

# AJMAL SUPER 40

PHASE - 2

ADMISSION CUM SCHOLARSHIP TEST : 2023 / P2

**FOR 12<sup>th</sup> PASSED/APPEARING [CHALLENGERS]**

Conducted by : **AJMAL FOUNDATION, Hojai**



## TEST BOOKLET SERIES

**A**

### INSTRUCTIONS TO CANDIDATE

1. Candidates are to use the OMR Answer Sheet provided.
2. It is the candidate's responsibility to write and fill in the **Application Number** (from Admit Card) and **Test Booklet Series** (from Question Paper) carefully and without any omission or discrepancy at the appropriate place in the **OMR Answer Sheet**.
3. Candidates are required to mark the correct answer choice by **shading** the circle completely with **blue** or **black** ball point pen. (Pen of any other colour or pencil is not allowed). For example, if the correct answer to question no. 1 is 'B' then the marking should be:



4. Write your details on the OMR Answer Sheet which are asked for.
5. Only one circle, i.e. the correct one should be shaded. Shading more than one circle will render the answer invalid.
6. A candidate having completed his/her **OMR ANSWER SHEET** must hand it over, even if blank, to the invigilator.
7. An examinee must not bring any loose paper, book, etc. to the Examination Hall. Any examinee found in possession of even loose papers will be **EXPELLED**.
8. An examinee must not talk to, disturb or seek help from a fellow examinee during the examination.
9. Any mechanical or digital calculating device (Smart Watch, Mobile, calculator etc.) shall not be used by the examinee during the examination.
10. No candidate will be allowed to leave the Examination Hall before completion of 2 hours.
11. For each correct answer 1 mark will be awarded and for each incorrect answer 0 mark will be deducted.
12. Duration of the exam is **02 hours from 11:00 AM to 01:00 PM**.

For Medical			For Engineering		
Subject	Questions	Marks	Subject	Questions	Marks
Physics	1 to 25	25	Physics	1 to 25	25
Chemistry	26 to 50	25	Chemistry	26 to 50	25
Biology	51 to 100	50	Maths	51 to 75	25
<b>Total</b>	<b>100</b>	<b>100</b>	<b>Total</b>	<b>75</b>	<b>75</b>

13. Contravention of any of the instruction mentioned above shall render a candidate liable for disciplinary action as per rule.

**14. Date of Result Declaration : 24 - 05- 2023, Time - 3.00 PM**

Name of the Candidate:

Your Application Number

SPACE FOR ROUGH WORK

**ADMISSION CUM SCHOLARSHIP TEST – 2023**  
**FOR 12<sup>th</sup> PASSED / APPEARING [CHALLENGERS]**

**PHYSICS**

**PHASE 02**

1. An electric current passes through a long straight wire. At a distance 10cm from the wire the magnetic field is- B. The field at 20cm from the wire would be –

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

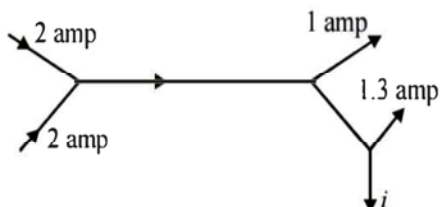
2. The r.m.s. value of potential due to superposition of given two alternating potentials  $E_1 = E_0 \sin \omega t$  and  $E_2 = E_0 \cos \omega t$  will be

- (1)  $E_0$  (2)  $2E_0$   
 (3)  $E_0 \sqrt{2}$  (4) 0

3. A wheel with ten metallic spokes each 0.50 m long is rotated with a speed of 120 rev/min in a plane normal to the earth's magnetic field at the place. If the magnitude of the field is 0.4 Gauss, the induced e.m.f. between the axle and the rim of the wheel is equal to

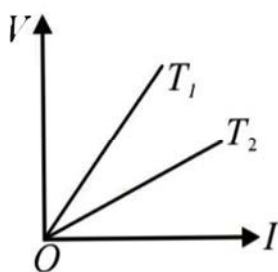
- (1)  $1.256 \times 10^{-3} V$  (2)  $6.28 \times 10^{-4} V$   
 (3)  $1.256 \times 10^{-4} V$  (4)  $6.28 \times 10^{-5} V$

4. The figure below shows currents in a part of electric circuit. The current  $i$  is



- (1) 1.7 amp (2) 3.7 amp  
 (3) 1.3 amp (4) 1 amp

5. The voltage  $V$  and current  $I$  graphs for a conductor at two different temperatures  $T_1$  and  $T_2$  are shown in the figure. The relation between  $T_1$  and  $T_2$  is.



- (1)  $T_1 > T_2$  (2)  $T_1 < T_2$

(3)  $T_1 = T_2$

(4)  $T_1 = \frac{1}{T_2}$

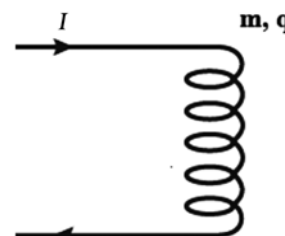
6. A dipole consisting of two equal and opposite charges having magnitude  $q = 2 \times 10^{-6} C$  and separated by a distance  $d = 0.01 m$  is placed in a uniform electric field of magnitude  $E = 5 \times 10^5 N/C$ . The maximum torque on the dipole is

- (1)  $1 \times 10^{-3} Nm^{-1}$  (2)  $10 \times 10^{-3} Nm^{-1}$   
 (3)  $10 \times 10^{-3} Nm$  (4)  $1 \times 10^{-4} Nm$

7. When the angle of incidence on a material is  $60^\circ$ , the reflected light is completely polarized. The velocity of the refracted ray inside the material is (in  $ms^{-1}$ )

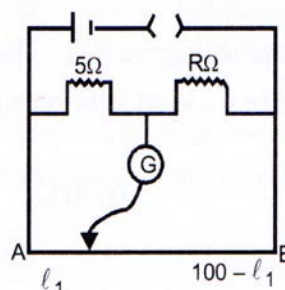
- (1)  $3 \times 10^8$  (2)  $\left(\frac{3}{\sqrt{2}}\right) \times 10^8$   
 (3)  $\sqrt{3} \times 10^8$  (4)  $0.5 \times 10^8$

8. A long solenoid carrying a current  $I$  is placed with its axis vertical. A particle of mass  $m$  and charge  $q$  is released from the top of the solenoid. Its acceleration is –



- (1) greater than  $g$  (2) less than  $g$   
 (3) equal to  $g$  (4) none of these

9. The resistance in the two arms of the meter bridge are  $5 \Omega$  and  $R \Omega$ , respectively. When the resistance  $R$  is shunted with an equal resistance, the new balance point is at  $1.6 l_1$ . The resistance 'R' is

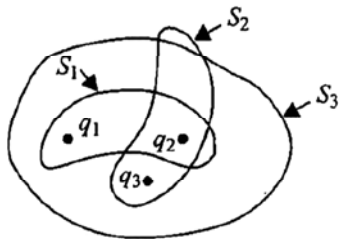


- (1)  $10 \Omega$  (2)  $15 \Omega$   
 (3)  $20 \Omega$  (4)  $25 \Omega$

10. Which of the following is of shortest wavelength?

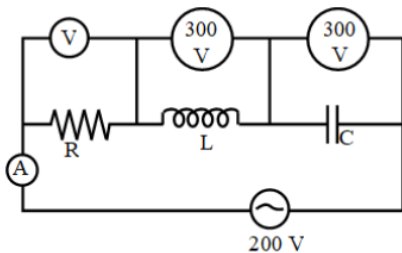
- (1) X-rays (2)  $\gamma$ -rays  
 (3) Microwaves (4) Radio waves

11. Three charges of  $q_1 = 1 \times 10^{-6} C$ ,  $q_2 = 2 \times 10^{-6} C$  and  $q_3 = -3 \times 10^{-6} C$  have been placed as shown. Then, the net electric flux will be maximum for the surface



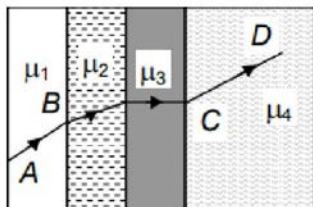
- (1)  $S_1$  (2)  $S_2$   
 (3)  $S_3$  (4) same for all three

12. In the series circuit shown in the figure the voltmeter reading will be



- (1) 300 V (2) 900 V  
 (3) 200 V (4) 100 V

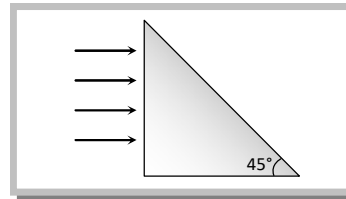
13. A ray of light passes through four transparent media with refractive indices  $\mu_1, \mu_2, \mu_3$ , and  $\mu_4$  as shown in the figure. The surfaces of all media are parallel. If the emergent ray  $CD$  is parallel to the incident ray  $AB$ , we must have



- (1)  $\mu_1 = \mu_2$  (2)  $\mu_2 = \mu_3$   
 (3)  $\mu_3 = \mu_4$  (4)  $\mu_4 = \mu_1$

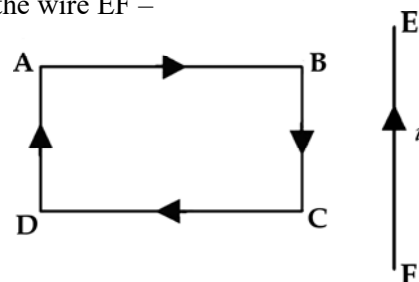
14. A beam of light consisting of red, green and blue colours is incident on a right angled prism. The refractive indices of the material of the prism for

the above red, green and blue wavelength are 1.39, 1.44 and 1.47 respectively. The prism will



- (1) Separate part of red colour from the green and the blue colours  
 (2) Separate part of the blue colour from the red and green colours  
 (3) Separate all the colours from one another  
 (4) Not separate even partially any colour from the other two colours

15. A wire  $EF$  carrying current  $i_1$  is placed near a current carrying rectangular loop  $ABCD$  as shown. Then the wire  $EF$  –

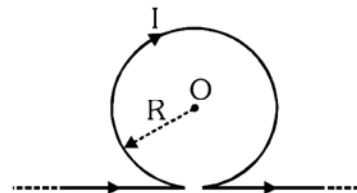


- (1) remains unaffected  
 (2) is attracted towards the loop  
 (3) is repelled away from loop  
 (4) first attracted and then repelled.

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

17. Magnetic field at point  $O$  will be



- (1)  $\frac{\mu_0 I}{2R} \otimes$                       (2)  $\frac{\mu_0 I}{2R} \odot$   
 (3)  $\frac{\mu_0 I}{2R} \left(1 - \frac{1}{\pi}\right) \otimes$                       (4)  $\frac{\mu_0 I}{2R} \left(1 + \frac{1}{\pi}\right) \odot$

18. An object 5 cm tall is placed 1 m from a concave spherical mirror which has a radius of curvature of 20 cm. The size of the image is

- (1) 0.11 cm                      (2) 0.50 cm  
 (3) 0.55 cm                      (4) 0.60 cm

19. A hydrogen atom in ground state absorbs 10.2 eV of energy. The orbital angular momentum of the electron is increased by

- (1)  $1.05 \times 10^{-34} \text{ J-s}$                       (2)  $2.11 \times 10^{-34} \text{ J-s}$   
 (3)  $3.16 \times 10^{-34} \text{ J-s}$                       (4)  $4.22 \times 10^{-34} \text{ J-s}$

20. The activity of a sample reduces from  $A_0$  to

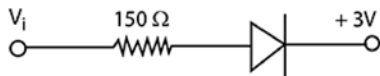
$A_0 / \sqrt{3}$  in one hour. The activity after 3 hour; more will be

- (1)  $\frac{A_0}{3\sqrt{3}}$                       (2)  $\frac{A_0}{9}$   
 (3)  $\frac{A_0}{9\sqrt{3}}$                       (4)  $\frac{A_0}{27}$

21. Two lenses of power +2.50 D and -3.75 D are combined to form a compound lens. Its focal length in cm will be

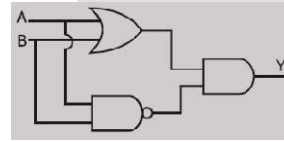
- (1) 40                      (2) -40  
 (3) -80                      (4) 160

22. In the circuit shown assume the diode to be ideal. When  $V_i$  increases from 2V to 6V, the change in the current in the current is (in mA)



- (1) zero                      (2) 20  
 (3) 80/3                      (4) 40

23. The following configuration of gates is equivalent to

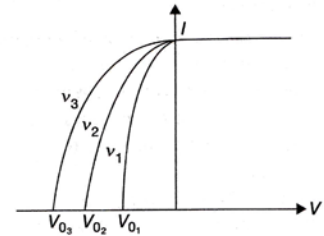


- (1) NAND                      (2) OR  
 (3) XOR                      (4) NOR

24. The following nuclear reaction is an example of  ${}^{12}_6\text{C} + {}^4_2\text{H} \rightarrow {}^{16}_8\text{O} + \text{Energy}$

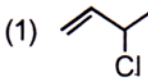
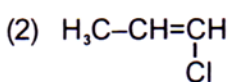

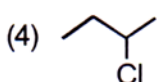

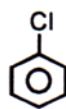
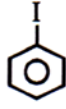
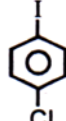
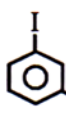
- (1) Fission                      (2) Fusion  
 (3) Alpha decay                      (4) Beta decay

25. Photoelectric current as a function of voltage V for different light frequencies is shown here. The correct relation is

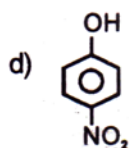
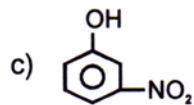
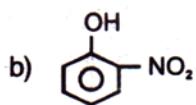
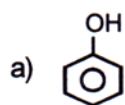


- (1)  $v_1 = v_2 = v_3$                       (2)  $v_1 > v_2 > v_3$   
 (3)  $v_1 < v_2 < v_3$                       (4) None of these

**CHEMISTRY**

26. Which has highest boiling point in aqueous solution?  
 (1) 0.2M NaCl (2) 0.5M glucose  
 (3) 0.3M CaCl<sub>2</sub> (4) All are equal
27. Vapour pressure of water is 12.3 KPa at 300K. What is the vapour pressure of 1 molal solution of a solute in it?  
 (1) 12.5 KPa (2) 12.08 KPa  
 (3) 2.3 KPa (4) 40 KPa
28. What is the coordination number in a square close packed structure in 2 - D?  
 (1) 2 (2) 3  
 (3) 4 (4) 6
29. What is the amount of charge in coulomb required for the conversion of one mole MnO<sub>4</sub><sup>-</sup> to 1 mole Mn<sup>2+</sup>  
 (1) 5 × 96500 (2) 3 × 96500  
 (3) 96500 (4) 9650
30. The E<sub>red</sub><sup>0</sup> value of A, B, C are 0.68 V, -2.54 V - 0.50V temperature. The order of their reducing power in aqueous solution is  
 (1) A > B > C (2) A > C > B  
 (3) C > B > A (4) B > C > A
31. The temperature-coefficient of most of reactions lies between  
 (1) 2 and 3 (2) 1 and 2  
 (3) 2 and 4 (4) 3 and 4
32. The number of phase present in colloidal solution is  
 (1) 2 (2) 4  
 (3) 3 (4) 1
33. When formic acid is treated with conc. H<sub>2</sub>SO<sub>4</sub> the gas evolved is  
 (1) H<sub>2</sub>S (2) SO<sub>2</sub>  
 (3) CO (4) CO<sub>2</sub>
34. A brown ring is formed in the ring test for NO<sub>3</sub><sup>-</sup> ion, it is due to the formation of  
 (1) [Fe(H<sub>2</sub>O)<sub>5</sub>NO]<sup>2+</sup>  
 (2) FeSO<sub>4</sub>.NO<sub>2</sub>  
 (3) [Fe(H<sub>2</sub>O)<sub>4</sub>(NO)<sub>2</sub>]<sup>2+</sup>  
 (4) FeSO<sub>4</sub>.HNO<sub>3</sub>
35. The correct formula of salt formed by the neutralization of hypophosphorus acid with NaOH  
 (1) Na<sub>3</sub>PO<sub>2</sub> (2) Na<sub>3</sub>PO<sub>3</sub>  
 (3) NaH<sub>2</sub>PO<sub>2</sub> (4) Na<sub>2</sub>HPO<sub>2</sub>
36. Malachite does not contain  
 (1) Cu (2) C  
 (3) O (4) Fe
37. Lanthanoids are non-radioactive except  
 (1) Neodymium (2) Europium  
 (3) Erbium (4) Promethium
38. EAN of Cr in [Cr(NH<sub>3</sub>)<sub>6</sub>]Cl<sub>3</sub> is  
 (1) 36 (2) 35  
 (3) 33 (4) 34
39. Hybridization of Ni in [Ni(CN)<sub>4</sub>]<sup>2-</sup> is  
 (1) sp<sup>3</sup> (2) dsp<sup>2</sup>  
 (3) sp<sup>3</sup>d (4) dsp<sup>3</sup>
40. Most reactive towards S<sub>N</sub>1 reaction is  
 (1)  (2)   
 (3)  (4) 
41.  + ICl  $\xrightarrow{\text{anhy. AlCl}_3}$  X; X is  
 (1)  (2)   
 (3)  (4) 
42. Which one has highest dipole moment?  
 (1) CH<sub>3</sub>F (2) CH<sub>3</sub>Cl  
 (3) CH<sub>3</sub>Br (4) CH<sub>3</sub>I

43. The acidity order of the following is



- (1)  $a > b > c > d$                       (2)  $d > b > c > a$   
 (3)  $b > d > c > a$                       (4)  $b > c > d > a$

44.  $\xrightarrow{\text{dil. FeCl}_3}$ ; colour of product is:

Colour of product is:

- (1) Violet                                      (2) Green  
 (3) Yellow                                      (4) Orange

45.  $\text{Cl}_3\text{C}-\text{CHO} + 2\text{PhCl} \xrightarrow{\text{conc. H}_2\text{SO}_4} \text{A}$

A is

- (1) DDT    (2) Gammaxene  
 (3) Phenolphthalein                      (4) Lindane

46. Fehlings solution test is given by

- (1) Benzaldehyde                      (2) Acetone  
 (3) Acetaldehyde                      (4) Both (1) and (3)

47. Formic acid gives test of

- (1) Ketonic group                      (2) Carboxylic group  
 (3) Aldehydic                              (4) Both (2) and (3)

48. The reactivity order of the given compounds towards nucleophilic addition reaction is

- (a)  $\text{HCHO}$                                       (b)  $\text{CH}_3\text{CHO}$   
 (c)  $(\text{CH}_3)_2\text{CO}$

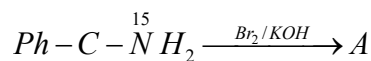
- (1)  $a > b > c$                                       (2)  $c > b > a$   
 (3)  $b > c > a$                                       (4)  $c > a > b$

49. Which of the following is the monomer of starch?

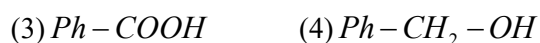
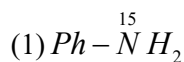
- (1) Glucose                                      (2) Sucrose  
 (3) Fructose                                      (4) Lactose

O

50. ||



Product (A) is



## BIOLOGY

51. The biomass available for consumption by the herbivores and the decomposers is called

- (1) Gross primary productivity
- (2) Net primary productivity
- (3) Secondary productivity
- (4) Standing crop

52. Given diagram represents



- (1) Male cone of gymnosperm
- (2) Female cone of gymnosperm
- (3) Strobilus of Equisetum
- (4) A multicarpellary, apocarpous gynoecium of Michelia

53. A typical angiosperm anther is dithecous which means that it is

- (1) One lobed and the lobe has two theca
- (2) Two lobed and each lobe has two theca
- (3) Two lobed and the lobe has one theca
- (4) Four lobed and the lobe has two theca

54. Select the correct match

- (1) Phenylketonuria - Autosomal dominant trait
- (2) Sickle cell anaemia – Autosomal recessive trait, chromosome-11
- (3) Thalassemia - X linked
- (4) Haemophilia - Y linked

55. Match List -I with List-II

	List-I		List-II
(a)	Carbon dissolved	(i)	55 billion tons
(b)	Annual fixation of Carbon through Photosynthesis	(ii)	71 %
(c)	PAR captured by plants	(iii)	$2 \times 10^{13}$ Kg
(d)	Productivity of oceans	(iv)	2 to 10%

Choose the correct answer from the options given below:

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

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

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

56. If a geneticist uses the blind approach for sequencing the whole genome of an organism, followed by assignment of function to different segments, the methodology adopted by him is called as

- (1) Gene mapping
- (2) Expressed sequence tags
- (3) Bioinformatics
- (4) Sequence annotation

57. Match List -I with List-I

Choose the correct answer from the options given below

	List-I		List-II
(a)	Sacred graves	(i)	Alien species
(b)	Zoological park	(ii)	Release of large quantity of oxygen
(c)	Nile perch	(iii)	Ex-situ
(d)	Amazon forest	(iv)	Khasi Hills in Meghalaya

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

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

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

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

58. Which of the following pairs is wrongly matched?

- (1) XO type sex determination → Grasshopper
- (2) ABO blood grouping → Co-dominance
- (3) Starch synthesis in pea → Multiple alleles
- (4) T.H. Morgan → Linkage

59. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is  $6.6 \times 10^9$  bp, then the length of the DNA is approximately

- (1) 2.2 meters
- (2) 2.7 meters
- (3) 2.0 meters
- (4) 2.5 meter

60. Which one of the following is most appropriately defined

- (1) Parasite is an organism which always lives inside the body of other organism and may kill it,
- (2) Host is an organism which provides food to another organism.
- (3) Amensalism is a relationship in which one species is benefited where as the other is unaffected.



- (4) Predator is an organism that catches and kills other organism for food.
61. Both, hydrarch and xerarch successions lead to  
 (1) Excessive wet conditions  
 (2) Medium water conditions  
 (3) Xeric conditions  
 (4) Highly dry conditions
62. The wheat grain has an embryo with one large shield-shaped cotyledon known as  
 (1) Coleoptile (2) Epiblast  
 (3) Coleorrhiza (4) Scutellum
63. The ovule of an angiosperm is technically equivalent to  
 (1) Magasporangium (2) Megasporophyll  
 (3) Megaspore mother cell (4) Megaspore
64. How many pairs of contrasting characters in pea plants were studied by Mendel in his experiments?  
 (1) Six (2) Eight  
 (3) Seven (4) Five
65. A pleiotropic gene  
 (1) Controls multiple traits in an individual  
 (2) Is expressed only in primitive plants  
 (3) Is a gene evolved during pliocene  
 (4) Controls a trait only in combination with another gene
66. Persons with 'AB' blood group are called as "Universal recipients". This is due to?  
 (1) Absence of antibodies, anti-A and anti-B, in plasma  
 (2) Absence of antigens A and B on the surface of RBCs  
 (3) Absence of antigens A and B in plasma  
 (4) Presence of antibodies anti-A and anti-B on RBCs
67. If male plant contain  $2n = 30$  chromosomes in leaf & female plant contains  $2n = 60$  chromosomes in their roots then they contain no of chromosomes in their aleurone layer and embryo region-  
 (1) Aleurone  $3n = 75$ , embryo  $3n = 90$   
 (2) Aleurone  $3n = 75$ , embryo  $2n = 45$   
 (3) Aleurone  $3n = 60$ , embryo  $2n = 45$   
 (4) Aleurone  $3n = 75$ , embryo  $2n = 60$
68. The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by  
 (1) Alfred Sturtevant (2) Sutton Boveri  
 (3) TH. Morgan (4) Gregor J. Mendel
69. The process of translation of mRNA to proteins begins as soon as  
 (1) The larger subunit of ribosome encounters mRNA  
 (2) Both the subunits join together to bind with mRNA  
 (3) The tRNA is activated and the larger subunit of ribosome encounters mRNA  
 (4) The small subunit of ribosome encounters mRNA
70. The Earth summit held in Rio de Janeiro in 1992 was called  
 (1) To assess threat posed to native species by invasive weed species  
 (2) For immediate steps to discontinue use of CFCs that were damaging the ozone layer  
 (3) To reduce  $\text{CO}_2$  emissions and global warming,  
 (4) For conservation of biodiversity and sustainable utilization of its benefit
71. Ten E.coli cells with  $^{15}\text{N}$ -dsDNA are incubated in medium containing  $^{14}\text{N}$  nucleotide. After 60 minutes, how many E.coli cells will have DNA totally free from  $^{15}\text{N}$ ?  
 (1) 40 cells (2) 60 cells  
 (3) 80 cells (4) 20 cells
72. If adenine makes 30% of the DNA molecule, what will be the percentage of Thymine, Guanine and Cytosine in it?  
 (1) T : 20 ; G : 25 ; C : 25  
 (2) T : 20 ; G : 30 ; C : 20  
 (3) T : 20 ; G : 20 ; C : 30  
 (4) T : 30; G : 20 ; C : 20
73. Thalassemia and sickle cell anemia are caused due to a problem in globin molecule synthesis. Select the correct statement  
 (1) Both are due to a qualitative defect in globin chain synthesis.  
 (2) Both are due to a quantitative defect in globin chain synthesis.  
 (3) Thalassemia is due to less synthesis of globin molecules  
 (4) Sickle cell anemia is due to a quantitative problem of globin molecules
74. Which one of the following is not used for ex situ plant conservation?  
 (1) Field gene banks (2) Seed banks

- (3) Shifting cultivation (4) Botanical Gardens
75. DNA finger printing involves identifying differences in some specific regions in DNA sequence, called as  
 (1) Polymorphic DNA (2) Satellite DNA  
 (3) Repetitive DNA (4) Single nucleotide
76. The enlarged end of penis is covered by a loose fold of skin is called  
 (1) glans penis (2) foreskin  
 (3) hymen (4) urethral meatus
77. In human females, meiosis-II is not complete until?  
 (1) fertilization  
 (2) uterine implantation  
 (3) birth  
 (4) puberty
78. Each spermatogonium which is diploid contains how many chromosomes?  
 (1) 23 (2) 26  
 (3) 46 (4) 48
79. Semen is a constituent of seminal plasma with:  
 (1) ovum (2) sperm  
 (3) zygote (4) follicle
80. Match between the following representing parts of the sperm and their functions and choose the correct option.

Column I		Column II	
A.	Head	I.	Enzymes
B.	Middle piece	II.	Sperm motility
C.	Acrosome	III.	Energy
D.	Tail	IV.	Genetic material

	A	B	C	D
(1)	II	IV	I	III
(2)	IV	III	I	II
(3)	IV	I	II	II
(4)	II	I	III	IV

81. RCH stands for  
 (1) Routine Check-up of Health  
 (2) Reproduction Cum Hygiene  
 (3) Reversible Contraceptive Hazards  
 (4) Reproductive and Child Health Care
82. Amniocentesis technique is used for the  
 (1) sex determination of foetus  
 (2) determination of any genetic abnormality in the embryo  
 (3) determination of errors in amino acid metabolism in embryo.  
 (4) Both (2) and (3).

83. Atmosphere of earth just before the origin of life consisted of:  
 (1) water vapours, CH<sub>4</sub>, NH<sub>3</sub> and oxygen.  
 (2) CO<sub>2</sub>, NH<sub>3</sub> and CH<sub>2</sub>  
 (3) CH<sub>4</sub>, NH<sub>3</sub>, H<sub>2</sub> and water vapours  
 (4) CH<sub>4</sub>, O<sub>3</sub>, O<sub>2</sub> and water vapours
84. The ship used by Charles Darwin during his sea voyages was:  
 (1) HMS Beagle (2) HSM Beagle  
 (3) HMS Eagle (4) HSM Eagle
85. The theory of natural selection was given by  
 (1) Lamarck  
 (2) Alfred Wallace  
 (3) Charles Darwin  
 (4) Oparin and Haldane
86. Which of the following pair of diseases is caused by virus?  
 (1) Typhoid and tetanus  
 (2) AIDS and syphilis  
 (3) Rabies and mumps  
 (4) Cholera and Tuberculosis
87. Typhoid fever is caused by  
 (1) *Salmonella* (2) *Shigella*  
 (3) *Escherichia* (4) *Giardia*
88. The most abundant type of antibodies which can also cross placenta, are  
 (1) IgG (2) IgM  
 (3) IgA (4) IgE
89. Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the newborn infants because it contains:  
 (1) Natural killer cells  
 (2) Monocytes  
 (3) Macrophages  
 (4) Immunoglobulin A
90. The 'mule' is the result of  
 (1) inbreeding depression  
 (2) out-breeding  
 (3) cross-breeding  
 (4) inter-specific hybridization
91. MOET stands for  
 (1) Multiple Ovulation and Embryo Transfer Technology  
 (2) Multiple Ovulation Energy Transport Technology  
 (3) Method of Ovulation Energy Transfer Technology  
 (4) Method of Ovulation Energy Transport Technology

92. Which one of the following is a freshwater fish?  
 (1) *Catla* (2) *Rohu*  
 (3) Common carp (4) All of these
93. Which of the following is correctly matched?  
 (1) Aqua culture – Mosquito  
 (2) Sericulture - Fish  
 (3) Pisciculture – Silkworm  
 (4) Apiculture - Honeybee
94. Which one of the following is a new breed of sheep developed in Punjab by crossing Bikaneri ewes and Marino rams?  
 (1) *Hilsardale* (2) White Leghorn  
 (3) *Assel* (4) Langshan
95. The term 'apiculture' refers to  
 (1) tissue culture (2) pisciculture  
 (3) bee-keeping (4) animal-keeping
96. Plasmid present in bacterial cells are:  
 (1) circular DNA molecules  
 (2) linear DNA molecules  
 (3) circular RNA molecules  
 (4) linear RNA molecules.
97. Gel electrophoresis is a  
 (1) technique of separation of charged molecules under the influence of magnetic field  
 (2) technique of incorporation of DNA molecules into the cell through transient power made due to electrical impulses.  
 (3) technique of separation of DNA fragments through the pores of agarose gel under the influence of electrical field.  
 (4) technique of separation and purification of gene products.
98. Agarose extracted from sea weeds finds use in:  
 (1) Spectrophotometry  
 (2) Tissue culture  
 (3) PCR  
 (4) Gel electrophoresis.
99. Cry gene is obtained from  
 (1) *Bacillus thuringiensis*  
 (2) *Bacillus subtilis*  
 (3) *Clostridium welchi*  
 (4) *E. coli*
100. Transgenic plants are the ones  
 (1) generated by introducing foreign DNA into a cell and regenerating a plant from that cell.  
 (2) produced after protoplast fusion in artificial medium.  
 (3) grown in artificial medium after hybridization in the field.  
 (4) produced by a somatic embryo in artificial medium.

**MATHEMATICS**

51. Let  $A = \{1, 2, 3\}$  and  $B = \{2, 4, 6, 8\}$   
 Consider the rule  $f : A \rightarrow B, f(x) = 2x \forall x \in A$ .  
 The domain, co-domain and range of  $f$  respectively are  
 (1)  $\{1, 2, 3\}, \{2, 4, 6\}, \{2, 4, 6, 8\}$   
 (2)  $\{1, 2, 3\}, \{2, 4, 6, 8\}, \{2, 4, 6\}$   
 (3)  $\{2, 4, 6, 8\}, \{2, 4, 6, 7\}, \{1, 2, 3\}$   
 (4)  $\{2, 4, 6\}, \{2, 4, 6, 8\}, \{1, 2, 3\}$
52. Let  $S = \{1, 2, 3, 4, 5\}$  and let  $A = S \times S$ . Define the relation  $R$  on  $A$  as follows:  $(a, b) R (c, d)$  iff  $ad = cb$ . Then,  $R$  is  
 (1) Reflexive only  
 (2) Symmetric only  
 (3) Transitive only  
 (4) Equivalence relation
53. The function  $f : R \rightarrow R$  defined by  $f(x) = 6^x + 6^{|x|}$  is  
 (1) One-one and onto  
 (2) Many-one and onto  
 (3) One-one and into  
 (4) Many-one and into
54. The value of  $\cot^{-1} 9 + \operatorname{cosec}^{-1} \frac{\sqrt{41}}{4}$  is given by  
 (1) 0  
 (2)  $\pi/4$   
 (3)  $\tan^{-1} 2$   
 (4)  $\pi/2$
55.  $\begin{bmatrix} 7 & 1 & 2 \\ 9 & 2 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix} + 2 \begin{bmatrix} 4 \\ 2 \end{bmatrix}$  is equal to  
 (1)  $\begin{bmatrix} 43 \\ 44 \end{bmatrix}$   
 (2)  $\begin{bmatrix} 43 \\ 45 \end{bmatrix}$   
 (3)  $\begin{bmatrix} 45 \\ 44 \end{bmatrix}$   
 (4)  $\begin{bmatrix} 44 \\ 45 \end{bmatrix}$
56. If  $A = \begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}$ , find  $AA^T$   
 (1) Zero matrix  
 (2)  $I_2$   
 (3)  $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$   
 (4) None of these
57. If the system of equations  $2x + 3y + 5 = 0, x + ky + 5 = 0, kx - 12y - 14 = 0$  has non-trivial solution, then the value of  $k$  is  
 (1)  $-2, \frac{12}{5}$   
 (2)  $-1, \frac{1}{5}$   
 (3)  $-6, \frac{17}{5}$   
 (4)  $6, \frac{12}{5}$
58. Let  $A$  and  $B$  be two invertible matrices of order  $3 \times 3$ . If  $\det(ABA^T) = 8$  and  $\det(AB^{-1}) = 8$ , then  $\det(BA^{-1}B^T)$  is equal to  
 (1) 1  
 (2) 16  
 (3)  $1/16$   
 (4)  $1/4$
59. If  $x = a \cos^4 \theta, y = a \sin^4 \theta$ , then  $\frac{dy}{dx}$  at  $\theta = \frac{3\pi}{4}$  is  
 (1)  $-1$   
 (2) 1  
 (3)  $-a^2$   
 (4)  $a^2$
60. The derivative of  $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$  with respect to  $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$  is  
 (1) 0  
 (2) 1  
 (3)  $\frac{1}{1-x^2}$   
 (4)  $\frac{1}{1+x^2}$
61. The value of  $c$  in Mean Value theorem for the function  $f(x) = x(x-2), x \in [1, 2]$  is  
 (1)  $\frac{3}{2}$   
 (2)  $\frac{2}{3}$   
 (3)  $\frac{1}{2}$   
 (4)  $\frac{5}{2}$
62. The slope of tangent to the curve  $x = t^2 + 3t - 8, y = 2t^2 - 2t - 5$  at the point  $(2, -1)$  is  
 (1)  $\frac{22}{7}$   
 (2)  $\frac{6}{7}$   
 (3)  $-\frac{6}{7}$   
 (4)  $-6$
63. If  $\theta$  denotes the acute angle between the curves,  $y = 10 - x^2$  and  $y = 2 + x^2$  at a point of their intersection, then  $|\tan \theta|$  is equal to  
 (1)  $8/15$   
 (2)  $8/17$   
 (3)  $4/9$   
 (4)  $7/17$
64. Evaluate:  $\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$   
 (1)  $\frac{\pi}{2} - \log 2$   
 (2)  $\pi$   
 (3)  $\frac{\pi}{4}$   
 (4)  $\frac{\pi}{4} - \log 2$

65. Evaluate:  $\int_0^{\pi/2} \frac{\cos x}{1 + \cos x + \sin x} dx$
- (1)  $\frac{\pi}{4} - \log 2$                       (2)  $\frac{\pi}{2} - \log 2$   
(3)  $\frac{1}{2} \left[ \frac{\pi}{2} - \log 2 \right]$               (4)  $\frac{1}{2} \left[ \frac{\pi}{4} - \log 2 \right]$
66. The area bounded the curve  $y^2 = 16x$  and line  $y = mx$  is  $\frac{2}{3}$ , then  $m$  is equal to
- (1) 3                                      (2) 4  
(3) 1                                      (4) 2
67. Area common to curve  $y = \sqrt{9 - x^2}$  and  $x^2 + y^2 = 6x$  is
- (1)  $\frac{\pi + \sqrt{3}}{4} sq. units$               (2)  $\frac{\pi - \sqrt{3}}{4} sq. units$   
(3)  $3 \left( \pi + \frac{\sqrt{3}}{4} \right) sq. units$   
(4)  $3 \left( \pi - \frac{3\sqrt{3}}{4} \right) sq. units$
68. The differential equation of all circles which passes through the origin and whose centre lies on  $y$ -axis is
- (1)  $(x^2 - y^2) \frac{dy}{dx} - 2xy = 0$   
(2)  $(x^2 - y^2) \frac{dy}{dx} + 2xy = 0$   
(3)  $(x^2 - y^2) \frac{dy}{dx} - xy = 0$   
(4)  $(x^2 - y^2) \frac{dy}{dx} + xy = 0$
69. The differential equation satisfied by  $(a - bx)e^{y/x} = x$  is
- (1)  $x^2 y_2 = (xy_1 - y)^2$   
(2)  $x^3 y_2 = (xy_1 - y)^2$   
(3)  $x^2 y_2 = (xy_1 + y)^2$   
(4)  $x^3 y_2 = (xy_1 + y)^2$
70. The solution curve of  $\frac{dy}{dx} = \frac{y^2 - 2xy - x^2}{y^2 + 2xy - x^2}$ ,  $y(-1) = 1$  is
- (1) a straight line                      (2) a parabola  
(3) a circle                                  (4) an ellipse
71. Find the projection of  $\vec{b} + \vec{c}$  on  $\vec{a}$  where  $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$ ,  $\vec{b} = \hat{i} + 3\hat{j} + \hat{k}$  and  $\vec{c} = \hat{i} + \hat{k}$
- (1)  $5/\sqrt{3}$                                   (2)  $2\sqrt{2}$   
(3)  $3/\sqrt{2}$                                   (4)  $10/\sqrt{6}$
72. If  $\vec{a}$  is perpendicular to  $\vec{b}$  and  $\vec{c}$ ,  $|\vec{a}| = 2$ ,  $|\vec{b}| = 3$ ,  $|\vec{c}| = 4$  and the angle between  $\vec{b}$  and  $\vec{c}$  is  $\frac{2\pi}{3}$ , then  $[\vec{a} \vec{b} \vec{c}]$  is equal to
- (1)  $4\sqrt{3}$                                   (2)  $6\sqrt{3}$   
(3)  $12\sqrt{3}$                                   (4)  $18\sqrt{3}$
73. The line which passes through the origin and intersect the two lines  $\frac{x-1}{2} = \frac{y+3}{4} = \frac{z-5}{3}$ ,  $\frac{x-4}{2} = \frac{y+3}{3} = \frac{z-14}{4}$  is
- (1)  $\frac{x}{1} = \frac{y}{-3} = \frac{z}{5}$                       (2)  $\frac{x}{-1} = \frac{y}{3} = \frac{z}{5}$   
(3)  $\frac{x}{1} = \frac{y}{3} = \frac{z}{-5}$                       (4)  $\frac{x}{1} = \frac{y}{4} = \frac{z}{-5}$
74. If the angle between the plane  $2x - y + 2z = 3$  and  $3x + 6y + cz = 4$  is  $\cos^{-1} \left( \frac{4}{21} \right)$ , then  $c^2 =$
- (1) 1    (2) 4  
(3) 9    (4) 5
75. The probability of guessing correctly at least 8 out of 10 answers on a true-false type examination is
- (1)  $\frac{7}{64}$     (2)  $\frac{7}{128}$   
(3)  $\frac{45}{1024}$                                       (4)  $\frac{7}{41}$

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