2-13

Booklet Code : A

Entrance Examinations – 2021
M.Sc. Animal Biology and Biotechnology

Hall Ticket No. _____

Time :2 hours Max. Marks : 100

INSTRUCTIONS: PLEASE READ BEFORE ANSWERING!

- ***Enter your hall ticket number on this sheet and the answer (OMR) sheet.***
- ***Answers have to be marked on the OMR answer sheet following the instructions provided there upon. Make sure that you have clearly mentioned the Booklet Code (A or B or C) on your OMR sheet.***
- ***Hand over OMR answer sheet at the end of the examination.***
- ***All questions carry one mark each. Answer all, or as many as you can.***
- ***There will be a negative marking of 0.33 mark for every wrong answer of 1 mark question in part A only***
- ***The question paper consists of Part A and Part B. The marks obtained in Part A will be taken into consideration in case of a tie i.e., when more than one student gets equal marks, to prepare the merit list.***
- ***There are a total of 19 pages in this question paper. Answer sheet (OMR) will be provided separately. Check this before you start answering.***
- ***Candidate should write and darken the correct Booklet Code in the OMR Answer Sheet, without which the OMR will not be evaluated. The candidates defaulting in marking the Booklet Code in the OMR shall not have any claim on their examination and University shall not be held responsible.***

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PART "A"

1. Open vascular system is usually found in

A) Crabs B) Monkeys

C) Crows D) Human

2. Which of the following gases has highest rate of diffusion?

A) O_2 B) CO_2

C) NH_3 D) N_2

3. In thermal stratification, the middle region which shows vertical temperature change is called

A) Mesolimnion B) Epilimnion

C) Metalimnion D) Hypolimnion

4. In bilateria development, splitting of solid mass of mesodermal cells to form the body cavity results in

A) Schizocoelom B) Enterocoelom

C) Endocoelom D) Mesocoelom

5. With reference to T cell receptor, which of the following statements are true:

I. It is required for helper T cells to stimulate B cells in humoral response
II. It is required for killer T cells to recognize antigen
III. It recognizes antigen fragments and MHC molecules independently
IV. It has a domain organization that is roughly similar to that of the immunoglobulin domain

A) I, IV B) I, III, IV

C) I, II, IV D) I, II, III, IV

6. An example of halide ore is

A) Galena B) Bauxite

C) Cinnabon D) Cryolite

7. Acridine orange is used to label

A) DNA and RNA B) Carbohydrates

C) Protein D) Lipids

8. The number of EDTA units required to make an octahedral complex with Ca^{2+} ion is

A) Six B) Three

C) One D) Two

9. A species that cannot exist is

A) SiF_6^- B) BF_6^{3-}

C) SF_6 D) AlF_6^{3-}

10. Nude mice used for developing tumor models lack one of the following functional glands

A) Pituitary
B) Thymus
C) Thyroid
D) Prostrate

11. The disappearance of the purple colour of $KMnO_4$ on its reaction with alkene is known as
A) Markonikov test
B) Grignard test
C) Bayer test
D) Wurtz test

12. The macrophage rich mass found at the site of injection of an adjuvant is called

A) Myeloma
B) Granuloma
C) Adjuvant activated lymphoma
D) Hybridoma

13. Ethanol is isomeric with
A) Dimethyl ether
B) Ethanol
C) Diethyl ether
D) Propanone

14. Hyaluronic acid is a multimer consisting of alternative residues of

A) N-acetylglucosamine and N-acetylmuramic acid
B) D-glucuronic acid and N-Acetylglucosamine
C) D-galactose and 3,6-anhydro-L-galactose
D) N-acetyl-galactosamine and glucuronic acid

15. Calcium acetate on strong heating gives

A) Methane+ $CaCO_3$
B) Acetone+ $CaCO_3$
C) Ethane+ $CaCO_3$
D) Ethane+ CaO

16. Which of the following statements holds true for placenta in mammals

A) Belongs to fetus only, that connects the uterus of mother
B) Belongs to uterus of mother only, that connects growing fetus
C) Belongs to fetus as well as mother from the respective ends
D) Belongs to fertilized embryo

17. Which of the following is not an electrophile?
A) NH_3
B) Br+

C) $AlCl_3$ D) NO_2^+

18. In a DNA fragment, the following sequence GTGAAACACAGGCTT is converted to GTGAAACAGAGGCTT. This is called as

A) Transition B) Transversion

C) Deletion D) Frame shift mutation

19. Chlorination of methane to give CCl_4 is an example of

A) An electrophilic addition B) A free radical substitution

C) A nucleophilic addition D) An electrophilic substitution

20. Oxidation of a primary alcohol with $KMnO_4/OH^-$ produces

A) A carboxylic acid B) An ether

C) A ketone D) An ester

21. Vesicles transporting proteins from plasma membrane to endosomes will be coated by

A) COPI B) COPII

C) COPIII D) Clathrin

22. Which of the following has maximum number of unpaired electrons?

A) Mg^{2+} B) Ti^{3+}

C) V^{3+} D) Fe^{2+}

23. Ora serrata is related to which organ

A) Intestine B) Brain

C) Liver D) Eye

24. Which of the following is true about the blood transfusion reactions, erythroblastosis fetalis and autoimmune hemolytic anemia?

A) Type-II hypersensitive responses B) Type-I hypersensitive responses

C) Type-III hypersensitive responses D) Type-IV hypersensitive responses

25. A hydrazone will result from the reaction of hydrazine with

A) A phenol B) An aldehyde

C) An alcohol D) An acid

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PART "B"

26. Which one of the terms describes a mitotic cell division giving rise to two daughter cells without increasing the size of the original parental cells

A) Cellulation
B) Blastocoel
C) Hyperplasia
D) Cytokinesis

27. Anti-aging pills like TA-65 primarily activate

A) Telomerase enzyme
B) Cell division
C) DNA recombination process
D) Production of immunoglobulins

28. The (9 + 2 Pattern) found in cilia/flagella occur in every animal phylum except

A) Arthropoda
B) Chordata
C) Protozoa
D) Mollusca

29. In Drosophila, the sex is determined by

A) The ratio of pairs of X chromosomes to the pairs of autosomes
B) X and Y chromosomes
C) The ratio of the number of X chromosomes to the sets of autosomes
D) The temperature of the environment

30. Which of the following method is better suited to identify a putative enhancer element/s

A) Electrophoretic Mobility Shift Assay
B) ChIP with p300 antibody
C) DMSO foot printing
D) DNA finger printing

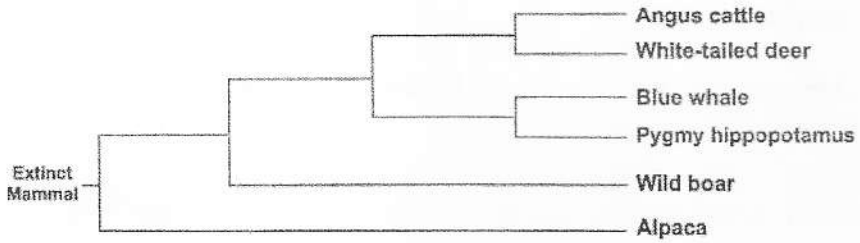
31. If a plant with genotype AaBb is self-fertilized, the probability of getting AABB genotype will be (A and B are not linked)

A) 1/2
B) 1/4
C) 1/8
D) 1/16

32. Plants adapted to swampy environment meet oxygen requirement of their roots by means of a specialized tissue called

A) Parenchyma
B) Aerenchyma
C) Collenchyma
D) Sclerenchyma

33. Consider the phylogenetic relation among the following species:



Which of the following are most closely related?

A) White-tailed deer and Blue whale
B) Pygmy hippopotamus and Wild boar
C) White-tailed deer and Angus cattle
D) Wild boar and Alpaca

34. The genome of Middle East Respiratory Syndrome CoV (MERS-CoV) is a

A) RNA, positive strand
B) RNA, negative strand
C) Diploid RNA
D) Linear DNA

35. Identify the mismatched pair

A) Tundra – Permafrost
B) Prairie – Epiphytes
C) Savanna – Acacia trees
D) Coniferous forest – Evergreen trees

36. If poly uracil RNA is used in *in vitro* translation reaction, the generated polypeptide contains

A) Alanine
B) Leucine
C) Isoleucine
D) Phenylalanine

37. The biogeochemical cycle of phosphorus differs from the cycles of carbon and nitrogen in that

A) Phosphorus cycles through biosphere, hydrosphere, lithosphere but not atmosphere
B) Phosphorus lacks a liquid phase
C) Only phosphorus is cycled through marine organisms
D) Living organisms do not need phosphorus

38. Which among the following is not a professional antigen-presenting cell?

A) Dendritic Cell
B) Macrophages
C) B Cell
D) Fibroblast Cells

39. The heaviest naturally occurring element is

A) Thorium
B) Uranium
C) Mercury
D) Polonium

40. "Water walking" occurs in many insect groups except

A) Hemiptera
B) Hymenoptera
C) Coleoptera
D) Collembola

41. Which one of the following is the correct food chain?

A) Phytoplankton —» Zooplankton —» Fish
B) Zooplankton —» Phytoplankton —» Fish
C) Zooplankton —» Protozoans —» Fish
D) Grass —» Fish —» Zooplankton

42. In an immunization experiment, there are four different groups of mice. Group (1) mice are administered with keyhole limpet hemocyanin, Group (2) mice received azobenzene arsonate, Group (3) mice received lipopolysaccharide, Group (4) mice received dextran. After four weeks, sera were collected and tested for antigen-specific IgG1 and IgG2a antibodies by ELISA. Which of the following groups will show maximum titer?

A) keyhole limpet hemocyanin-primed
B) azobenzene arsonate-primed mice

mice

C) lipopolysaccharide-primed mice

D) dextran-primed mice

43. Which of the following among alkali metals is most reactive?

A) Na
B) K
C) Rb
D) Cs

44. Relationship of an epiphyte with its host is an example of

A) Amensalism
B) Mutualism
C) Commensalism
D) Competition

45. Which one of the following is not an example of selective media?

A) Hektoen enteric Agar
B) Trypticase soy Agar
C) Baird–Parker Agar
D) MacConkey Agar

46. The major difference between food web and food chain is

A) Food chain and food web are linear pathways
B) Food chain and food web are interconnected pathways
C) Food chain is a single linear pathway and food web is interconnected pathway
D) Food chain is interconnected pathway and food web is single linear pathway

47. In *E. coli*, which of the following σ factor is involved in the transcription of the housekeeping genes?

A) σ^{70}
B) σ^{48}
C) σ^{32}
D) σ^{54}

48. Find weight of H_2SO_4 in 1200ml of a solution of 0.4N strength

A) 23.52 g
B) 2.52 g

C) 3.52 g

D) 29.52 g

49. Cryptochromes are fluorophores of plants that are sensitive to

A) Red Light
B) Violet Light
C) Blue Light
D) White Light

50. Which one of the following is not true with reference to limbic system related memory response in vertebrates?

A) Severe damage to hippocampus usually does not destroy memory events prior to injury, yet later events are recalled only with great difficulty or not at all

B) Experimental or accidental removal of parts of the limbic system leads to emotional passiveness

C) Human being with hippocampal damage by neurodegeneration retains good short-term memory, but poor long-term memory

D) Limbic system is involved in temporarily retaining the memory of a recent experience until it becomes established as a long-term memory in the isocortex

51. Which of the following compounds will be optically active?

A) Succinic acid
B) Meso-Tartaric acid
C) Lactic acid
D) Chloroacetic acid

52. Production of ammonia by microbes is tested by

A) Methyl red test
B) Nesseler test
C) Voges-Proskauer test
D) Kovac method

53. Phosphoric acid has three pKa values. The number of pKa values that a phosphate group can have in DNA or RNA is / are

A) 0
B) 1
C) 2
D) 3

54. Twin studies in humans are useful because

A) They allow more refined estimates of chromosome location

B) Twins have a greater likelihood of being heterozygous

C) They do not allow environmental influences on variation in a trait to be estimated

D) They allow genetic as opposed to environmental influences on variation in a trait to be estimated

55. Water logging is a phenomenon that refers to

A) Erosion of soil

B) Rotation of crop patterns

C) Saturation of soil root zone

D) Cultivating the same crops

56. Which is the correct sequence of arrangement of types of WBC in decreasing order in terms of number per mm^3 of healthy human blood

A) Eosinophils>Basophils>Neutrophils

B) Basophils >Eosinophils>Neutrophils

C) Neutrophils >Eosinophils>Basophils

D) Eosinophils> Neutrophils >Basophils

57. Grey crescent is present in

A) Zygote of frog

B) Brain of rabbit

C) Eye of frog

D) Retina of cockroach

58. The atoms of the element having same mass number but different atomic number are called

A) Isotopes

B) Isobars

C) Isotones

D) Isomers

59. The DNA-polymerase with 3' to 5' exonuclease activity is

A) DNA polymerase-I

B) DNA polymerase-II

C) DNA polymerase-III

D) Rep-A

60. You have a mixture of proteins with following properties

Protein 1= 58 kDa

Protein 2= 28 kDa

Protein 3= 17 kDa

Protein 4= 10 kDa

Protein 3 and Protein 4 exist as a hetero-dimer while Protein 1 and 2 exist as monomers in solution. What is the order of elution of these proteins on a gel exclusion column?

A) Protein 3 and 4 will co-elute first followed by Protein 2 and 1 (the chromatogram will depict 3 major peaks)

B) Protein 1 will elute first and then protein 2,3 and 4 co-elute as a single peak (the chromatogram will depict 2 major peaks)

C) Protein 1 will elute first followed by Protein 2,3 and 4 (the chromatogram will depict 4 major peaks)

D) Protein1 will elute first. Protein 2 will elute next followed by Protein 3 and 4 (the chromatogram will depict 3 major peaks)

61. Which of the following can precipitate antigens

A) Fab

B) Fc

C) $F(ab)_2$

D) FcR

62. Transamination of which of the following amino acids gives rise directly to one of the intermediates of the tricarboxylic acid cycle?

A) Glycine

B) Alanine

C) Glutamate

D) Arginine

63. PAP smear test is used for screening the

A) Breast Cancer

B) Bone Metastasis

C) Cervical Cancer

D) Blood Cancer

64. An example of a compound that acts as an antioxidant in packed food is

A) Benzoic acid
B) Parachlorometaxylenol
C) Sodium bicarbonate
D) Butylated hydroxy toluene (BHT)

65. For enzymes obeying the Michaelis-Menten relationship, a plot generated using $1/V_0$ versus 1/[S] is known as

A) Lineweaver-Burk plot
B) Michaelis-Menton plot
C) Ramachandran plot
D) Eadie-Hofstee plot

66. Which of the following compound will react with ammoniacal silver nitrate?

A) 1-Butene
B) 1-Butyne
C) 2-Butene
D) 2-Butyne

67. For a given DNA sequence of 5'-GGAACCTT----------GATCGATC-3' which one of the following serves as a forward (FP) and reverse primers (RP) during PCR amplification?

A) FP: 5'-CCTTGGAA----- and RP: 5'-GATCGATC-----
B) FP: 3'-GGAACCTT----- and RP: 3'-GATCGATC-----
C) FP: 3'-CCTTGGAA----- and RP: 3'-GATCGATC-----
D) FP: 5'-GGAACCTT----- and RP: 5'-GATCGATC-----

68. In the absence of any gonads in a fetus, the external genitalia will be

A) Absent
B) Ambiguous
C) Male
D) Female

69. At pre-B cell stage immunoglobulin heavy chain polypeptides are expressed on the cell surface along with

A) Ig alpha chain
B) Ig beta chain
C) Lambda 5
D) Lambda 5 and Vpre B

70. Match the following

(1) Telolecithal egg	(i) Sea urchin
(2) Isolecithal egg	(ii) Frog
(3) Centrolecithal egg	(iii) Bird
(4) Mesolecithal egg	(iv) Insect

A) 1-i, 2-ii, 3-iii and 4-iv

B) 1-iii, 2-I, 3-iv and 4-ii

C) 1-iv, 2-i, 3-iii and 4-ii

D) 1-ii, 2-i, 3-iv and 4-iii

71. Which one of the following technique is used to determine the size of a native protein?

A) SDS-PAGE

B) Affinity chromatography

C) Gel filtration

D) Electrophoresis

72. "Beltsville sperm sexing technology" is developed based on

A) Differential Density Gradient Centrifugation

B) Flow-Cytometry

C) Flow-Fractionation

D) Mass-Spectrometry

73. A cross between two inbred lines, one with dark blue flowers and one with bright white flowers produce F1 offspring that are light blue. When the F1 progeny are selfed, a 1:2:1 ratio of dark blue to light blue to white flowers is observed. What genetic phenomenon is consistent with these results?

A) Epistasis

B) Co-dominance

C) Inbreeding depression

D) Incomplete dominance

74. A substance that diffuses through the egg and by virtue of its concentration determines the developmental fate of the embryo is known as

A) Immunogen

B) Zymogen

C) Cytokine

D) Morphogen

75. Cas9 is a

A) Viral protein that binds non-specifically to double strand DNA and cleaves it

B) Viral protein that disrupts bacterial membranes

C) Viral protein that binds to target DNA by complementary base pairing

D) An enzyme that cuts DNA at specified site through a guide RNA molecule

76. Which one of the following statement about mitochondrial protein import is true

A) The mitochondrial targeting sequences are always present on carboxy terminal

B) Mitochondrial proteins cross the membrane in an unfolded state

C) All the mitochondrial proteins are synthesized by mitochondria itself

D) Chaperons are not required for mitochondrial protein import

77. With reference to the 2018 Nobel Prize in Physiology or Medicine given to immunologists James Allison and Tasuku Honjo for their discovery of cancer therapy, which of the following statements is true:

A) Tasuku Honjo work pertained to CTLA-4 receptor
B) James Allison work pertained to PD-1 receptor
C) CTLA-4 and PD-1 protein functions as a brake on the immune system
D) Role of CTLA-4 and PD-1 in inhibition of positive immune regulation.

78. Which of the following is not a potential prezygotic reproductive barrier?

A) Temporal segregation of breeding seasons

B) Differences in chemicals that attract mates

C) Hybrid infertility

D) Spatial segregation of mating sites

79. Which of the following statement about biological membranes is not true

A) They contain carbohydrates covalently bound to protein and lipids

B) They are very large sheet like structures with closed boundaries

C) They contain symmetrical lipid bilayer

D) They contain microdomains that mediate distinct functions

80. Which one of the following is a DNA vaccine ?

A) Rota Virus
B) MMR
C) HPV
D) Hepatitis –B

81. Which one of the following is a marker for early endosomes?

A) Rab5
B) Rab7
C) LAMP1
D) Rab11

82. Germ cell aplasia is best described by which one of the following?

A) Infertility without sexual abnormality, normal levels of LH and Testosterone, low level of Inhibin-B, elevated levels of FSH, Azoospermia
B) Infertility with sexual abnormality, elevated levels of LH and Testosterone, low levels of Inhibin-B, normal levels of FSH, Azoospermia
C) Subfertile without sexual abnormality, elevated levels of LH and Testosterone, low levels of Inhibin-B, normal levels of FSH, Oligospermia
D) Subfertile with moderate sexual abnormality, normal levels of LH and Testosterone, low levels of Inhibin-B, elevated levels of FSH, Oligospermia

83. The phenomenon of converting differentiated cell into another cell type by activation of a different set of transcription factors is known as

A) Induced differentiation
B) Trans-differentiation
C) De-differentiation
D) Cross-differentiation

84. Which one of the following methods describe probing proteins that have been separated by gel electrophoresis, with radiolabelled bait proteins and then detecting the interacting proteins by autoradiography

A) Western blotting
B) Southern blotting
C) Far-western blotting
D) North-western blotting

85. Addison's Disease is an organ specific autoimmune disorder in which antibodies are produced against

A) Adrenal gland
B) Thyroid gland
C) Pineal gland
D) Pituitary gland

86. Which one of the following statements is true

A) The longer the fatty acid chain, the fluidity of the membrane increases
B) The longer the fatty acid chain, the fluidity of the membrane decreases
C) Fluidity of the membrane is not dependent on the length of the fatty acids
D) Increased number of unsaturated fatty acids decreases the fluidity of the membrane

87. During gastrulation in *Xenopus*, the future mesoderm and endoderm move inside the embryo through the "blastopore"; in contrast, in chickens, gastrulation involves cells moving inward through the

A) Blastoderm
B) Yolk
C) Cleavage furrow
D) Primitive streak

88. Match the following

I. Transduction
II. Transformation
III. Transfection
IV. Transvection

1. Interaction between homologous chromosome segments
2. Interaction between segments of same chromosome
3. Uptake of DNA into bacteria
4. Introducing DNA into bacteria by a virus
5. Introducing DNA into mammalian cell

A) I-4, II-3,III-5, IV-1
B) I-3,II-4,III-5,IV-2
C) I-4,II-3,III-2,IV-5
D) I-4,II-5,III-3,IV-1

89. Which of the following zone has abundant phytoplanktons?

A) Littoral zone
B) Benthic zone
C) Limnetic zone
D) Profoundal zone

90. In the equation, $K_w = (55.5\ M)(K_{eq}) = [H^+][OH^-]$, K_w indicates

A) Disassociation rate of water B) Ionization potential of water

C) Ionic product of water D) Equilibrium constant of water

91. Which one of the following statements hold true for human haploid sperms produced from a diploid spermatogonial cells during spermatogenesis

(I) All sperms have identical DNA sequences
(II) Every sperm has a unique DNA sequence
(III) All sperms have identical SNPs
(IV) Every sperm has unique SNPs

A) I and III B) II and IV

C) II only D) I, II and III

92. Xeroderma pigmentosum (XP) is a rare autosomal inherited skin and neurodegenerative disease, mainly caused due to defects in

A) Non-homologous end joining B) Nucleotide excision repair system

C) Mismatch repair D) Homologous recombination

93. An individual possessing two or more genetically different cells lines all derived from a single zygote is known as

A) Chimera B)Polyploid

C) Mosaic D) Hybrid

94. A Barr body is

(I) Active X chromosome
(II) XIST RNA
(III) Decondensed inactive X chromosome
(IV) Polycomb proteins
(V) Associated with nuclear periphery

A) I, III and V B) II, IV and V

C) II, III, IV D) III, IV and V

95. A 1000bp linear and circular DNA has two EcoR1 restriction enzyme sites. After digestion with EcoR1 and followed by ligation with T4DNA ligase. How many combinations of DNA ligation products are possible respectively?

A) 6, 4 B) 6, 6

C) 4, 4 D) 4^4 , 4^4

96. Select a non-denitrifying bacterium

A) *Pseudomonas aeruginosa* B) *Bacillus ramosus*

C) *Thiobacillus denitrificans* D) *Rhizobium leguminosarum*

97. ADF/cofilin increases actin turnover by regulating the actin filament's

A) Initiation B) Polymerization

C) End-capping D) Severing

98. Oleic acid contains

A) 12 carbons B) 14 carbons

C) 16 carbons D) 18 carbons

99. The following method is used to analyze protein post translational modifications of carbohydrate epitopes

A) Western blotting B) Eastern blotting

C) Northern blotting D) South blotting

100. Which one of the following disease is endemic in India

A) Influenza B) Cholera

C) Typhoid D) Plague

For rough work

Entrance Examination 2021
M.Sc. Animal Biology and Biotechnology

(M.Sc Ent 2021) KEY Set A

Q1	A	Q26	A	Q51	C	Q76	B
Q2	C	Q27	A	Q52	B	Q77	C
Q3	C	Q28	A	Q53	B	Q78	C
Q4	A	Q29	C	Q54	D	Q79	C
Q5	C	Q30	B	Q55	C	Q80	C,D
Q6	D	Q31	D	Q56	C	Q81	A
Q7	A	Q32	B	Q57	A	Q82	A
Q8	C	Q33	C	Q58	B	Q83	B
Q9	B	Q34	A	Q59	A	Q84	C
Q10	B	Q35	B	Q60	B	Q85	A
Q11	C	Q36	D	Q61	C	Q86	B
Q12	B	Q37	A	Q62	C	Q87	D
Q13	A	Q38	D	Q63	C	Q88	A
Q14	B	Q39	B	Q64	D	Q89	C
Q15	B	Q40	B	Q65	A	Q90	C
Q16	C	Q41	A	Q66	B	Q91	B
Q17	A	Q42	A	Q67	D	Q92	B
Q18	B	Q43	D	Q68	D	Q93	C
Q19	B	Q44	C	Q69	D	Q94	B
Q20	A	Q45	B	Q70	B	Q95	B
Q21	D	Q46	C	Q71	C	Q96	B,D
Q22	D	Q47	A	Q72	B	Q97	D
Q23	D	Q48	A	Q73	D	Q98	D
Q24	A	Q49	C	Q74	D	Q99	B
Q25	B	Q50	C	Q75	D	Q100	C

NOTE :

For Q.Nos. 80 & 96 two options are correct and benefit will be given to those who have answered any one of them or both.