Section A General Aptitude

Question Numbers: (1 to 5)

Question Label: Comprehension

Read the passage and answer the questions that follow

The opportunity that beckons India is to make optimal use of technology, management, entrepreneurship and investments to overcome the challenges of this decade and beyond. Yesterday's goals Cannot be a benchmark as India contemplates graduating to the company of the developed nations of the world. Our targets must be higher, our coverage more inclusive and above all, the methods to achieve must be unique.

Since Independence, India as a nation has indeed made massive progress in almost every social and economic field. But as we strive to have an economically developed nation by 2020. Each incremental step opens up new vistas before us. After every few pages, we mark our place in history, heading for a new chapter of challenges not experienced earlier.

Following a steady decline in world income — from about 33 percent in 0 CE to around 25 percent in 1600 CE — India's share declined even further during the British Raj, falling sharply from about 16 per cent in 1820 CE, to less than 4 per cent at the time of Independence. Since Independence, there has been a steady rise in income, and the per capita national product has increased by more than five times, from Rs. 5,700 in 1950 to about Rs. 32,000 in 2008, and today, India's share in world income — purchasing power parity (PPP) — stands at about 6.3 percent But while the economy has been growing steadily and poverty, as a percentage, declining steadily, the absolute number of people below the poverty line has been constant.

Sub questions

1. According to the passage, use of the phrase "make optimal use of" means:
   (a) Set a higher benchmark for growth.
   (b) Using the methods effectively and efficiently.
   (c) Experiment with new challenges.
   (d) Mark our place in history.

2. Which word in the given passage means "without interruption"?
   (a) Consistent
   (b) Steady
   (c) Optimal
   (d) Constant

3. What does India need to become a developed nation?
   A. Take rapid and incremental steps towards progress.
   B. Contemplate on only yesterday's goals.
   C. Make thoughtful usage of technology in various fields.
   D. Work steadily on economic indicators.
   E. Set higher, inclusive and unique targets.
   Choose the CORRECT answer from the options given below:
   (a) A, B, C only.
   (b) B, D, E, only.
   (c) A, D, E only.
   (d) C D, E only.

4. Given below are two statements:
   Statement A: Since Independence, there has been a steady rise in income and the increase of per capita national product by five times from 5,700 in 1947 to about 32000 in 2008.
   Statement B: Poverty has declined while the economy has grown but the absolute number of people below poverty line has been constant.
   In the light of the above statements, choose the most appropriate answer from the options given below:
   (a) Both Statement A and Statement B are correct.

(b) Both Statement A and Statement B are incorrect.
(c) Statement A is correct but Statement B is incorrect.
(d) Statement A is incorrect but Statement B is correct.

5. Read the given passage and Match List I with List II.

	List I (India's share in world GDP)		List II (Year)
A	16 percent	i	0CE
B	33 percent	ii	1820 CE
C	25 percent	iii	1947 CE
D	4 percent	iv	1600 CE

Choose the CORRECT options given below:
(a) A-i, B-ii, C-iv, D-iii
(b) A-iii, B-ii, C-i, D-iv
(c) A-ii, B-i, C-iv, D-iii
(d) A-iv, B-ii, C-iii, D-i

Question Numbers: (6 to 10)
Question Label: Comprehension
Read the following passage and answer the questions that follow:

Let us discuss coal, another fossil fuel. Even though India has abundant quantities of coal, it is constrained by regional locations, a high ash content that affects the thermal efficiency of our power plants, besides which there are also environmental concerns. Thus, a movement towards energy independence would demand accelerated work in the production of energy from the coal sector through integrated gasification and a combined cycle route.

In 2030, the total energy requirement of the nation is expected to be 4,00,000 MW. By that time, if we were to follow the present route, the power generated from coal-based power plants would increase from the existing 80,000 MW to 2,00,000 MW. This would demand a significant build-up of thermal power stations and a large-scale expansion of coal fields, leading, naturally, to much higher levels of pollution.

The hydel capacity generated through normal water sources and by the interlinking of rivers is expected to contribute an additional 50,000 MW- Numerous large-scale solar energy farms with a capacity of hundreds of megawatts could together contribute around 55,000 MW. The nuclear power plants should have a target of 50,000 MW of power. At least 64,000 MW of electrical power should come from wind energy. The balance 51,000 MW has to be generated through conventional thermal plants, through coal and gas, and renewable sources of energy such as biomass, through municipal solid waste and solar thermal power. The most significant aspect, however, is that the power generated through renewable energy technologies has to be increased to 28 percent from the present 5 percent.

Sub questions

6. To meet the energy requirements of the nation, the power generation through renewable energy technologies should be:
(a) Increased from 80,000 MW to 400,000 MW.
(b) Covering the remaining balance of 51,000 MW generated through various modes.
(c) Accelerated through integrated gasification and combined cycle route.
(d) Increased by 23 percent from the present 5 percent.

7. Which word in the passage is the antonym of "rare"?
(a) Existing
(b) Numerous
(c) Significant
(d) Additional

8. Which of the following factor(s) are a reason behind the constrained utilization of coal as a fuel for generating energy?
A. Low thermal efficiency of our power plants.
B. Regional locations.

C. Lack of integrated gasification.
D. High ash content.
E. Environmental concerns.
Choose the CORRECT answer from the options given below:
(a) A, B, C only
(b) B, C, D only
(c) B, D, E only
(d) B, D, A only

9. Given below are two statements that are based on the passage mentioned above:
Statement A: To meet the expected energy requirements in 2030, the power generation through renewable energy technologies has to be increased by percent.
Statement B: The balance 51,000 MW will be generated through conventional thermal plants.
In the light of the above statements, choose the most appropriate answer from the options given below:
(a) Both Statement A and Statement B are correct.
(b) Both Statement A and Statement B are incorrect.
(c) Statement A is correct but Statement B is incorrect.
(d) Statement A is incorrect but Statement B is correct.

10. Match List I with List II on the basis of the passage mentioned above:

	List i (power)		List ii (energy source)
A	50.000 MW	i	Wind energy
B	55,000 MW	ii	Thermal energy
C	51.000 MW	iii	Hydel energy
D	64000 MW	iv	Solar energy

Choose the CORRECT options given below:
(a) A-i, B-iii, C-iv, D-ii
(b) A-ii, B-iii, C-iv, D-i
(c) A-iii, B-ii, C-iv, D-i
(d) A-iii, B-iv, C-ii, D-i

11. If it was Saturday 17th December, 2002, what was the day on 26th December 2004?
(a) Monday
(b) Sunday
(c) Tuesday
(d) Thursday

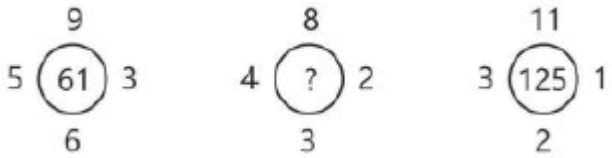
12. Study the given pattern and select the number that can replace question mark in the given matrix:

11	103	9
13	157	6
15	?	7

(a) 175
(b) 196
(c) 211
(d) 225

13. If in a certain code language 'FRIEND' is written as 'JPMCRB', 'UNCLE' is written as YLGJI% then what will be the code for 'LEADER'?
(a) QCDBIP
(b) PDFBDL
(c) PCEBIP
(d) RBFCNR

14. Find the missing number from the given alternatives:



(a) 41
(b) 56
(c) 67
(d) 79

15. If, P ×Q means P is the husband of Q:
P + Q means P is the father of Q.
P - Q means P is the mother of Q.
P ÷Q means P is the sister of Q,
Then, which of the following relations shows that C is the paternal grandfather of D?
(a) C × B − E ÷ D + A
(b) C + A × B ÷ E ÷ D
(c) C + B × A − E ÷ D
(d) C × B ÷ E + A − D

16. In this question a number series is given. Choose the CORRECT alternative that will continue the same pattern and replace the question mark in the given series. 856, 849, 824 763, ?, 431:
(a) 681
(b) 642
(c) 535
(d) 495

17. Sunita starts from her home towards North. After walking 15 meters, she turned to her right and walked 55 meters. Then she turned to her left and after walking a distance of 20 meters turned to her left again and walked 67 meters. What is the shortest distance between her home and final position and what is the direction of final position with respect to her home?
(a) 26 m, North-West.
(b) 35 m, North-East.
(c) 37 m, North-West.
(d) 49 m, North-East.

18. Seven friends A, B, C, D, E, F and G are sitting on a straight bench all facing north. There are exactly three friends sitting between A and B. D is sitting to the left of B. Only one friend is sitting to the left of A. B is sitting immediately left of F. Only one friend is sitting between D and A Who is sitting at the extreme right end?
(a) E
(b) F
(c) C
(d) D

19. Select the option that is related to the third term in the same way as the second term is related to the first term and the sixth term is related to the fifth term. BSNT: Y X G C : : M X R V : ? : : F P C Y : C U V H :
(a) JDKE
(b) JCKD
(c) JCKE
(d) JCLE

20. A cube is painted black on two adjacent faces and on one apposite face, yellow on two apposite faces and green on the remaining face. It is then cut into 64 equal cubes. How many cubes have one black coloured face only?
(a) 12
(b) 24
(c) 16
(d) 8

21. In the given question, two statements are given followed by two conclusions numbered A and B. You have to take the given statements to be TRUE even if seem to be at variance from the commonly known facts and then decide which of the given conclusions logically follows from the given statements disregarding Commonly known facts:
Statements: All Hammers are pliers. All screws are pliers.
Conclusions A: Some hammers are screws.
B: Some screws are hammers is a possibility.
(a) Both Conclusions A and B follow.
(b) Both Conclusions A and B do not follow.
(c) Conclusion A follows but conclusion B does not follow.
(d) Conclusion A does not follow but conclusion B follows.

22. In this question there is a statement followed by two assumptions numbered A and B. You have to consider the statement and the following assumptions and decide which of the assumption(s) is/are implicit in the statement:
Statement: Rohan always studies from the reference books of publication X for his competitive exams.
Assumptions A: many of the questions asked in competitive exams are from the reference books of publication X.
B: Studying from reference books are necessary for competitive exams.
(a) Only Assumption A is implicit.
(b) Only Assumption B is implicit.
(c) Neither assumption A nor B is implicit.
(d) Both assumptions A and B are implicit.

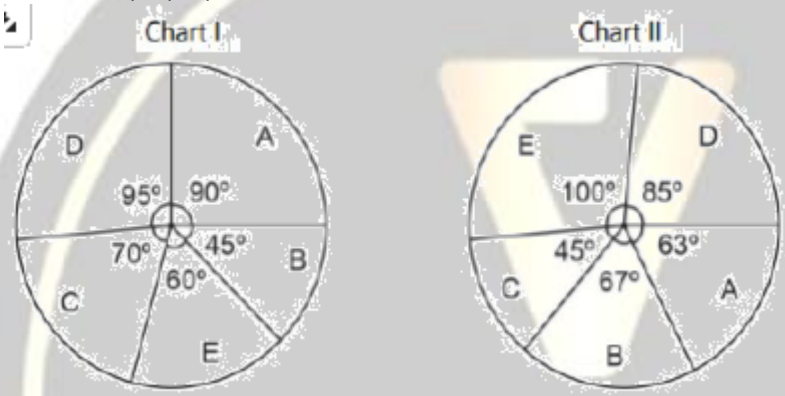
23. Following table provides the marks obtained by four friends in five different subjects. Maximum marks in each subject are 100:

Friends	Physics	Chemistry	Mathematics	English	Physical Education
Rahul	89	92	79	81	90
Vinay	75	96	85	86	92
Abeer	94	90	89	77	90
Sudesh	93	91	84	86	92

Who has scored exactly 88% marks in total?
(a) Rahul
(b) Vinay
(c) Abeer
(d) Sudesh

24. In this question there is a statement, followed by two courses of action numbered A and B. You have to assume everything in the statement to be TRUE and on the basis of the information given in the statement, decide which of the suggested courses of action logically follow(s) for pursuing.
Statement: A large number of people got ill due to eating cut fruits from road side shops.
Courses of Action A. Municipal corporation should penalize the road side vendors if they sell cut fruits.
B. People should be made aware about the dangers of eating cut fruits sold in open.
(a) Only A follows.
(b) Only B follows.
(c) Neither A nor B follows.
(d) Both A and B follow.

25. The following pie chart show the distribution of students appearing in the Board examination (Chart I) and the students who have passed the Board examination (Chart II) from the different schools A, B, C, D and E:

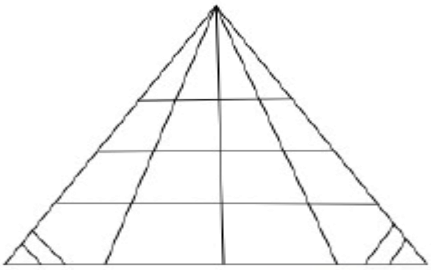


Total number of students appeared = 1800
Which school has the lowest percentage of students passed with respect to those appeared?
(a) A
(b) B
(c) C
(d) D

26. How many rectangles are there in the given figure?

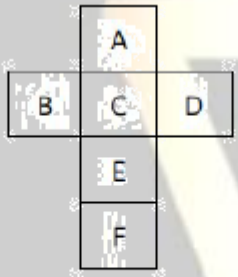
(a) 65
(b) 70
(c) 75
(d) 80

27. How many triangles are there in the given figure?

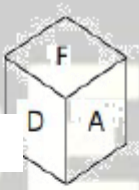


(a) 26
(b) 34
(c) 44
(d) 46

28. Select the box that **CANNOT** be formed by folding the given unfolded box:



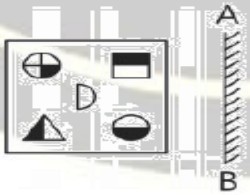
(A)

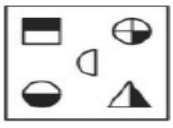

(B)


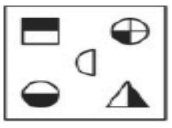
(C)

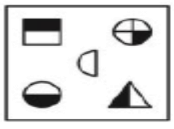

(D)

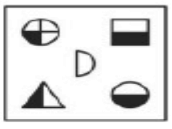

29. Choose the CORRECT mirror image of the given figure when the mirror is placed at line AB:



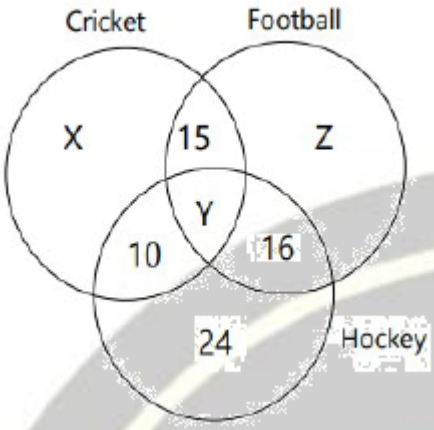
(A)


(B)


(C)


(D)


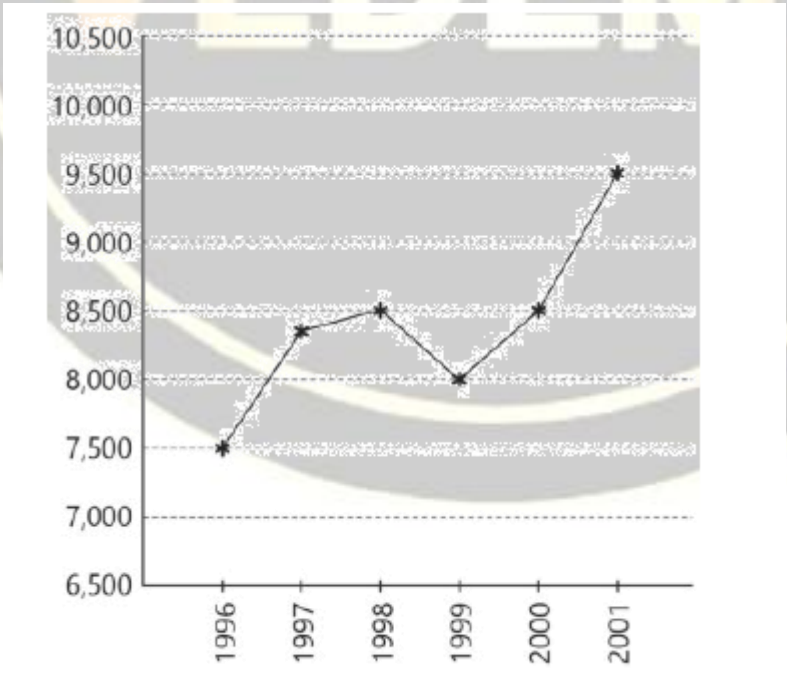
30. Study the Venn diagram and answer the question. The alphabets and numbers in different sections indicate the number of persons who play different games in a school:



If the total number of persons who play games in the school is 108 and the number of persons who play at least two games is 54. find the number of persons who play all the three games?
(a) 11
(b) 13
(c) 19
(d) 21

31. If 'AMAN' is written as 'CLCM' in a certain code then in the same code 'ARUN' is written as:
(a) CQWO
(b) CQVM
(c) CPWM
(d) CQWM

32. Direction: Refer the chart below and answer the question. What is annual average rate of increase in the ice-cream market from 1996 to 2001?

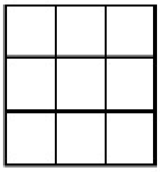


(ice-cream market in India)

(a) 5.33%
(b) 26.67%
(c) 6.67%

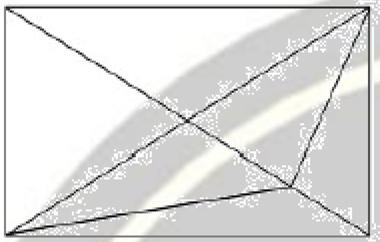
(d) 10%

33. Statement A: The number of squares in the figure:



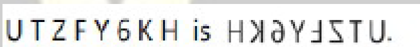
is 14.

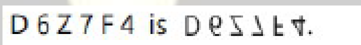
Statement B: The number of triangles in the figure.



is 15.

In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but statement B is false.
(d) Statement A is false but statement B is true.

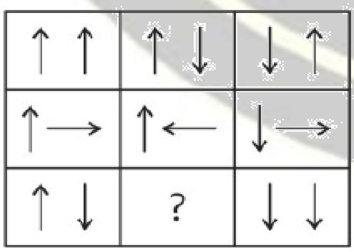
34. Statement A: The mirror-image of 

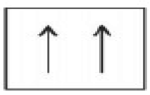
Statement B: The water-image of 

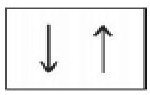
In the light of above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but statement B is false.
(d) Statement A is false but statement B is true.

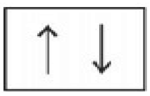
35. If '—' means '÷' means '+' means ' ×' , '÷ 'means '—' , 'x' means '+' then which of the following equations is CORRECT?
(a) 52÷4 + 5 × 8 − 2= 36
(b) 43 ×7 ÷ 5 + 4-8=25
(c) 36 x 4- 12+5 ÷ 3 =420
(d) 36-12 × 6÷ 3+ 4= 60

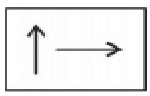
36. Complete the figure matrix:



(A) 

(B) 

(C) 

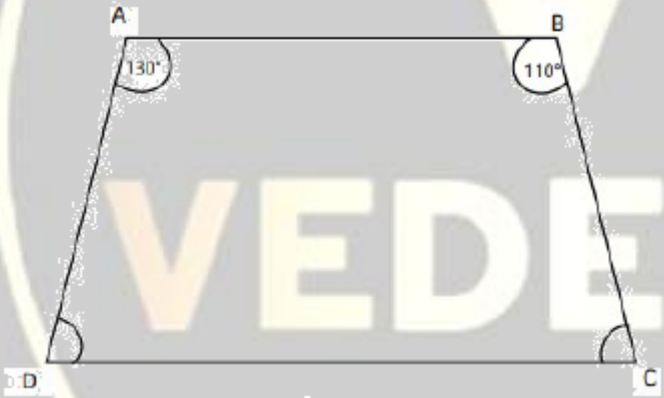
(D) 

37. A cube whose two adjacent faces are coloured is cut into 64 identical small cubes. How many of these small cubes are **NOT** coloured at all?
    (a) 60
    (b) 48
    (c) 36
    (d) 32

38. A dealer marks his goods at 20% above the cost price and allows a discount of 16% on the marked price. What is his gain percentage?
    (a) 1%
    (b) 2%
    (c) 0.8%
    (d) 0.08%

39. If 2a = 3b = 4c = 6d, then value of $\frac{a2+b2}{c2+d2}$, is:
    (a) 2/3
    (b) 4
    (c) $\frac{1}{6}$
    (d) 7/3

40. In trapezium ABCD, in which AB//DC:



$\angle A = 130^0$ and $\angle B = 110^0$ What is the value of $\angle C - \angle D$?
    (a) 10^0
    (b) 20^0
    (c) -20^0
    (d) 40^0

41. In a town, 65% people watched the news on television. 40% read a newspaper and 25% read a newspaper and watched the news on television also. What percent of the people neither watched the news on television nor read a newspaper?
    (a) 10
    (b) 14
    (c) 16
    (d) 20

42.
    A. The missing term of the series.
    4, 8, 28, 80, 244, ? , is 728.
    B. The missing term of the alphabet series.
    UPI, SHJ, ODP, MBQ ? is IAV.
    C. The missing term of the letter — number series.

Q1F, S2E U6D, W21C, ? is Y88B.

D. The missing term of the letter — number series.
D-4, F-6, H-8, J-10, ? is L-22

Choose the CORRECT answer from the options given below:
(a) A and C only.
(b) A, B and C only.
(c) B, C and D only.
(d) B and D only.

43. The ratio of the ages of man and his wife is 4 : 3, After 4 years, this ratio will be 9 : 7. If at the time of their marriage, the ratio of their ages was 5 : 3, then how many years ago were they married?
(a) 8
(b) 10
(c) 12
(d) 15

44. Read the following information and answer the question:
Alka is older than Mala. Gopal is older than Mala but younger than Alka. Kapil is younger than Ram and Mala. Mala is older than Ram.
A. Mala's age is between Gopal and Ram.
B. Gopal age is between Mala and Kapil.
C. Mala lies in the middle.
D. Alka is the youngest.
E. Kapil is the eldest.
Choose the CORRECT answer from the options given below:
(a) C and E only.
(b) B, D and E only.
(c) A, C and D only.
(d) A and C only.

45. Direction: Study the table carefully and answer the question:
Number of washing machines and refrigerators manufactured by a company.

	2005	2006	2007	2008	2009
Washing machine	14400	20500	12800	16400	18600
Refrigerator	12800	24700	19200	20200	14900

Find, what was the difference in the total number of washing machines and refrigerators manufactured in 2006 to the total number of washing machines and refrigerators manufactured in 2008?
(a) 6800
(b) 5600
(c) 8600
(d) 8200

46. Given below are two statements:
Statement A: A compound interest on a certain sum for 2 years at 10% per annum is 525. The simple interest on the same sum for double the time at half the rate percent per annum is 500.
Statement B: The respective ratio of milk and water in the mixture is 4 3. If 6 litres of water is added to this mixture, the respective ratio of milk and water becomes 8 : 7, then the quantity of milk in the original mixture is 24 litres.
In the light of the above statements, choose the most appropriate answer from the options:
(a) Both Statement A and Statement B are correct.
(b) Both Statement A and Statement B are incorrect.
(c) Statement A is correct but statement B is incorrect.
(d) Statement A is incorrect but statement B is correct.

47. If $x + \frac{1}{x} = 10$, then what is the value of $(x^2 - \frac{1}{x^2})^2$:
    (a) 9,600
    (b) 9,604
    (c) 9,608
    (d) 9,610

48. A sector of a circle of radius 6 cm is formed with central angle 60^0. What will be its area (in cm^2)? (Here ' π' refers to $\frac{22}{7}$)
    (a) $\frac{3}{4}\pi$
    (b) $\frac{5}{4}\pi$
    (c) 6π
    (d) 12π

49. How many four-digit numbers can be formed by using the digits 0, 1, 3, 7 if repetition of digits are allowed?
    (a) 160
    (b) 500
    (c) 2400
    (d) 2500

50. What is the difference between simple interest and compound interest on sum 10,000 at the rate of 10% per annum for the period of two years?
    (a) 110
    (b) 100
    (c) 150
    (d) 160

Section B Cross Disciplinary

51. A short microtubular organelle projecting into extra cellular medium used for locomotion:
    (a) Cisternae
    (b) Cilium
    (c) Pseudopodium
    (d) Basal Body

52. Organelle that is involved in carbohydrate digestion, autophagy, hydrolysis etc:
    (a) Golgi body
    (b) Nucleus
    (c) Lysosome
    (d) Mitochondria

53. Microtubular protein having ATPase activity and required for movement:
    (a) Ecdysone
    (b) Fibronectin
    (c) Dynein
    (d) Sarcopin

54. Which of the following principle of bioethics emphasizes the importance of minimizing harm and maximizing benefits in health care decisions?
    (a) Justice
    (b) Autonomy
    (c) Beneficence

(d) Non-maleficence

55. Which of the following ethical principle supports the idea that health care resources should be distributed fairly among individuals and communities?
(a) Confidentiality
(b) Informed consent
(c) Justice
(d) Beneficence

56. Match List I with List II.

	List I		List II
A	Released by anterior pituitary and affects the adrenal gland.	i	FSH
B	Influences extracellular fluid volume.	ii	Oxytocin
C	Stimulates estrogen secretion and egg maturation in females.	iii	ADH
D	Causes uterine contractions during child birth.	iv	ACTH

Choose the CORRECT options given below:
(a) A-ii, B-iv, C-iii, D-i
(b) A-iv, B-i, C-ii, D-iii
(c) A-iii, B-iv, C-ii, D-i
(d) A-iv, B-iii, C-i, D-ii

57. Given below are two statements:
Statement A: An endocrine gland releases substance through tubes or ducts.
Statement B: An exocrine gland releases substance it makes directly into the fluid bathing the glands.
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but statement B is false.
(d) Statement A is false but statement B is true.

58. Match List I with List II.

	List I		List II
A	Mechanoreceptor	i	Detects Change in water volume of a solution.
B	Nociceptor	ii	Responds to heat or cold.
C	Osmoreceptor	iii	Detects tissue damage.
D	Thermoreceptor	iv	Detects changes in pressure position or acceleration.

Choose the CORRECT answer from the options given below:
(a) A-iv, B-i, C-ii, D-iii
(b) A-iii, B-iv, C-ii, D-i
(c) A-ii, B-i, C-iv, D-iii
(d) A-iv, B-iii, C-i, D-ii

59. Which of the following connective tissues has a matrix of collagen and elastin fibres in a rubbery ground substance?
(a) Adipose
(b) Bone
(c) Cartilage
(d) Blood

60. All of the following acts as anaphylotoxins **EXCEPT:**
(a) C3a
(b) C4a

(c) C5a
(d) C6a

61. The mechanism by which B cells ensure that only one heavy and one light chain allele is translated is referred to as:
(a) Co-dominance
(b) Allelic exclusion
(c) Isotypic selection
(d) Idiotypic selection

62. Given below are two statements regarding Major Histocompatibility Complex (MHC).
Statement A: MHC I contain two different polypeptide chains — α chain and βchain.
Statement B: MHC I is present on all nucleated cells.
In the light of the above two statements, select the most appropriate answer from the options given below:
(a) Both Statement A and Statement B are correct.
(b) Statement A is correct but Statement B is incorrect.
(c) Statement A is not correct but Statement B is correct.
(d) Both Statement A and Statement B are not correct.

63. The function of the 3' to 5' exonuclease activity of a DNA polymerase is to:
(a) Remove the 5' end of the polynucleotide strand that is attached to the template strand that is being copied.
(b) Remove incorrect nucleotides from the newly synthesized strand of DNA.
(c) Remove damaged nucleotide from the template strand during DNA synthesis.
(d) Remove nucleotides from the ends of DNA molecules to ensure the generation of blunt ends.

64. Identify which of the following tests in the most convincing to identify a gene as oncogene or tumor suppressor gene:
(a) Transgenic mice overexpressing the candidate oncogene and knock-out mice lacking the candidate tumor suppressor gene.
(b) Transgenic mice overexpressing the candidate tumor suppressor gene and knock-out mice lacking the candidate oncogene.
(c) Transgenic mice that overexpresses the candidate oncogene and tumor suppressor gene.
(d) Knockout mice that lacks the candidate oncogene and tumor suppressor Gene.

65. A study is done on a mammalian cell line that has a doubling time of 24 hours. These cells are synchronized in G1 and then labeled for 2 days with BrdU (an analog of thymidine), At the end of labeling period, chromosomal DNA is isolated from the cells and its density analyzed by equilibrium centrifugation in cesium chloride gradients. Which of the following patterns would be expected to be seen? (H = heavy, L = light):
(a) 100% H/H
(b) 100% H/L
(c) 50% H/H, 50% H/L
(d) 50% H/H 50% L/L

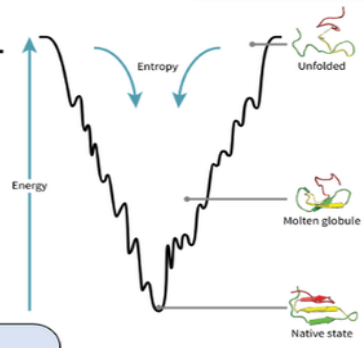
66. Identify the CORRECT order in which extra-cellular signals are transmitted:
A. Adenylate cyclase
B. cAMP
C. Protein kinase A
Choose the CORRECT answer from the options given below:
(a) A, B and C
(b) C, B and A
(c) A, C and B
(d) B, C and A

VEDEMY'S CAPSULE (VEDEMY'S SPECIAL NOTES)

Amino acid Classes

Essential	**M**y **V**ery **T**alented **F**riend **I**s **W**aiting **F**or **K**ajo**L**
Semi-essential	**R**ahu**L**
Non-Polar	**GAV** के लोग **PILW** लेकर **FM** सुन रहे थे
Polar Uncharged	**CN**(कार्टून नेटवर्क) pe **STY**(सत्य) **Q**ues पूछते है
Negative charged	Ye **DE**kh
Positive charged	**R**a**H**u**L** bola
Gluco-ketogenic	**I**tni **T**alented **WYF** (wife)
Ketogenic	**K**ajo**L**

Protein Folding Curve



Energy profile-

High

- **U**- Unstructured
- **M**- molten globule
- **D**- discrete structure
- **N**- native
- **A**- amorphous
- **A**- amyloid

Low

Urmila Matoldkar ka DNA Achha hai

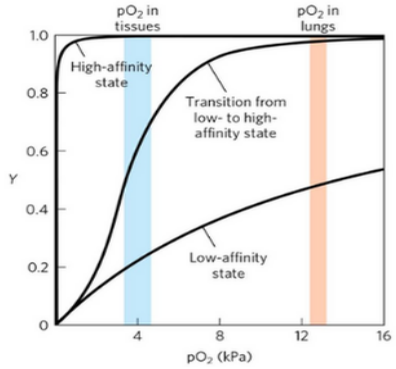
Hemoglobin

State of Hb – MOLD

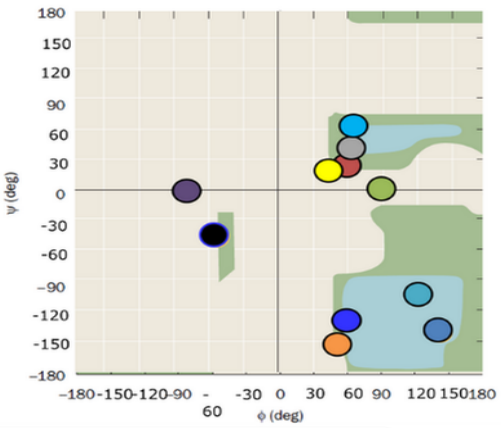
- **O**xy Hb
- **L**ess acidic (Tensed state)
- **M**ore acidic (Relaxed state)
- **D**eoxy Hb

Affinity of Curve – DRIL

- H+, Temp. BPG, CO_2
- **D**ecrease
- **R**ight shift
- **I**ncrease
- **L**eft shift

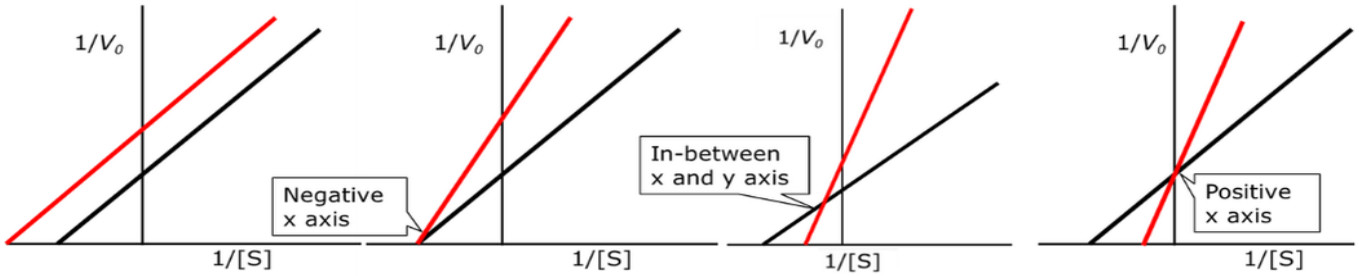


Ramachandran plot



Secondary Structure	Phi	Psi
AP β Sheet	+140⁰	-135⁰
P β Sheet	+120⁰	-115⁰
CTH	+50⁰	-150⁰
L-α-H	-60⁰	-50⁰
R-α-H	+60⁰	+50⁰
Type-I i+1	+60⁰	+30⁰
Type-I i+2	+90⁰	0⁰
Type-II i+1	+60⁰	-120⁰
Type-II i+2	-80⁰	0⁰

Enzyme Inhibition Curve



Uncompetitive Inhibition
Decrease K_m = increased $1/K_m$
Decreased V_{max}= increased $1/V_{max}$

Noncompetitive Inhibition
Decreased V_{max}= increased $1/V_{max}$

Mixed Inhibition
K_m increase
V_{max} decrease

Competitive Inhibition
Increase K_m = decreased $1/K_m$

UP ke **NaNa** patekar **MI** ka **PC** lekar aaye

- **UP**: Parallel, Uncompetitive
- **NaNa**: Negative x axis, Non-competitive
- **MI**: Mixed, In-between x and y axis
- **PC**: Positive x axis, Competitive

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67. Which of the following is **NOT** a function of the lysosomes?
    (a) Engulf worn out components of the cells.
    (b) Engulf exogeneous substances.
    (c) Suicidal bags.
    (d) Power generating units.

68. Given below are two statements:
    Statement A: In Anaphase I, homologous chromosomes separate which sister chromatids remain together.
    Statement B: In Anaphase II. chromosomes line up along the metaphase plate.
    In the light of the above statements, choose the most appropriate answer from the options given below:
    (a) Both Statement A and Statement B are correct.
    (b) Both Statement A and Statement B are incorrect.
    (c) Statement A is correct but Statement B is incorrect.
    (d) Statement A is incorrect but Statement B is correct.

69. The function of the hepatic portal circulation is to:
    (a) Carry toxins to the venous system for disposal through the urinary tract.
    (b) Hormone distribution.
    (c) Collect absorbed nutrients for metabolic processing or storage.
    (d) Transfer bile to the liver from the pancreas.

70. Which of the following statements is **INCORRECT**?
    (a) Aldosterone stimulates the reabsorption of Na^+.
    (b) Aldosterone affects water resorption.
    (c) Aldosterone is made in the hypothalamus and released from the anterior pituitary.
    (d) Aldosterone stimulates the secretion of K^+.

71. Regarding BLAST (Basic Local Alignment Search Tool) all the following statements are CORRECT **EXCEPT:**
    (a) The tool is used to compare newly sequenced genomic DNA to known sequences stored in various databases.
    (b) Once aligned the result is showed as Output Of three lines: Query, Sbject (Subject) and human sequence.
    (c) Access to BLAST is provided by NCBI.
    (d) BLAST report also provides an 'Expect' value or E value based on number of Matches.

72. Given below are two statements; in which one is Assertion (A) and the other one is:
    Reason (R):
    Assertion (A): Cri du chat syndrome is a classical example of endopolyploidy in human.
    Reasoning (R): In Cri du chat syndrome there is partial monosomy resulting from small terminal deletion involving chromosome 5.
    In the light of above statements choose the CORRECT answer:
    (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
    (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
    (c) (A) is true but (R) is false.
    (d) (A) is false but (R) is true.

73. Given below are two statements:
    Statement A: The genetic code is written in linear form with three nucleotide letters thus referred as triplet code.
    Statement B: The coding system is highly variable, in different organisms one triplet code can specify different amino acids in different organisms.
    In the light of the above statements, choose the CORRECT answer from the options:

(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but statement B is false.
(d) Statement A is false but statement B is true.

74. In a pedigree, the first person identified to be suffering from a genetic disease is called as:
(a) Consultant
(b) Proband
(c) Kindred
(d) Consultand

75. Two hypothetical SNPs (Single Nucleotide Polymorphism) in humans are 4 map units (m.u.) apart the allele at SNPI can be A or T; the allele at SNP2 can be C or G. A male with genotype AG/TC and a female with genotype AC/AC have a child. What is the probability they have a child with genotype AG/AC?
(a) 96%
(b) 4%
(c) 48%
(d) 16%

76. The clover leaf structure is a unique feature of which of the following molecules?
(a) 28S subunit of ribosome.
(b) Unspliced mRNA molecule.
(c) Spliced tRNA molecule.
(d) Pre-processed sno RNA.

77. An autosomal recessive condition affects 1 new born in 10,000. What is the expected frequency of carriers?
(a) 198/10,000
(b) 99/10,000
(c) 1/100
(d) 99/100

78. The Hardy Weinberg principle is integral to population genetics. All of the following options can disturb the Hardy Weinberg equilibrium **EXCEPT:**
(a) Random mating
(b) Mutation
(c) Gene Flow
(d) Small population Size

79. In genetic linkage, the concept of recombination fraction is very important, of the characteristics given here, choose the CORRECT ones:
A. Recombination fraction is usually designated as θ (theta).
B. It is the measure of the distance separating two loci on different chromosomes.
C. It gives an indication of the likelihood that a cross-over will occur between the two loci.
D. Genes at loci are not linked then θ = 0.5.
E. Genes at unlinked loci will segregate together during 20% of all meiosis.
(a) B, C and E
(b) A, D and E
(c) A, C and D
(d) A, B and C

80. The process of genetic counselling involves various steps. These steps have been randomised and listed below. From the options given below, choose the CORRECT sequence in which the counselling steps should be undertaken/performed:

A. Risk assessment.
B. Diagnosis based on history and investigation.
C. Long term contact and support group.
D. Discussion of options.
(a) B, D, C, A
(b) B, A, D, C
(c) A, B, C, D
(d) B, C, A, D

81. In which stage of the cell cycle, the cells double their amount of DNA?
(a) G1 phase
(b) G2 phase
(c) M phase
(d) S phase

82. In Eukaryotes, citric acid cycle takes place in:
(a) Nucleus
(b) Cytoplasm
(c) Mitochondria
(d) Golgi bodies

83. What is the approximate molecular mass of polypeptide containing 100 amino acid residues?
(a) 300 Da
(b) 1 1,000 Da
(c) 30000 Da
(d) 110 Da

84. Human genomic DNA isolated with concentration of 400 μg/ml, needs to be digested with restriction enzyme Bam H1 (2000 U/ml). Investigator needs to set reaction with 10 ug of genomic DNA with 10 units of enzyme. How much volume (in ul - micro litre) needs to be drawn from the two stock solutions respectively to get 10 ug of DNA and 10 U of enzyme?
(a) DNA stock -25μl Enzyme — 5 μl.
(b) DNA stock - 35μl Enzyme- 7.5 μl.
(c) DNA stock — 27.5μl Enzyme — 7.5 μl.
(d) DNA stock — 1OμI Enzyme -10 μl.

85. Match the List I with List II.

	List I		List II
A	Taq DNA polymerase	i	Used to make cDNA.
B	MMLV Reverse Transcriptase	ii	Used to phosphorylate oligos or DNA.
C	RNA polymerase II	iii	Used to amplify DNA.
D	T_4 poly nucleotide kinase	iv	Transcription particularly of mRNA Ln (RNA.

Choose the CORRECT options given below:
(a) A-iv, B-iii, C-ii, D-i
(b) A-iii, B-iv, C-i, D-ii
(c) A-i, B-ii, C-iii, D-iv
(d) A-iii, B-i, C-iv, D-ii

86. Select the CORRECT primer pair of forward and reverse primer sequence that amplify full length of sequence given below:
5' - TAC TAT CGA GTA CTA GAC TAC TAAGT 1 - 100 - 1 ACT, AGA CGT ACG, TAG, TAC, GTT ACT AC - 3'
(a) 5' - ATG ATA GCT CAT GAT CTG AT - 3' Forward.
5' - GTA GTA ACG TAC TAC GTA CG - 3' Reverse.
(b) 5' - TAC TAT CGA GTA CTA GAC TA- 3' Forward.

5 - GTA GTA ACG TAC TAC GTA CG- 3' Reverse.
(c) 5' - ATG ATA GCT CAT GAT CTG AT- 3' Forward.
5' - GCA TGC ATC ATG CAA TGA TG- 3 Reverse.
(d) 5' -TAG TCT AGT ACT CGA TAG TA - 3' Forward.
5' - GCA TGC ATC ATG CAA TGA TG- 3' Reverse.

87. _____variant of BLAST, compares a DNA query sequence to the protein database:
(a) BLASTP
(b) BLASTX
(c) BLAST N
(d) TBLASTN

88. Which one of the following is **NOT** a primary database?
(a) SWISS – PROT
(b) EMBL
(c) DDBJ
(d) Gen Bank

89. The computational approaches to predict the three-dimensional structures of proteins are:
A. Homology modeling
B. X-ray crystallography
C. NMR
D. Threading
E. Ab-initio
Choose the CORRECT answer from the options given below:
(a) A only.
(b) B and C only.
(c) A, D and E only.
(d) C only.

90. What happens to transferrin when iron is bound to it and it interacts with its receptor?
(a) It is degraded inside the lysosome.
(b) Undergoes a conformational change allowing binding to its receptor.
(c) It is converted to apotransferriz.
(d) Permanently internalized and degraded.

91. Which non-viral gene delivery method utilizes physical forces to introduce genetic material into cells?
(a) Liposomes
(b) Poly (L-lysine)
(c) Electroporation
(d) Adenoviruses

92. Which protein is responsible for cleaving double stranded RNA into smaller fragments during RNA interference?
(a) Slicer
(b) Helicase
(c) RISC
(d) Dicer

93. What is the main advantage of using Short Tandem Repeats (STRs) over restriction fragment length polymorphism (RFLP) in DNA fingerprinting?
(a) STRs are easier to visualize on a gel.
(b) STRs requires less DNA and are more resistant to degradation.
(c) STRs produce more distinct band pattern.

(d) STRs are less expensive to analyze.

94. Which of the following steps in PCR is responsible for separating double-stranded DNA into single strands?
(a) Annealing
(b) Extension
(c) Melting
(d) Elongation

95. Match the following

	List I		List II
A	Autotroph	i	Macro consumers
B	Phagotrops	ii	Micro consumers
C	Saprotrops	iii	Primary producers
D	Heliotrophs	iv	Sun loving plants

Choose the CORRECT answer from the options given below:
(a) A-ii, B-iv, C-iii, D-i
(b) A-i, B-ii, C-iii, D-iv
(c) A-iii, B-i, C-ii, D-iv
(d) A-i, B-iii, C-iv, D-ii

96. The reductive pentose phosphate pathway is also known as:
A. Photosynthetic Carbon Oxidation cycle (PCO)
B. Calvin - Benson cycle
C. Photorespiration
D. C4 cycle
Choose the CORRECT answer from the options given below:
(a) Both A and B are correct
(b) Both B and C are correct
(c) B only
(d) C only

97. Cortisones, used in the treatment of rheumatoid arthritis, are produced from fermentation of_____ by Rhizopus migracans:
(a) Amino acids
(b) Lipids
(c) Glycosides
(d) Starch

98. In cell cycle there are 4 stages. M, G1, S and G2. There is another term commonly used; G0 phase. Choose the best described statement for this G0 phase:
(a) Cells are at growing stage.
(b) Cells are at the stage of differentiation.
(c) Cells have ceased to divide.
(d) Cells are about to double.

99. Based on series of events outlined in Central Dogma, there are enzymes that convert from one Stage to the other, However, one conversion is **NOT** possible yet. Identify the stage:
(a) DNA to RNA
(b) Protein to RNA
(c) DNA to DNA
(d) RNA to DNA

100. In lactose operon, the following events happen:
A. The operon is normally in an "off mode when appropriate substrate in absent.

B. Lactose in an inducer substrate.
C. If lactose is added to the cells environment it triggers events that turn the operator "on".
D. The structural genes are transcribed in 3 different transcripts coding for all three different enzymes.
E. As lactose is depleted, operon is repressed.

Which of the answer is CORRECT?
(a) A, B and C
(b) B, C and D
(c) A, D and E
(d) C, D and E

Section C Biotechnology

101. Consider the following statements with reference to ELISA:
A. When detection is done on the basis of labelled antibody raised against the antigen of interest, the antibody is called as primary antibody.
B. When detection is done on basis of labelled antibody that binds to an antibody raised against the antigen of interest, the labelled antibody is called as secondary antibody.
C. Secondary antibody recognizes multiple epitopes in the FC region of primary antibody, thus amplify the signal.
D. Non-specific antibodies also bind to antigen.
Choose the CORRECT answer from the options given below:
(a) A only.
(b) A and B only.
(c) A, B and C only.
(d) A, B, C and D.

102. With reference to Beer Lambert Law read the following statements carefully:
A. Beer-Lambert Law is a linear relationship between absorbance and the concentration.
B. A plot of concentration against absorbance will always be linear.
C. A plot of concentration against absorbance will be linear at low concentration only.
D. A plot of concentration against absorbance will be linear at low concentration but forms a plateau at high concentration.
E. A plot of concentration against absorbance will be linear at low temperature but exponential at high concentration.
Choose the CORRECT answer from the options given below:
(a) A, C and D only.
(b) C, D and E only.
(c) A, B and D only.
(d) B, D and E only.

103. The characteristic strong absorbance of light by most proteins at 280 nm wavelength is mainly due to which of the following class of amino acids?
(a) Acidic
(b) Basic
(c) Hydroxy
(d) Aromatic

104. Match List I with List II:

	List I		List II
A	Dialysis	i	Large molecule will be eluted first
B	Lyophilization	ii	Thin layer chromatography
C	Adsorption	iii	Dispersal of molecule from high concentration through a semi permeable membrane
D	Size exclusion chromatography	iv	Rapid freezing of samples followed by removal of water

Choose the CORRECT answer from the options given below:
(a) A-i, B-ii, C-iii, D-iv
(b) A-ii, B-iii, C-iv, D-i
(c) A-iii, B-iv, C-ii, D-i
(d) A-iv, B-ii, C-iii, D-i

105. TBLAST X results in 36 database searches because:
(a) It translates query sequence in 6 frames.
(b) It back-translates target sequence in 6 frames.
(c) It translates both query and database sequences in 6 frames.
(d) It back-translates both query and database sequences in 6 frames.

106. Match List I with List II:

	List I		List II
A	Zymogen	i	Specificity of enzyme substrate interaction
B	Lock and key Model	ii	Enzyme kinetics
C	Isoenzyme	iii	Inactive form of an enzyme
D	Michaelis-Menten Equation	iv	Lactate dehydrogenase

Choose the CORRECT answer from the options given below:
(a) A-i, B-iii, C-iv, D-ii
(b) A-iii, B-i, C-iv, D-ii
(c) A-iii, B-iv, C-i, D-ii
(d) A-ii, B-iv, C-iii, D-i

107. A competitive inhibitor of an enzyme:
(a) Increases its Km.
(b) Increases both its V_{max}, and the Km.
(c) Decreases its.
(d) Decreases its Km but increases the $V_{max.}$

108. Match List with List II:

	List I		List II
A	Homology Modelling	i	Disorder prediction
B	Fold recognition	ii	Target protein lacks homology at both sequence and structure level
C	ab-initio prediction	iii	Target protein shares substantial similarity to other protein of known structure.
D	Disordered	iv	Target protein shares folds but lacks homology of sequence level.

Choose the CORRECT answer from the options given below:
(a) A-ii, B-iii, C-iv, D-ii
(b) A-i, B-ii, C-iii, D-iv
(c) A-iii, B-iv, C-ii, D-i
(d) A-iv, B-iii, C-i, D-ii

109. Match List I with List II:

	List I		List II
A	BLAST N	i	Protein pattern against Protein DB
B	BLAST P	ii	DNA query against Protein DB
C	PHI-BLAST	iii	Protein query against Protein DB
D	BLAST X	iv	DNA/RNA query against Gene Bank (D NA)

Choose the CORRECT answer from the options given below:
(a) A-iv, B-i, C-iii, D-ii
(b) A-ii, B-iii, C-i, D-iv
(c) A-iii, B-i, C-iv, D-ii

(d) A-iv, B-iii, C-i, D-ii

110. Given below are two statements:
Statement A: The α—helix structure is stabilized by hydrogen bonds formed between the main chain atoms of residues i and i + 4.
Statement B: β—strands are stabilized by hydrogen bonds between residues of adjacent strands
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

111. Given below are two statements:
Statement A: Peptide bond exhibits partial double bond character.
Statement B: Peptide bond has non-planar nature.
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

112. Which among the following techniques is primarily used for 3D structure determination of determination of biological macromolecules?
(a) Circular Dichroism
(b) Atomic Field Microscopy
(c) Affinity Chromatography
(d) X-ray Crystallography

113. Match List I with List II:

	List I		List II
A	Tertiary Structure	i	Amino acid sequence
B	Primary Structure	ii	α—helices
C	Secondary structure	iii	Arrangement of secondary structural elements in space
D	Quaternary structure	iv	Arrangement of tertiary structure in space

Choose the CORRECT answer from the options given below:
(a) A-iv, B-iii, C-i, D-ii
(b) A-i, B-ii, C-iii, D-iv
(c) A-iii, B-i, C-ii, D-iv
(d) A-ii, B-iv, C-i, D-iii

114. Determination of 3D structure of membrane proteins often appears difficult as compared to the cytoplasmic proteins because:
(a) Membrane proteins have novel 3D fold.
(b) Preparation Of homogeneous samples of membrane proteins is technically challenging.
(c) Membrane proteins do not possess 3D structure.
(d) Membrane proteins have unusual primary structure.

115. Ramachandran plot is widely used to:
(a) Validate the correctness of the 3D structure of proteins.
(b) Determine the function of proteins.
(c) Determine the sequence of proteins.
(d) Determine the molecular weight of proteins.

116. Which among the following chromatographic methods can be used to separate samples from each other on the basis of size?
(a) Affinity chromatography.
(b) Gel-filtration chromatography.
(c) Ion exchange chromatography.
(d) Hydrophobic interaction chromatography.

117. Which among the following techniques can **NOT** be used to determine 3D structure of biomolecules?
(a) Cryo-Electron microscopy
(b) X-ray Crystallography
(c) NMR-Spectroscopy
(d) SDS-PAGE

118. Given below are two statements:
Statement A: Dynamic light scattering principle can be used to determine the approximate size and dimension of a protein in solution.
Statement B: Circular Dichroism spectroscopy can map protein-ligand interactions.
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

119. You performed an experiment to create a gene knock out mice to study the function of gene X, during this experiment you prepared a plasmid containing a cloned gene X and two drug sensitivity genes neo and tk which conferes resistance to neomycin and sensitivity to ganciclovir, respectively. You then introduced the recombinant plasmid into the mouse ES cells. What it is purpose of including the neo and tk genes in the plasmid?
A. Gene tk is used to make cells with non-homologous recombination ganciclovir sensitive.
B. Gene neo is used to select transfected cells.
C. Gene neo is used to make cells with non-homologous recombination neomycin sensitive.
D. Gene tk is used to select transfected cells.
Choose the CORRECT answer from the options given below:
(a) A and C only.
(b) B and C only.
(c) A and B only.
(d) D and C only.

120. Which among the following statements are CORRECT about very long DNA fragments (>100 kb) from eukaryotic genomes?
A. They can be efficiency packaged in a α phage vector.
B. They can be propagated in a yeast artificial chromosome.
C. They must have cohesive ends for cloning.
D. They can be separated by pulsed field gel electrophoresis technique.
Choose the CORRECT answer from the options given below:
(a) A and B only.
(b) A and D only.
(c) C and D only.
(d) B and D only.

121. All the following statements are TRUE regarding RFLP and RAPD **EXCEPT:**
(a) RAPD is a guide method compared to RFLP.
(b) RFLP is a more reliable than RAPD.
(c) Species specific primers are required for RAPD.

(d) Radioactive pubes are not required in RAPD.

122. Recombinant DNA technology has made it possible to Start with a particular gene, make mutations in it, and then create mutant cells or organisms, a process commonly referred to as:
(a) Recombination
(b) Reverse genetics
(c) Altered genetics
(d) Transgenesis

123. Nobel Prizes in immunologic Research:
Match List I with List II:

	List I		List II
A	Jules Bordet (1919)	i	Development of Radio Immunoassay
B	Rosalyn R Yalow (1977)	ii	Immune Regulatory Theories
C	Charles Richet (1913)	iii	Complement Mediated Bacteriolysis
D	Niels K Jerne (1984)	iv	Anaphylaxis

Choose the CORRECT answer from the options given below:
(a) A-iv, B-ii, C-iii, D-i
(b) A-i, B-iii, C-iv, D-ii
(c) A-ii, B-i, C-iii, D-iv
(d) A-iii, B-i, C-iv, D-ii

124. Given below are two statements:
Statement A: The restriction enzymes are natural products of Bacteria and they cut the DNA at defined sequences.
Statement B: The restriction enzymes cut only single stranded DNA molecules.
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

125. Given below are two statements:
Statement A: Isopleth is a contour line showing the value of a function of two variables connecting the points where the function has a particular value This was explained in Wandewalls equilibration.
Statement B: The relationship between pH and biosconsonate concentration is described by Henderson's-Hasselbalch equation.
In the light of the above statements, choose the CORRECT answer from the given options:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

126. In the process of signaling and vertebrate motor neuron:
A. Action potential have three main phases, a depolarization phase, a repolarization phase and after hyperpolarization phase.
B. The depolarization phase is result of opening and voltage gated Ca^{+} channels which open in response to suprathreshold depolarization of the membrane.
C. The opening and voltage-gated Na^{+} channels causes the repolarization phase.
D. An action potential in one part of axon triggers Other action potentials in adjacent areas of the axonal membrane, allowing conduction without decrement.
Choose the CORRECT answer from the options given below:
(a) A and B only.

(b) A and D only.
(c) B, C and D only.
(d) A, B, C and D.

127. Given below are two statements:
Statement A: The difference in carbon dioxide equilibrium curve for oxygenated and deoxygenated blood is called as Haldane effect.
Statement B: Detection of injected chemical is known as gustation and a G- protein coupled receptor involved in the sense of taste that detects sweet tastants is known as metaducin.
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

128. Given below are two statements:
Statement A: The simplest mechanism of RNA replication such as 'Rolling circle synthesis by RNA polymerase II' is used by several negative and positive polarity viruses.
Statement B: Majority of RNA vi ruses appear to employ two general mechanisms of initiation of RNA dependent RNA polymerase — (1) a primer independent mechanism and (2) a primer dependent mechanism.
In the light of the above statements choose CORRECT answer from the options below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

129. Match the viral encoded enzymes to their respective functions.
Match List I with List II:

	List I		List II
A	DNA integrase	i	Poly adenylation
B	RNA helicase	ii	5' capping
C	Poly (A) polymerase	iii	Integration of viral DNA
D	Guanyl and Methyl transferase	iv	Disrupt intermolecular or intramolecular base pairing

Choose the CORRECT answer from the options given below:
(a) A-iv, B-iii, C-ii, D-i
(b) A-iii, B-iv, C-i, D-ii
(c) A-ii, B-i, C-iv, D-iii
(d) A-i, B-iii, C-ii, D-iv

130. Which among the following are CORRECT for the processes of membrane extrusion termed as 'Budding' during viral replication?
A. Membrane extrusion is driven by envelope glycoprotein alone.
B. In the absence of viral glycoproteins, the capsid precursors are able to induce budding.
C. Interaction between viral glycoprotein spikes and the assembled capsid is required.
D. Membrane fusion is a final event in the process.
E. Endosomal sorting complex for transport (ESCRT) mediates transport
Choose the CORRECT answer from the options given below:
(a) A, B, C and D only.
(b) A, B, C, D and E.
(c) A and E only.
(d) B, C and D only.

131. Given below are two statements:

Assertion A: During replication of retroviruses, mutants that are unable to integrate do not establish a spreading infection.
Reason R: Because 'integration' of linear retroviral DNA like reverse transcription is a crucial step of the retroviral life cycle and required for efficient replication of retroviruses.
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

132. Given below are two statements:
Assertion A: Viruses can cause cancer.
Reason R: Evidence based facts showing that the ability of the causative agent passing through a fine filter identified as a virus. Also solid tumor in chickens, 'sarcoma' could be transmitted by cell free filtrates.
In the light of the above statements choose the CORRECT answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

133. The mutation rates expressed as mutations / nucleotide /cell injection for RNA viruses vary between:
(a) 10^{-5} to 10^{-4}
(b) 10^{-6} to 10^{-4}
(c) 10^{-8} to 10^{-6}
(d) 10^{-6} to 10^{-9}

134. Given below are two statements:
Statement A: The error rate of retroviruses such as HIV overlaps in the error rates observed in viruses that utilize RNA dependent RNA polymerase.
Statement B: The fidelity of the reverse transcriptases are similar to the fidelity of RNA dependent RNA polymerase.
In the light of the above statements, choose the CORRECT answer from the options given below:
(a) Both Statement A and Statement B are true.
(b) Both Statement A and Statement B are false.
(c) Statement A is true but Statement B is false.
(d) Statement A is false but Statement B is true.

135. What is the estimated ratio of non-synonymous (d_NJ to synomymous (ds) nucleotide substitutions per site (ratio) d_N/d_s in RNA and DNA viruses indicative of selective neutrality?
(a) $d_N/ds < 1$
(b) $d_N/ds = 1$
(c) $d_N/ds > 1$
(d) $d_N/ds = 0$

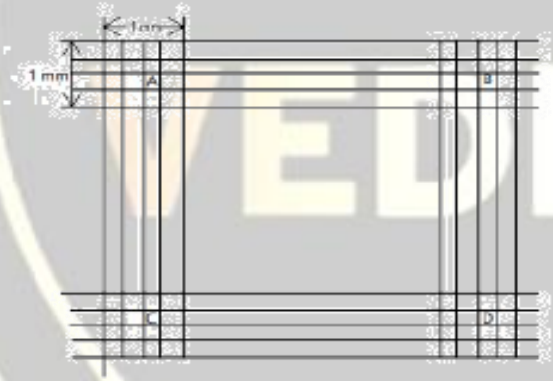
136. Various defense mechanisms, that hosts have developed as antiviral mechanisms in response to viral infection are:
A. Inducible cytokines (interferon).
B. RNA interference (in plants and invertebrates).
C. Apoptosis.
D. Cell- and Antibody-mediated immune response.
E. Autophagy.
Choose the CORRECT answer from the options given below:
(a) A and D only.

(b) A, B, C, and E only.
(c) A, C, D and E only
(d) A, B, C, D and E

137. Arrange the following vectors in the increasing order of their inset range:
A. Phage λ
B. YAC
C. M13
D. Plasmid
E. Cosmid
Choose the CORRECT answer from the options given below:
(a) C, D, E, A, B.
(b) B, E, A, D, C.
(c) E, C, D, B, A.
(d) C, D, A, E, B.

138. Which among the followings is **NOT** a termination codon?
(a) TAA
(b) TAG
(c) TGA
(d) TGG

139. A cell culture experiment needs 2×10^6 live cells to be dispensed in a cell culture flask. The cells are available as homogeneous suspension of 20 ml in a test tube. The cells number was counted and the cell viability was tested using trypan blue staining followed by counting in a Hemocytometer with 1 mm × 1 mm chambers outlined below:



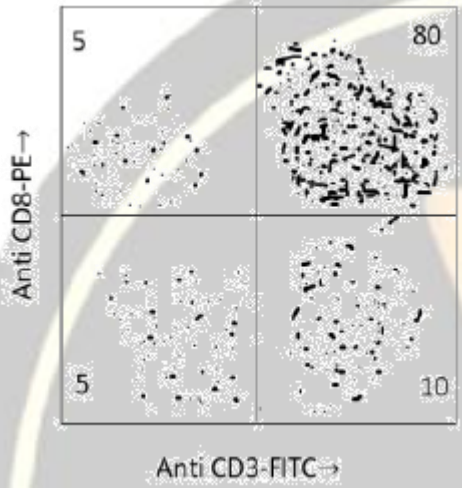
A volume of 1O ul of cell suspension was mixed with 1O pl of the trypan blue dye reagent and the mix was loaded on hemocytometer and the cell count was as follows:

Chamber	Unstained	Trypan blue stained
A	16	4
B	20	6
C	25	5
D	19	5

How much of the stock cell suspension will be needed for the experiment?
(a) 4ml
(b) 5ml
(c) 10ml
(d) 20ml

140. A swing out rotor exhibits the maximum radius from the axis of the rotor to the bottom of the tube as 7 cm. If the rotor is operated at a speed of 20,000 rpm. What will be the relative centrifugal field (RCF) at the bottom of the centrifuge tube?
(a) 31,360
(b) 15,680
(c) 20,000
(d) 2,857

141. Cells from a mouse lymphoid tissue were isolated and stained with T cell marker anti-CD3-APC, anti CD4-FITC and anti-CD8-PF. Stained cells were analyzed by flow cytometry for T lymphocyte population and dot plot was prepared for cells gated on CD^{3+} cells as indicated below:



Based on distribution of CD4 and CD8 cell surface marker and relative population proportion of cells with this maker, identify the tissue of origin of the cells used for staining as belonging to:
(a) Bone marrow
(b) Thymus
(c) Spleen
(d) Lymph node

142. Which among the followings is TRUE of the sympathetic nervous system?
(a) It is a subdivision of the somatic nervous system.
(b) It uses different neurotransmitters at the ganglion and at synaptic cleft
(c) It's voluntarily controlled via the reticular formation.
(d) It's voluntarily controlled via the fore brain.

143. Which among the following statements are TRUE?
A. Continuous conduction is faster than salutatory conduction.
B. The frequency of impulses and the number of activated sensory neurons encode differences in stimuli intensities.
C. Large diameter axons conduct nerve impulses faster than the smaller diameter ones.
D. The diameter of an axon and the presence or absence of a myelin sheath are the most important factors that determine the speed of nerve impulse propagation.
Choose the CORRECT answer from the options given below:
(a) A, B and D only.
(b) B, C and D only.
(c) A, D and C only.
(d) A, B and C only.

144. Trajectory of molecular dynamic simulation of a complex receptor-drug can be analyzed using:
Root Mean Square Deviation (RMSD) of backbone with respect to time.
Root Mean Square Fluctuation (RMSF) of amino acids during simulation.

Change in radius of Gyration with respect to time.
Number of hydrogen bonds formed / broken down during the course of simulation.
Choose the CORRECT answer from options given below:
(a) A only
(b) A and B only
(c) A, B and C only.
(d) A, B, C and D only.

145. Which among the following factors has the greatest effect on the ability of blood to transport oxygen?
(a) Temperature of the blood.
(b) pH of the plasma.
(c) Capacity of the blood to dissolve oxygen.
(d) Amount of haemoglobin in the blood.

146. Which of the following techniques gives the most information about the positional and spatial characteristics of all atoms in a protein:
(a) Magnetic resonance spectroscopy.
(b) Automated Edman analysis.
(c) Circular dichroism spectroscopy.
(d) Reversible unfolding.

147. HPLC is the diagnostic modality for:
(a) Nutritional deficiency anemia.
(b) Hemolytic anemia.
(c) Hemoglobinopathy — associated anemia.
(d) Anemia of chronic diseases.

148. Choose the CORRECT range of membrane potential, the voltage across a membrane:
(a) -1 to - 1O mV (millivolts).
(b) -200 to - 5OO mV (millivolts).
(c) -500 to -1000 mV (millivolts).
(d) -20 to - 200 mV (millivolts).

149. NATIVE-PAGE experiment for separation of proteins, if the amount of cross-linker is increased, what would happen?
(a) Proteins will migrate to more distance.
(b) NO difference will be noted in distance to which protein will migrate because cross-linker only keep the gel hydrated.
(c) Presence of more amount of cross-linker will lead to disruption of native Structure of proteins.
(d) There will less among different proteins.

150. A G protein-coupled receptor (GPCR) is a cell-surface transmembrane receptor that works with the help of a G-protein. Choose the CORRECT option for the role of G-protein:
(a) Ligand binding
(b) Binds to GTP
(c) Binds to ATP
(d) Binds to ADP

ICMR-BRET-JRF 2024 BIOTECHNOLOGY ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
b	d	d	d	c	d	b	c	b	d	d	c	c	c	c	b	c	b	c	a
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
d	c	c	d	c	b	c	b	b	b	d	a	a	d	a	a	c	c	b	b
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
d	a	c	d	c	c	a	c	Drop	b	b	c	c	d	c	d	b	d	c	d
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
b	c	b	a	c	a	d	c	c	c	b	d	c	b	c	c	a	a	c	b
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
d	c	b	a	d	b	b	a	c	b	c	d	b	c	c	c	c	c	b	a
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
c	a	d	c	d	b	a	c	d	a	c	d	c	b	a	b	d	c	c	d
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
c	b	d	c	d	b	c	d	b	b	a	a	b	c	b	d	d	d	b	a
141	142	143	144	145	146	147	148	149	150										
b	b	b	d	d	a	c	d	d	b										