as per the requirement

(3) Dispose the used sanitary napkins properly wrapping it with a used paper

(4) After handling napkin, wash hands with soap

92. Match the column-I and column-II.

Column-I	**Column-II**
(A) Hormone releasing IUDs	(i) Lippe's loop
(B) Non-medicated IUDs	(ii) Cervix hostile to the sperm
(C) Coitus interrupts	(iii) withdrawal method
(D) Cervical cap	(iv) conception by blocking the entry of sperm through cervix

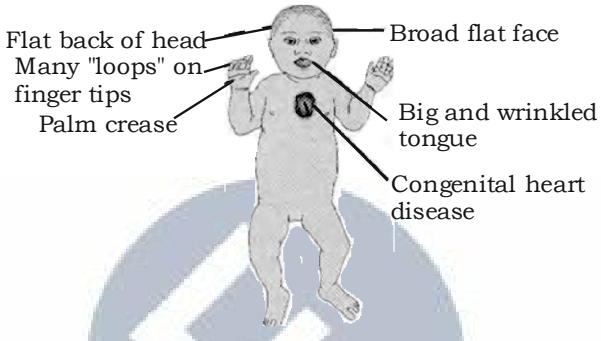
Choos the correct answer from the option given below :

	A	**B**	**C**	**D**
(1)	(i)	(ii)	(iii)	(iv)
(2)	(i)	(ii)	(iv)	(iii)
(3)	(ii)	(i)	(iii)	(iv)
(4)	(ii)	(i)	(iv)	(iv)

93. Infertility caused due to inability of the male partner to inseminate the female (or) due to very low sperm count in the ejaculation, could be corrected by

(1) ICSI (2) AI (3) GIFT (4) IUT

94. From the diagram given below select the false statement regarding given diagram



(1) first discovered by Langdon Down (1876)

(2) physical, psychomotor and mental development is retarded

(3) palm is broad with characteristic palm crease

(4) All of these

95. A molecule that act as a genetic material must fulfill the following criteria :

(i) It should be able to generate its translate (translation).

(ii) It should be stable chemically and structurally.

(iii) It should be able to express itself in the form of 'mendelian characters'

(iv) It should provide the scope for fast change (mutation) that are required for evolution.

How many statement are incorrect ?

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

96. A gene locus has two alleles A, a. if the frequency of recessive allele a is 0.35, then what will be the frequency of homozygous dominant, recessive and heterozygous individual in the population ?

(1) 0.4225; 0.1225; 0.455 (2) 0.1225; 0.4; 0.475

(3) 0.1225; 0.4225; 0.455 (4) 0.455; 0.4; 0.1225

97. Among the following sets of examples for homologous structure select the false option.

(1) Heart of man, bat, and cheetah

(2) Brain of bat, cheetah, man

(3) flippers of penguins and dolphins

(4) thorn of *Bougainvillea* and tendrils of *Cucurbita*

98. Which of the following sets of examples are true for adaptive radiation of marsupials of Australia?

(1) Tasmanian wolf, sugar glider, and banded anteater

(2) Tasmanian wolf, koala and spotted cuscus

(3) Wolf, flying phalanger and tasmanian wolf

(4) Lemur, mouse and anteater

99. How many statement/s are false related with AIDS ?

(A) AIDS is caused by rhinoviruses

(B) It has spread all over the world killing more than 35 million persons.

(C) Transmitted by sharing infected needle as in the case of intravenous drug abusers

(D) HIV/AIDS does not spread by mere touch or physical contact

(E) Incubation period may vary from a few month to many years (usually 10 – 15 years)

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

100. Select the incorrect match pair.

Column-I		Column-II
(1) Ladybird	—	Aphid
(2) Dragon flies	—	*Bacillus thuringiensis*
(3) Baculoviruses	—	Insects and other orthropods
(4) Free-living in soil	—	*Azospirillum* & *Azotobacter*

THIS SEGMENT IS ONLY FOR PCM GROUP STUDENTS

71. Let f : R → R be a differentiable function and f(1) = 4, then the value of $\lim\limits_{x\to 1}\int_4^{f(x)} \frac{2t\,dt}{x-1}$ is

(1) 8f′ (1) (2) 4f′ (1) (3) 2f′ (1) (4) f′ (1)

72. If the unit vectors $\vec{a}$ and $\vec{b}$ are inclined at an angle 2θ such that $|\vec{a}-\vec{b}|<1$ and $0\le\theta\le\pi$, then θ lies in the interval

(1) $\left[0,\frac{\pi}{6}\right[$ or $\left]\frac{5\pi}{6},\pi\right]$ (2) $\left[\frac{\pi}{6},\pi\right]$

(3) $\left[\frac{\pi}{6},\frac{\pi}{2}\right]$ (4) $\left[\frac{\pi}{2},\frac{5\pi}{6}\right]$

73. The sine of the angle between the straight line $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-4}{5}$ and the plane 2x –2y + z = 5 is

(1) $\frac{10}{6\sqrt{5}}$ (2) $\frac{4}{5\sqrt{2}}$ (3) $\frac{\sqrt{2}}{10}$ (4) $\frac{2\sqrt{3}}{5}$.

74. If in a triangle ABC, $\begin{vmatrix}1 & a & b\\ 1 & c & a\\ 1 & b & c\end{vmatrix}=0$, then the value of $\sin^2A+\sin^2B+\sin^2C$ is

(1) $\frac{9}{4}$ (2) $\frac{4}{9}$ (3) $\frac{3\sqrt{3}}{2}$ (4) 1

75. Out of 40 consecutive natural numbers, two are chosen at random. Probability that the sum of the numbers is odd, is

(1) $\frac{14}{29}$ (2) $\frac{20}{39}$

(3) $\frac{1}{2}$ (4) none of these

76. If f is an even function defined on the interval (–5, 5), then the real values of x satisfying the equation $f(x)=f\left(\frac{x+1}{x+2}\right)$ are

(1) $\frac{3\pm\sqrt{5}}{2},\frac{-3\pm\sqrt{5}}{2}$ (2) $\frac{-1\pm\sqrt{3}}{2},\frac{-3\pm\sqrt{3}}{2}$

(3) $\frac{-2\pm\sqrt{5}}{2}$ (4) none of these

77. $\lim\limits_{x\to 0}\frac{f(\cos x)}{x^2}=?$, where $f(x)=\frac{1-x}{1+x}$

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

78. Suppose that f is differentiable function with the property f(x + y) = f(x) + f(y) + x^2y^2 and $\lim\limits_{x\to 0}\frac{f(x)}{x}=100$. Then f′(0) is equal to

(1) 100 (2) 20

(3) 30 (4) none of these

79. $\vec{a}, \vec{b}$ and $\vec{c}$ are vectors of magnitudes 1, 1 and 2, respectively. If $\vec{a}\times(\vec{a}\times\vec{c})+\vec{b}=0$, then acute angle between $\vec{a}$ and $\vec{c}$ is

(1) 90° (2) 60° (3) 45° (4) 30°

80. Let f(x) = x^3 + 6x^2 + px + 2, if the largest possible interval in which f(x) is a decreasing function is (–3, –1), then p equals

(1) 3 (2) 9

(3) –2 (4) none of these

81. Let f = R → R be defined by f(x) = 2x + |x|, then f(2x) + f(–x) – f(x) =

(1) 2x (2) 2|x| (3) –2x (4) –2|x|

82. $\int \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)dx, x>0 =$

(1) $2\left[x\tan^{-1}x - \log\sqrt{1+x^2}\right]+c$

(2) $2\left[x\tan^{-1}x + \log\sqrt{1+x^2}\right]+c$

(3) $2\left[x\cos^{-1}x\log\sqrt{1+x^2}\right]+c$

(4) none of these

83. Three numbers are chosen at random without replacement from [1, 2, 3, ..., 10]. The probability that the minimum of the chosen numbering is 3 or their maximum is 7,

(1) $\frac{7}{40}$ (2) $\frac{5}{40}$

(3) $\frac{11}{40}$ (4) none of these

84. The domain of the function $f(x) = \frac{\cos^{-1}x}{[x]}$ is

(1) $[-1, 0[\cup [1]$ (2) $[-1, 1]$

(3) $[-1, 1)$ (4) none of these

85. At the point x = 1, the function
$f(x) = x^3 - 1, 1 < x < \infty$
$= x - 1, -\infty < x \le 1$, is

(1) continuous and differentiable

(2) continuous and not differentiable

(3) discontinuous and differentiable

(4) discontinuous and not differentiable

86. The value of $\int_{-2}^{2}(ax^3+bx+c)dx$ depends on the

(1) value of b (2) value of c

(3) value of a (4) value of a and b

87. The area bounded by the curve y = cos 2x and the lines x = 0 and $x = \frac{\pi}{3}$ is

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

(3) $\frac{4-\sqrt{3}}{4}$ (4) $\frac{2-\sqrt{3}}{4}$.

88. If $\frac{dy}{dx} = e^{-2y}$ and y = 0, when x = 5, then the value of x when y = 3 is

(1) e^5 (2) $e^6 + 1$

(3) $\frac{e^6+9}{2}$ (4) $\log_e 6$

89. The differential equation of the family of curves $y = ax + \frac{1}{a}$, where $a \neq 0$ is an arbitrary constant, has the degree

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

90. If f is a function such that f(0) = 2, f(1) = 3 and f(x + 2) = 2f(x) – f(x + 1) for every real x then f(5) is

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

91. The direction ratio of a normal to the plane passing through (1, 0, 0), (0, 1, 0) and making an angle $\frac{\pi}{4}$ with the plane x + y = 3 are

(1) $(1,\sqrt{2},1)$ (2) $(1,1,\sqrt{2})$

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

92. If $\frac{z-1}{z+1}$ is purely imaginary, then

(1) $|z| = \frac{1}{2}$ (2) $|z| = 1$ (3) $|z| = 2$ (4) $|z| = 3$

93. $2\cos^{-1}x = \sin^{-1}(2x\sqrt{1-x^2})$ is valid for all value of x satisfying

(1) $0 \le x \le \frac{1}{2}$ (2) $-1 \le x \le 1$

(3) $0 \le x \le 1$ (4) $\frac{1}{\sqrt{2}} \le x \le 1$

94. The sum of the first n terms of the series, $1^2 + 2\cdot2^2 + 3^2 + 2\cdot4^2 + 5^2 + 2.6^2 + \ldots$ is $\frac{n}{2}(n+1)^2$, when n is even, when n is odd the sum is—

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

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

95. If α and β are the roots of the equation $ax^2 + bx + c = 0$, $\alpha\beta = 3$ and a, b, c are in A.P., then $\alpha + \beta$ is equal to

(1) –4 (2) –1 (3) 4 (4) –2

96. If f(x) is differentiable and strictly increasing function, then the value of $\lim_{x\to0}\frac{f(x^2)-f(x)}{f(x)-f(0)} =$

(1) –1 (2) 0 (3) 1 (4) 2

97. Let $f : [-2, 2] \to R$ be a continuous function such that f(x) assumes only irrational values. If $f(\sqrt{2}) = \sqrt{2}$, then

(1) f(0) = 0 (2) $f(\sqrt{2}-1) = \sqrt{2}-1$

(3) $f(\sqrt{2}-1) = \sqrt{2}+1$ (4) $f(\sqrt{2}-1) = \sqrt{2}$

98. If $f : R \to R$ is defined by f(x) = |x|, then

(1) f′ (x) = x

(2) $f'(x) = \frac{1}{|x|}$

(3) the function f′(x) does not exist

(4) $f'(x) = \frac{1}{x}$

99. Let n be a positive integers such that $\sin\frac{\pi}{2n} + \cos\frac{\pi}{2n} = \frac{\sqrt{n}}{2}$, then

(1) $6 \le n \le 8$ (2) $4 < n \le 8$

(3) $4 \le n < 8$ (4) n = 6

100. Let A and B are two matrices such that AB = B and BA = A, then $A^2 + B^2$ equals

(1) 2AB (2) 2BA (3) A + B (4) AB

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Gautam Kumar, RANK - 01 G

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Just after completing my 12th Board Exam I joined GOAL Institute and GOAL Hostel under 1 year program wherein I prepared myself for Medical Entrance Exam. The right approach of recent competition with Healthy Competitive Environment of Institute and hostel helped me a lot to crack AIIMS with such Remarkable Rank.
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" Being a topper (1st Ranker) of Medical Entrance Exam is matter of Pride for any one and that is why for me also. I never thought that could be the Topper of Bihar Medical but was always boosted by the GOAL Members to make my believe stronger. Apart from depth in Organic & Inorganic part of Chemistry, time Management is one of the strong deciding factor to crack Bihar PMT. Joining GOAL Institute was one of the good decisions of my life which proved the turning point of my career. Wishing All the best to every aspirant of medical."

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Md. Mobasshir, Qualified & studying in AMU

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ANSWER KEY

CLASS - 12 (PCB / PCM)

PHY. + CHEM. + REAS.						BIO		MATH	
1.	(4)	31.	(3)	61.	(1)	71.	(3)	71.	(1)
2.	(1)	32.	(3)	62.	(1)	72.	(1)	72.	(1)
3.	(2)	33.	(2)	63.	(3)	73.	(3)	73.	(3)
4.	(4)	34.	(2)	64.	(2)	74.	(2)	74.	(1)
5.	(3)	35.	(3)	65.	(3)	75.	(4)	75.	(2)
6.	(1)	36.	(1)	66.	(2)	76.	(2)	76.	(1)
7.	(3)	37.	(1)	67.	(4)	77.	(4)	77.	(2)
8.	(2)	38.	(1)	68.	(4)	78.	(3)	78.	(1)
9.	(1)	39.	(1)	69.	(2)	79.	(2)	79.	(4)
10.	(4)	40.	(4)	70.	(2)	80.	(3)	80.	(2)
11.	(3)	41.	(4)			81.	(4)	81.	(2)
12.	(2)	42.	(4)			82.	(2)	82.	(1)
13.	(4)	43.	(4)			83.	(1)	83.	(3)
14.	(1)	44.	(2)			84.	(4)	84.	(1)
15.	(3)	45.	(4)			85.	(1)	85.	(2)
16.	(3)	46.	(2)			86.	(3)	86.	(2)
17.	(2)	47.	(1)			87.	(4)	87.	(2)
18.	(4)	48.	(2)			88.	(3)	88.	(3)
19.	(1)	49.	(4)			89.	(4)	89.	(4)
20.	(3)	50.	(2)			90.	(2)	90.	(2)
21.	(1)	51.	(1)			91.	(2)	91.	(2)
22.	(4)	52.	(4)			92.	(3)	92.	(2)
23.	(2)	53.	(3)			93.	(2)	93.	(4)
24.	(3)	54.	(1)			94.	(1)	94.	(1)
25.	(1)	55.	(1)			95.	(2)	95.	(4)
26.	(4)	56.	(1)			96.	(1)	96.	(1)
27.	(2)	57.	(3)			97.	(3)	97.	(4)
28.	(3)	58.	(2)			98.	(1)	98.	(3)
29.	(1)	59.	(1)			99.	(2)	99.	(4)
30.	(4)	60.	(2)			100.	(2)	100.	(3)

Correction and Modification

Though every caution has been taken in preparing question and their answer of GTSE Main-Paper, if you find any error in our question or answer or in both of them, then suggest the correct one with reference of book and explanation. Your suggestion will be sent to expert of respective subject and may be corrected in case of right claim. You can go either on the following two links

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Note: All the request will be accepted till **26th December 2023 till 11:59 PM.**

No further request can be entertained in any cases after said time.