

## GATE - LIFE SCIENCE MOCK TEST PAPER

- There are a total of 65 questions in this paper which are of multiple choice type or numerical answer type.
- There 15 question carrying 25 marks in Chemistry paper, which is compulsory. Question Q.1 - Q.5 will carry 1marks each, and questions Q.6 - Q.15 will carry 2 marks each.
- Each of other four section papers contains 20 questions carrying 30 marks. Questions Q.1 - Q.10 will carry 1mark each and questions Q.11 - Q.20 will carry 2marks each. Attempt any two sections.
- There are 10 questions carrying 15 marks in General Aptitude (GA) section, which is compulsory. Questions Q.1 - Q.5 will carry 1 mark each, and questions Q.6 - Q.10 will carry 2 marks each. There is no negative marking for questions of numerical answer type.

TIME : 3 HOURS

MAX. MARKS : 100

# VPM CLASSES

For IIT-JAM, JNU, GATE, NET, NIMCET and Other Entrance Exams

1-C-8, Sheela Chowdhary Road, Talwandi, Kota (Raj.) Tel No. 0744-2429714

Web Site [www.vpmclasses.com](http://www.vpmclasses.com) E-mail-[vpmclasses@yahoo.com](mailto:vpmclasses@yahoo.com)

Toll Free: 1800-2000-092

Phone: 0744-2429714

E-Mail: [vpmclasses@yahoo.com](mailto:vpmclasses@yahoo.com) / [info@vpmclasses.com](mailto:info@vpmclasses.com)

Address: 1-C-8, Sheela Chowdhary Road, SFS, TALWANDI, KOTA, RAJASTHAN, 324005

Mobile: 9001297111, 9829567114, 9829597114, 9001297243

Website: [www.vpmclasses.com](http://www.vpmclasses.com)

## GA : GENERAL APTITUDE

1. A lent Rs. 600 to B for 2 years and rs. 150 to C for 4 years and received altogether from both Rs. 90 as interest. Find the rate of interest, simple interest being calculated.  
(A) 5%  
(B) 16%  
(C) 6%  
(D) 4.5%
2. A and B together can complete a piece of work in 35 days while a alone can complete the same work in 60 days. In how many days, B alone will be able to complete the same work ?  
(A) 84 days  
(B) 83 days  
(C) 85 days  
(D) 90 days
3. What is the synonym of Phlegmatic?  
(A) Practical  
(B) Salivary  
(C) Dishonest  
(D) Calm
4. What is the synonym of Ponderous?  
(A) Contemplative  
(B) Moist  
(C) Erect  
(D) Bulky

5. Atom: Microscope
- (A) tape: microphone
  - (B) Planet: telescope
  - (C) person: microcosm
  - (D) receiver: telephone
6. Chronic: Acute
- (A) symphony: ditty
  - (B) Constant: sudden
  - (C) Ailing: mortal
  - (D) Timely: belated
7. What is the antonym of Vernacular?
- (A) native
  - (B) Incurable
  - (C) perfect
  - (D) pious
8. What is the antonym of Pastime?
- (A) Employment
  - (B) Amusement
  - (C) Hobby
  - (D) Enjoy

9. 210, 195, 175, 150, 120

(A) 90

(B) 75

(C) 80

(D) 85

10. 2, 5, 26, 677

(A) 17803

(B) 13576

(C) 458329

(D) 458330

## H : CHEMISTRY

1. Electrovalent bond is formed by:-

(A) Sharing of electrons

(B) Donation of electrons

(C) Transfer of electrons

(D) None of the above

2. The element with the lowest atomic number and having ground state electron configuration of  $(n-1)d^{10}ns^2np^3$  is placed in the

(A) Third period

(B) Fourth period

(C) Fifth period

(D) Sixth period

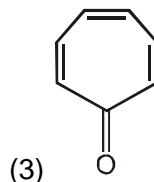
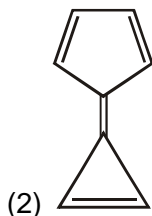
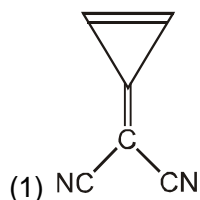
3. In the electronic structure of acetic acid there are

- (A) 16 shared and 8 unshared electrons
- (B) 8 shared and 16 unshared electrons
- (C) 12 shared and 12 unshared electrons
- (D) 18 shared and 6 unshared electrons

**Q. 4 - Q. 5 are questions with numerical answer.**

4. The rate of a gaseous reaction is given by the expression  $K(A)^m(B)^n$ . If the volume of the reaction vessel is suddenly reduced to  $1/4$  of the initial vol. the reaction rate relative to the original rate will be \_\_\_\_\_.
5. The Arrhenius equation expressing the effect of temperature on the rate constant of the reaction is \_\_\_\_\_
6. Correct formula of the complex formed in the brown ring test for nitrates is
- (A)  $\text{FeSO}_4 \cdot \text{NO}$
  - (B)  $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$
  - (C)  $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^+$
  - (D)  $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{3+}$
7. In  $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$ , the isomerism shown is:-
- (A) Ligand
  - (B) Optical
  - (C) Geometrical
  - (D) Ionization

8. Consider the following compounds:-



Which of the above compounds exhibit aromaticity ?

- (A) 1 and 2 only  
(B) 2 and 3 only  
(C) 1 and 3 only  
(D) 1, 2 and 3
9. Of the following elements which one has the same oxidation state in all of its compounds ?
- (A) Hydrogen  
(B) Fluorine  
(C) Carbon  
(D) Oxygen

**Q. 10 - Q. 11 are questions with numerical answer.**

10. In the  $^1\text{H-NMR}$  spectrum of toluene, the resonance due to  $\text{CH}_3$  group is expected at \_\_\_\_\_.
11. For total \_\_\_\_\_ orbitals, the quantum numbers  $n = 3$ ,  $i = 2$ ,  $m = +2$  are possible.

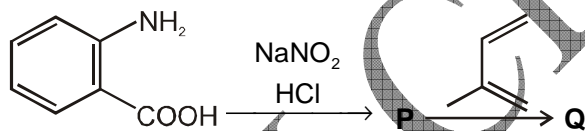
**Common data question 12-13**

For the reaction,  $\text{P(g)} \rightleftharpoons 2\text{Q(g)}$ , the equilibrium constant with a standard state pressure of 1 bar is 0.25. Assume ideal gas behavior.

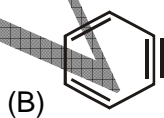
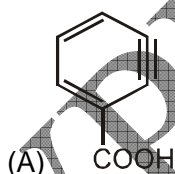
12. The total pressure (in bar) needed for 50% conversion of P into Q is
- (A) 0.1250  
(B) 0.1875  
(C) 0.5000  
(D) 0.7500
13. The amount of P that be converted to Q at a total pressure of 0.5 bar is approximately
- (A) 13%  
(B) 25%  
(C) 33 %  
(D) 55%

### 14-15 Linked Answer Question

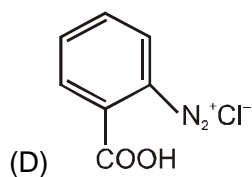
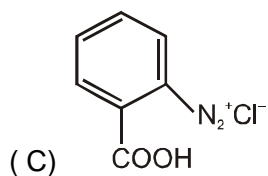
In the reaction sequence



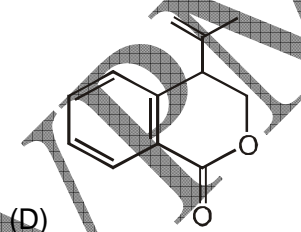
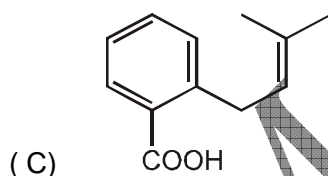
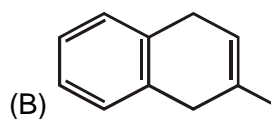
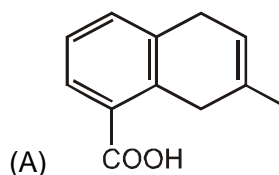
14. The compound [ P ] is







15. The compound [ Q ] is



## I : BIOCHEMISTRY

1. All chemical reactions in the body proceed in the presence of?

(A) Organic salts

Toll Free: 1800-2000-092

Phone: 0744-2429714

E-Mail: [vpmclasses@yahoo.com](mailto:vpmclasses@yahoo.com) / [info@vpmclasses.com](mailto:info@vpmclasses.com)

Address: 1-C-8, Sheela Chowdhary Road, SFS, TALWANDI, KOTA, RAJASTHAN, 324005

Mobile: 9001297111, 9829567114, 9829597114, 9001297243

Website: [www.vpmclasses.com](http://www.vpmclasses.com)



- (B) Inorganic salts
- (C) Water
- (D) Alkali
2. The difference between plant and animal cells is?
- (A) Plant cells have one large central vacuole while animal cells have many small vacuoles
- (B) Animal cells have thinner cell walls than the ones present in plant cells
- (C) Plant cells lack chloroplasts which are abundant in animal cells
- (D) None of the above
3. In human and other ureotelic organisms, the end product of amino acid nitrogen metabolism is?
- (A) Bile acids
- (B) Ketone bodies
- (C) Urea
- (D) Barium sulphate
4. Deoxyribose is ?
- (A)  $C_5H_{10}O_5$
- (B)  $C_5H_{10}O_4$
- (C)  $C_6H_{12}O_6$
- (D)  $C_6H_{12}O_5$
5. High density lipoproteins are also called?
- (A)  $\alpha$  - lipoproteins
- (B)  $\beta$  - lipoproteins

- (C)  $\gamma$  - lipoproteins
- (D)  $\alpha_1$  - lipoproteins
6. The chemical name 2-amino -6- oxypurine is said to be?
- (A) Adenine
- (B) Xanthine
- (C) Guanine
- (D) Hypoxanthine
7. Hemoglobin takes up how many of molecules of oxygen?
- (A) 1
- (B) 2
- (C) 4
- (D) 6
8. Thiamine is also said to be ?
- (A) Antiberiberi substance
- (B) Antineuritic vitamin
- (C) Aneurine
- (D) All of these
9. Respiratory quotients refers to?
- (A) The number of glucose molecules breaking up and produces energy in one hour
- (B) The ratio between the amount  $\text{CO}_2$  produced to the amount of  $\text{O}_2$  absorbed
- (C) Amount of ATP produced to the amount lost during respiration
- (D) None of these

10. Where does glycolysis and TCA (Krebs, cycle) occur in cell?
- (A) Glycolysis in cytoplasm and TCA cycle in oxisomes of mitochondrion
  - (B) Glycolysis in cytosol and TCA cycle in stroma of chloroplast
  - (C) Glycolysis in cytosol and TCA cycle in matrix of mitochondria
  - (D) Glycolysis in matrix of mitochondrion and TCA cycle on inner membrane of mitochondria
11. Disease of lipid metabolism is?
- (A) Gaucher's disease
  - (B) Niemann - Pick disease
  - (C) Tay-Sach's disease and Fabry's disease
  - (D) All of these
12. Extrinsic proteins of cell membrane are
- (A) Present superficially and are easily separable
  - (B) Present superficially but are not separable
  - (C) Attached to intrinsic proteins but are easily separable
  - (D) Attached to intrinsic proteins and are not easily separable
13. Which of the following is phosphorylated by a cAMP-independent protein kinase; which activated when a cell is under stress?
- (A) eIF - 2 $\alpha$
  - (B) eIF -3 $\alpha$
  - (C) eIF- 3
  - (D) eIF -1A
14. Which of the following is the improvement of cellular activities by manipulation of enzymatic, transport and regulatory functions of the cell with the use of recombinant DNA technology?

- (A) Metabolic engineering
  - (B) Genetic engineering
  - (C) Biotechnology
  - (D) None of the above
15. Thigmonasty is ?
- (A) Paratonic movement of growth
  - (B) Paratonic movement of variation
  - (C) Paratonic movement of locomotion
  - (D) Autonomic movement of growth
16. The magnetic resonance generated by the nuclei of hydrogen atoms of biological tissue subjected to an external magnetic field is the basis of?
- (A) NMR (Nuclear Magnetic Resonance Imaging)
  - (B) ECG (electro cardiograph)
  - (C) CT scanning
  - (D) All of the above
17. During adsorption chromatography, a single substance separating in multiple peaks is due to
- (A) Molecules being degraded during passage
  - (B) Channelling
  - (C) Retention
  - (D) Rise in temperature
18. Positive selection of T- cells ensures
- (A) MHC restriction

- (B) Self tolerance
- (C) TCR engagements
- (D) Activation by co-stimulatory signal

19. One of the following compounds is NOT a neurotransmitter?

- (A) Dopamine
- (B) Glutamic acid
- (C) Histidine
- (D) Glycine

20. In tryptophan operon, tryptophan acts as

- (A) Repressor
- (B) Activator
- (C) Co - repressor
- (D) Co - activator

## L : ZOOLOGY

1. Besides Annelida and Arthropoda metamerism is found in?

- (A) Cistoda
- (B) Acanthoaphala
- (C) Chordata
- (D) Mollusca

2. Tribe is newly discovered between subfamily and \_\_\_\_?

- (A) Order
- (B) Family

- (C) Species
- (D) Genus
3. The key point in Lamarck's theory was
- (A) Descent with change
- (B) Natural selection
- (C) Continuity of germ plasma
- (D) Inheritance of acquired characters
4. Determination of percentage of crossing over between two linked genes is important in?
- (A) Maintaining heterozygosity in population
- (B) Indicating relative position of genes in chromosomes
- (C) Fixation of heterosis in organisms
- (D) Explaining the phenomenon of coupling and repulsion
5. Which of the following is a globular protein?
- (A) Elastin
- (B) Keratin
- (C) Derived protein
- (D) Small polysaccharide
6. During elongation of polypeptide chain sigma factor is?
- (A) Functionless
- (B) Retained for specific function
- (C) Released for re-use
- (D) Required during closing of chain

7. Enzyme alter rate of reaction by?
- (A) Combining with product
  - (B) Forming reactant - product complex
  - (C) Changing equilibrium of reaction
  - (D) Lowering activation energy
8. Pairing of homologous chromosome is known as?
- (A) Chiasma formation
  - (B) Synapsis
  - (C) Dis - junction
  - (D) Crossing-over
9. Lactose operon produces enzymes
- (A)  $\beta$  - galactosidase, permease and glycogen synthetase
  - (B)  $\beta$  - galactosidase, permease and transacetylase
  - (C) Permease, glycogen synthetase and transacetylase
  - (D)  $\beta$  - galactosidase, phosphoglucose, is isomerase and permease
10. A patient of diabetes mellitus excretes glucose in urine even when he is kept on a carbohydrate free diet. Most likely reason for this is that.
- (A) Fats are catabolised to form glucose
  - (B) Amino acids are catabolised in liver to form sugar
  - (C) Amino acids are discharged into blood by liver
  - (D) Glycogen is released from muscles into blood
11. Neuro hypophysis contains and releases



- (A) Oxytocin and Vasopressin
- (B) Vasopressin and estrogen
- (C) Oxytocin and estrogen
- (D) Oxytocin, prolactin and GH
12. Foramen magnum is found at?
- (A) Base of skull
- (B) Apex of vertebral column
- (C) Base of brain
- (D) Base of medulla
13. Pig gets infection of taenia solium through food contaminated by?
- (A) Onchosphere
- (B) Cysticercus
- (C) Hexacanth
- (D) Adult worm
14. The main function of immune system is ?
- (a) To recognize invading pathogens
- (b) To trigger pathway that will destroy pathogen
- (c) Destruction of main organs
- (d) Destruction of main organs
- (A) A and D only
- (B) C and D only
- (C) A, b, and D

(D) A, B, and C

15. Function of edysome in insects is?

(A) Growth and development of larva

(B) Maturity and egg lying in adult

(C) Metamorphoses in larva and pupa formation

(D) Secretion of cuticle in adult

16. When mouth develops from blastopore, the organism called?

(A) Deutrostome

(B) Protostome

(C) Blastostome

(D) None of these

17. Which of the following is critically endangered?

(A) Black Buck

(B) Red panda

(C) Pigmy Hog

(D) None of these

18. Instinct and learning both ensures?

(A) Searching behaviour

(B) Consummately behaviour

(C) Adaptive behaviour

(D) Refractory behaviour

19. If the ribosomes of a cell are destroyed then?

- (A) Fats will not stored
- (B) Proteins will not be formed
- (C) Carbon assimilation will not occur
- (D) Respiration will not take place

**20. Eusociality is**

- (A) When one sacrifices its own reproductive privileges to promote reproduction in another related individual
- (B) Behaviour that reduces Darwinian fitness of performing while increasing that of recipient
- (C) Reciprocation
- (D) A selfish and spite behavior

**J : BOTANY**

**1. The ratio 12 : 3 : 1 is most commonly observed in which of the following genetic process?**

- (A) Collaborator gene effect
- (B) Recessive epistasis
- (C) Dominant epistasis
- (D) Duplicate dominant effect

**2. The carrying capacity of a population can be explained by logistic curve. Which of the following is the correct expression for logistic equation?**

- (A)  $\frac{dN}{dt} = rN$
- (B)  $\frac{dN}{dt} = rN \frac{(k-N)}{k}$
- (C)  $\frac{dN}{dt} = r \frac{(k-N)}{k}$

(D)  $\frac{dN}{dt} = \frac{(K - N)}{rNK}$

3. Which of the following is a precursor of IAA biosynthesis ?
  - (A) Tryptophan
  - (B) Methionine
  - (C) Putrecine
  - (D) Geranylgeranyl pyrophosphate.
4. Triticale octoploids is a hybrid crop formed by crossing?
  - (A) T. durum × Secale cereal
  - (B) T. aestivum × Secale cereale
  - (C) T. monococcum × secale cereale
  - (D) T. turgidum × Secale cereale
5. Broad leaved evergreen leaves are characteristic of which forest?
  - (A) Tropical woodland
  - (B) Temperate deciduous
  - (C) Tropical rainforest
  - (D) Temperate rain forest
6. Which of the following is correctly matched?
  - (A) Nutation – movement due to injury
  - (B) Traumatotropism – movement due to change in turgor pressure
  - (C) Thigmotropism – movement of tendril due to contact
  - (D) Seismonasty – movement of stem tips of twining plants

7. The organs that are affected in the xenia and Metaxenia effect respectively are?
- (A) Fruits, seed coat  
(B) Endosperm, testa  
(C) Nucellus, egg apparatus  
(D) Nucellus, endosperm
8. In a cross 45 tall and 14 dwarf plants were obtained. Genotype of parents was?
- (A)  $TT \times TT$   
(B)  $TT \times Tt$   
(C)  $Tt \times Tt$   
(D)  $TT \times tt$
9. Which of the following statement about energy flow incorrect?
- (A) Secondary productivity decline with each trophic level  
(B) Only net primary productivity is available to consumers  
(C) About 90% of the energy at one trophic level does not appear at next  
(D) Eating meat is probably the most economical way of acquiring energy of photosynthetic productivity
10. Match the following
- | Plants               | Oils              | Family        |
|----------------------|-------------------|---------------|
| P. Oleaeuropea       | i. Coconut oil    | W. Palmae     |
| Q. Cocos Nucifera    | ii. Olive oil     | X. Oleaceae   |
| R. Carthamus         | iii. Oil palm     | Y. Palmae     |
| S. Elaeis guineensis | iv. Safflower oil | Z. Compositae |
- (A) P-i-W, Q-ii-X, R-iv-Z, S-iii-Y

(B) P-ii-X, Q-i-W, R-iii-Y, S-iv-Z

(C) P-ii-X, Q-i-W, R-iv-Z, S-iii-Y

(D) P-iv-X, Q-ii-Z, R-i-Y, S-iii-W

11. Which of the following is correct?

P. Cereal grains have caryopsis type of fruit

Q. Scutellum is another name for a very reduced cotyledon

R. Bacterio rhodopsin occurs mainly in eubacteria and is main photosynthetic pigment

S. The ratio of  $\text{CO}_2$  : ATP :  $\text{NADPH}_2$  in  $\text{C}_3$  plants is 1 : 2 : 1

(A) R, S

(B) P, Q

(C) Q, R

(D) Q, S

12. Match the following

P. Lupins

1. Datura

Q. Scopolamine

2. Indole alkaloid

R. Secologanin

3. Rubber

S. Crotonic acid

4. Quinolizidine

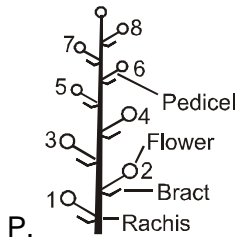
(A) P-4, Q-1, R-3, S-2

(B) P-4, Q-1, R-2, S-3

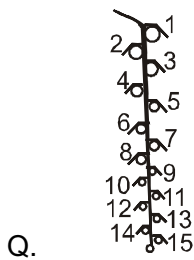
(C) P-1, Q-4, R-3, S-2

(D) P-3, Q-4, R-1, S-2

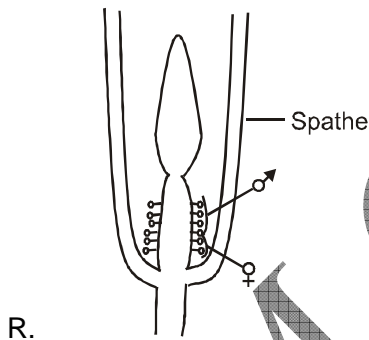
13. Identify the correct match ?



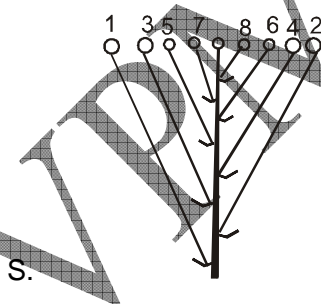
1. Catkin



2. Corymb



3. Raceme



4. Spadix

(A) P-3, Q-4, R-1, S-2

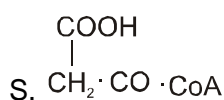
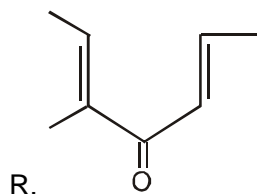
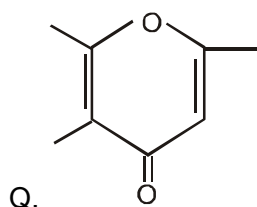
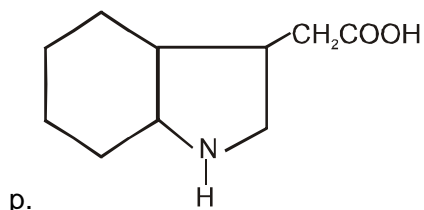
(B) P-3, Q-1, R-2, S-4



(C) P-3, Q-1, R-4, S-2

(D) P-2, Q-1, R-3, S-2

14. Match the following



1. Butene

2. IAA

3. Malonyl CoA

4. Flavone

(A) P-2, Q-4, R-1, S-3

(B) P-4, Q-3, R-2, S-1

(C) P-1, Q-2, R-3, S-4

(D) P-3, Q-4, R-1, S-4

15. Match List I with List II and select the correct answer using the code given below the lists

List I

List II

(Authors)

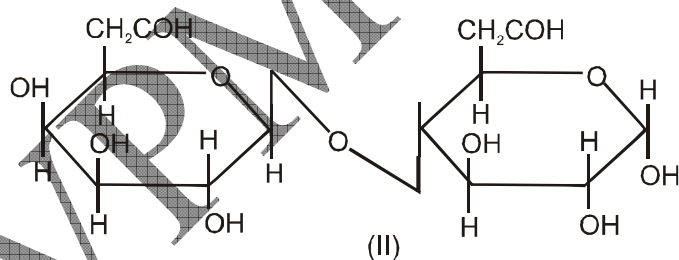
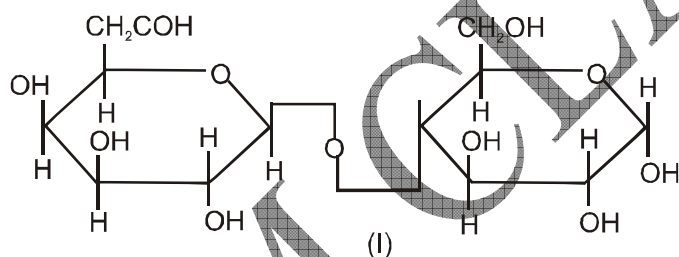
(Books)

- |                       |                                     |
|-----------------------|-------------------------------------|
| A. Hutchinson         | 1. Die Naturlichen                  |
| B. Bentham and Hooker | 2. The Families of Flowering Plants |
| C. Engler and Prantl  | 3. The Origin of Angiospermous      |
| D. Takhtajan          | 4. Genera Plantarum                 |

Codes:

	A	B	C	D
(A)	2	1	4	3
(B)	3	4	1	2
(C)	2	4	1	3
(D)	3	1	4	2

16. Identify the following structures and the linkage in them:



- (A) I - Amylose, II - Sucrose I = 1, 4 - glycosidic bond II = 1, 4 - glycosidic bond
- (B) I - Lactose, II - Cellobiose I =  $\beta$  1, 4- galactosidic bond, II =  $\beta$  0, 4 - glycosidic bond
- (C) I = Maltose II = lactose I =  $\alpha$  1, 4- galactosidic bond, II =  $\alpha$  1, 4 - glycosidic bond

(D) I = Sucrose II = Starch I =  $\alpha$  1, 6 - glycosidic bond II =  $\alpha$ , 1, 4-glycosidic bond

17. Which of the following are incorrect for ethylene Receptor?

P. It is dimeric transmembrane protein

Q. Intracellular histidine kinase units

R. Ethylene binding inactivates the receptor

S. Cyclooctene is an inhibitor of ethylene receptor

(A) P, Q

(B) P, Q, R

(C) P, Q, R, S

(D) None of the above

18. The following 4 different solutions are prepared by mixing the components of electron transport chain. Which among them is expected to cause a net transfer of electrons to cytochrome C ?

(A) Reduced ubiquinone and reduced cytochrome C

(B) Reduced ubiquinone, cytochrome b-C<sub>1</sub> complex, reduced cytochrome C

(C) Oxidized ubiquinone, oxidized cytochrome C

(D) Reduced ubiquinone, cytochrome b-C<sub>1</sub> complex, oxidized cytochrome c

19. Diploid chromosome number in human is 46. However, if you count chromatids which are visible during mitotic or meiotic cell divisions, you would be able to count different sets of chromatid numbers depending on the stage and the type of the cell division. Match the chromatid numbers given on the left with division stage shown on the right

A. 46

1. Mitotic metaphase

B. 23

2. Aneuploid meiotic telophase II

C. 92

3. Meiotic telophase I

D. 24

4. Meiotic anaphase II

(A) A-3, B-4, C-1, D-2

(B) A-2, B-4, C-1, D-3

(C) A-1, B-4, C-2, D-3

(D) A-1, B-2, C-3, D-4

20. Chose the correct match

P. 5' capping mRNA

1. 5-methyl guanosine

Q. Ribozyme

2. Polyadenylate transferase

R. Promoter

3. Spliceosome

S. Poly A tail

4. 7-Methyl guanosine

5. RNA polymerase

6. Catalytic RNA

7. Polyadenylate polymerase

(A) P-1, Q-6, R-5, S-2

(B) P-1, Q-5, R-3, S-7

(C) P-4, Q-6, R-5, S-7

(D) P-4, Q-3, R-6, S-2

**L : ZOOLOGY**

1. The following set of organs represent?

Wings of Birds, flippers of whales, legs of horses, hands of man.

(A) Analogous Organs

- (B) Homologous Organs
- (C) Vestigial Organs
- (D) Unrelated Organs
2. When a coelom arises as a central split in each mesodermal band and confluence of cavities of all bands forms a coelom known as ?
- (A) Acoelom
- (B) Pseudocoel
- (C) Enterocoel
- (D) Schizocoel
3. Which of these animals is a matching set in classification?
- (A) Neries, Planarian, Round worm, Earth worm
- (B) Millipede, crab, cockroach, centipede
- (C) Starfish, jelly fish, cattle fish, silver fish
- (D) Leech, locust, lobster, sea urchin
4. Which of the following is not an example of coevolution ?
- (A) Adaptation of flowers and their exclusive pollinators
- (B) Passion flower, vines and butterfly helicons
- (C) A parasite that is specific for host
- (D) Aposematic correlation of monarch butterflies and predators that learn not to eat them
5. Which is not a progressive parasitic modifications occurring in phylum Platyhelminthes ?
- (A) Protective, thick tegument around body
- (B) Development of suckers for attachment
- (C) More easy and simple nervous system

- (D) Anaerobic respiration
6. In a chemical reaction, transition state species have free energy?
- (A) Lower than either reactant and product
  - (B) Higher than either reactant or product
  - (C) Lower than reactant, higher than product
  - (D) Higher than reactant, lower than product
7. The most common cause of pleiotropy is ?
- (A) Same product of given gene being involved in different metabolic pathway
  - (B) Gene making very different products in different cell types
  - (C) DNA sequence of gene getting changed in cell specific manner
  - (D) Gene is not functioning in cell
8. Radioactive thymidine is fed to cell about to enter S phase. It will make radioactive
- (A) Euchromatin
  - (B) Heterochromatin
  - (C) Neither euchromatin nor heterochromatin
  - (D) Both euchromatin and heterochromatin
9. Grb 2 is a famous example of ?
- (A) Docking protein
  - (B) Adaptor protein
  - (C) Ras-Raf kinase
  - (D) G-protein coupled receptor
10. Sometimes, speciation can be quit abrupt after long periods of stability. This is called

- (A) Founder effect
- (B) Crossing over
- (C) Macro evolution
- (D) Punctuated equilibrium
11. During cleavage the cell division is very rapid. The daughter cells do not undergoes growth and cells become gradually smaller in volume, Hence
- (A) There is no growth in volume of embryo
- (B) The embryo grows in volume
- (C) The embryo becomes smaller in volume.
- (D) The embryo remains static
12. In a heteropolymer experiment using  $\frac{1}{2}C : \frac{1}{4}A : \frac{1}{4}G$ . The number of different triplets that will occur in synthetic RNA are ?
- (A) 8
- (B) 27
- (C) 9
- (D) 64
13. Which of the following drug will be used for abortion ?
- (A) Vincristine
- (B) Norethindrone
- (C) Mifepristone
- (D) Estradiol ethynyl



14. A keystone species is one that ?
- (A) Preys heavily on a particular species
  - (B) Is vulnerable to extinction
  - (C) Restricted to small geographic area
  - (D) Strongly affect the structure and functioning of its ecological community
15. Identify the correct statements for the 'HAT medium'
- P. Includes drug aminopterin to block major pathway for synthesis of deoxyribonucleotides
  - Q. Hypoxanthine is precursor for thymidine
  - R. Includes drug aminopterin to block minor pathway for synthesis of polypeptides
  - S. Cells can grow in presence of aminopterin only if they have enzymes thymidine kinase and hypoxanthineguanine phosphoribosyl transferase
- (A) P, Q
  - (B) P, S
  - (C) R, S
  - (D) Q, S
16. The phosphorus cycle differs from those of carbon and nitrogen in that
- (A) It lacks a gaseous phase
  - (B) It lacks a liquid phase
  - (C) Living organisms don't need phosphorus
  - (D) The phosphorus cycle does not differ importantly from the carbon and nitrogen cycles
17. Which of the following are advanced vertebrate characters?
- (A) Presence of Jaws
  - (B) Presence of Paired Appendages

(C) Pineal eye absent

(D) All the above

18. A species of flowering plant has a wide altitudinal distribution. Which of the following methods is most appropriate to determine whether phenotypic variation in these plants is due to genetic variation
- (A) Find chromosomal differences between populations of plants at the extremes of the altitudinal range
- (B) Examine amount of phenotypic variation within populations along entire altitudinal range
- (C) Determine if phenotypic differences are retained when plants from different altitudes are grown under the same environmental conditions
- (D) Determine whether hybrids between phenotypically different populations grow at altitudes intermediated by the two parent populations
19. An unaffected woman who is heterozygous for X linked trait Duchene's muscular dystrophy has children with normal man. If family has 3 children what is the probability if all children are affected?
- (A)  $1/4$
- (B)  $3/4$
- (C)  $9/16$
- (D)  $1/64$
20. Nucleated cells tends to be more resistant to complement mediated lysis than RBC because
- (A) Many nucleated cells can endocytosis membrane attack complex
- (B) Membrane attack complex cannot get inserted in the nucleated cell membrane
- (C) Membrane attack complex can get inactivated by the nucleated cells

(D) Membrane attack complex get inactivated hence cannot get inserted in the nucleated cell membrane

## ANSWER KEY

### GA : General Aptitude

Question	1	2	3	4	5	6	7	8	9	10
Answer	A	A	D	D	B	B	D	A	D	D

### H : Chemistry

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	C	B	A	16	$K = Ae-Ea/RT$	B	B	D	B	2.3	1	B	C	A	A

### I : Biochemistry

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	C	A	C	B	A	C	C	D	B	C	D	C	A	A	B	A	B	A	B	C

### K : Microbiology

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	C	B	C	C	D	C	B	D	D	B	C	C	D	B	B	C	D	A	D	B

### J : Botany

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	C	B	A	B	C	C	B	C	D	C	B	B	C	A	C	B	D	D	A	C

### L : Zoology

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Answer	B	D	B	D	C	B	A	D	B	D	A	B	C	D	B	A	D	C	D	A

## HINTS AND SOLUTIONS

### GA : General Aptitude

1.(A) Rs. 600 for 2 years = Rs. 1200 for 1 year

and Rs. 150 for 4 years = Rs. 600 for 1 year

∴ Total principal = Rs. 1800 for 1 year

Interest = Rs. 90

∴ Rate of interest =  $\frac{90 \times 100}{1800 \times 1} = 5\%$

2.(A) Fundamental applied is fraction of work done

In this question, A and B did the work for 35 days to complete it. A can complete the work in 60 days.

So,  $\frac{A \text{ did}}{A \text{ can}} + \frac{B \text{ did}}{B \text{ can}} = 1$

∴  $\frac{35}{60} + \frac{35}{x} = 1$

or  $x = 84$  days.

3.(D) The synonym of Phlegmatic is calm.

4.(D) The synonym of Ponderous is bulky.

5.(B) One needs a microscope to see an atom. One needs a telescope to see a planet.

6.(B) Chronic : Acute :: constant : sudden

7.(D) The antonym of Vernacular is pious.

8.(A) The antonym of Pastime is employment.

9.(D)  $210 - 15 = 195$

$195 - 20 = 175$

$175 - 25 = 150$

$150 - 30 = 120$

$$120 - 35 = 85$$

10.(D)  $2^2 + 1 = 5$

$$5^2 + 1 = 26$$

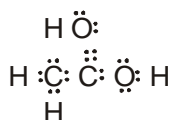
$$26^2 + 1 = 677$$

$$677^2 + 1 = 458330$$

## H : Chemistry

1.(C) Electrovalent bond is formed by transfer of electrons.

2.(B) The element is placed in the fourth period.



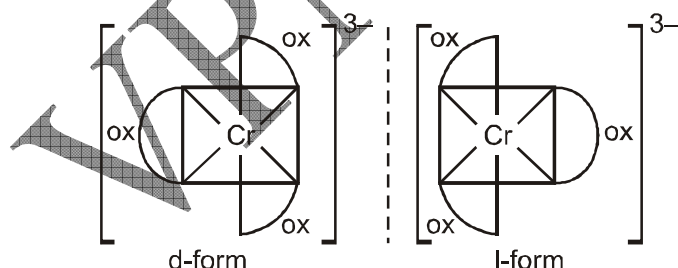
3.(A)

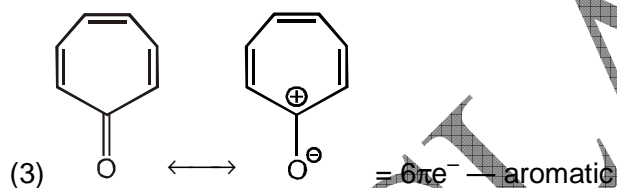
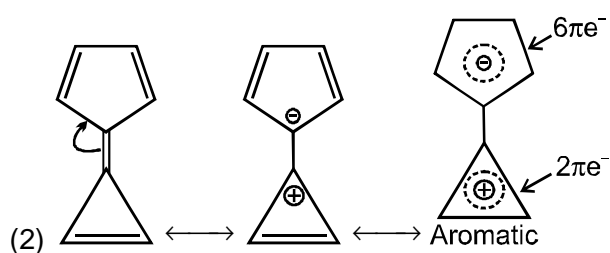
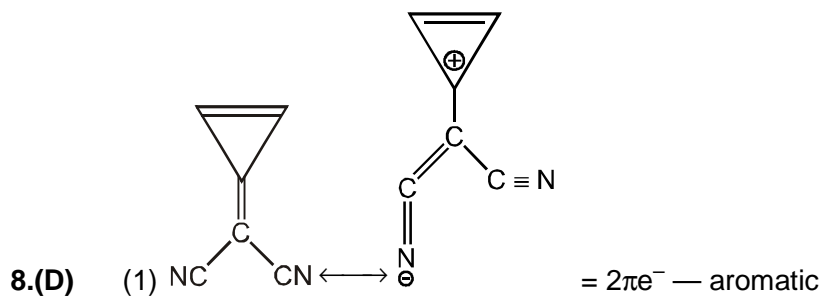
4. If volume is reduced to  $\frac{1}{4}$  concentration will be increased 4 times hence reaction rate will increase by 16. rate =  $K[A][B]$ . New rate =  $K[4A][4B] = 16K[A][B]$

5.  $K = Ae^{-E_a/RT}$

6. (B) Brown ring test for nitrate is due to the complex  $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$

7. (B)  $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$





9.(B) Fluorine has the same oxidation state in all of its compounds.

10. In the  $^1\text{H-NMR}$  spectrum of toluene, the resonance due to  $\text{CH}_3$  group is expected at  $\delta$  2.5 because the Tau value for  $\text{CH}_3$  protons when attached with aromatic ring is 7.7.

$$\tau = 10 - \delta$$

$$\delta = 10 - \tau = 10 - 7.7 = 2.3$$

11.  $m = +2$  signifies only one orbital.

12.(B)  $P = 2Q$

Initial	1	0
At equation	$(1 - x)$	$2x$
Total moles	$1 - x + 2x = 1 + x$	

$$P_P = \left( \frac{1-x}{1+x} \right) P \quad P_Q = \left( \frac{2x}{1+x} \right) P$$

$$x = 0.50$$

$$P_P = \left( \frac{1-0.5}{1+0.5} \right) P = \frac{0.5}{1.5} P = \frac{1}{3} P$$

$$P_Q = \left( \frac{2 \times 0.5}{1+0.5} \right) P = \frac{10}{15} P = \frac{2}{3} P$$

$$K_P = \frac{[Q]^2}{[P]}$$

$$K_P = \frac{(2/3P)^2}{1/3P} = \frac{4}{3} P$$

$$0.25 = \frac{4}{3} P$$

$$P = \frac{0.75}{4} = 0.1875 \text{ bar}$$

13.(C)  $P \rightarrow 2Q$

$$K_P = \frac{\left( \frac{2x}{1+x} \right)^2 P^2}{\frac{(1-x)P}{(1+x)}} = \frac{4x^2 P}{1-x^2}$$

$$0.25 = \frac{4x^2 \times 0.5}{1-x^2}$$

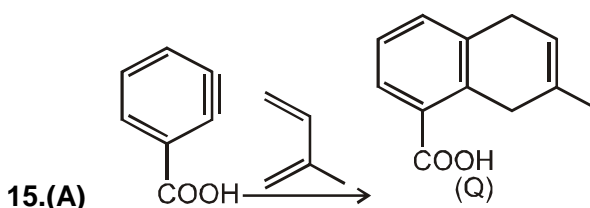
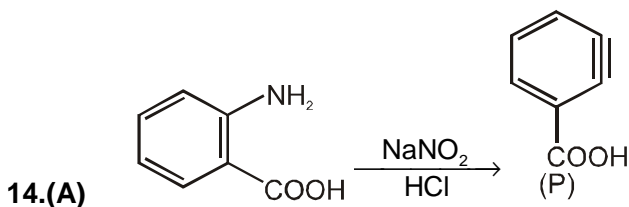
$$0.25 - 0.25 \times 2 = 2x^2$$

$$2.25 - x^2 = 0.25$$

$$x^2 = \frac{0.25}{2.25}$$



$$x = \sqrt{\frac{0.25}{2.25}} = 33\%$$



## I : Biochemistry

- 1.(C) All chemical reaction in the body proceed in the presence of water.
- 2.(A) The difference between plant and animal cell is that the plant cells have one large central vacuole while animal cell have many small vacuoles.
- 3.(C) In human and other ureotelic organisms, the end product of amino acid nitrogen metabolism is urea. And in uricotelic organisms, the end product is uric acid.
- 4.(B) Deoxyribose is  $C_5H_{10}O_4$ .
- 5.(A) High density lipoproteins are also called  $\alpha$  - lipoproteins and Low density lipoproteins are also called  $\beta$  - lipoproteins
- 6.(C) The chemical name 2-amino - 6- oxypurine is said to be of Guanine.
- 7.(C) Hemoglobin takes up 4 molecules of oxygen . It takes up two atoms of oxygen for each atom of ferrous ion present.
- 8.(D) Thiamine is also said to be Antiberiberi substance, Antineuritic vitamin and Aneurine.

- 9.(B) Respiratory quotient refers to the ratio between the amount of  $\text{CO}_2$  produced to the amount of  $\text{O}_2$  absorbed.
- 10.(C) Glycolysis occurs in cytosol and TCA cycle occurs in matrix of mitochondria.
- 11.(D) Diseases of Lipid metabolism are Gaucher's disease, Niemann- Pick disease, Tay- sach's disease and Fabry's disease.
- 12.(C) Extrinsic proteins of cell membrane are attached to intrinsic proteins but are easily separable.
- 13.(A) eIF -2 $\alpha$  is phosphorylated by a cAMP -independent protein kinase, which is activated when a cell is under stress.
- 14.(A) Metabolic engineering is the improvement of cellular activities by manipulation of enzymatic, transport and regulatory functions of the cells with the use of recombinant DNA technology.
- 15.(B) Thigmonasty is paratonic movement of variation .
- 16.(A) The magnetic resonance generated by the nuclei of hydrogen atoms of biological tissues subjected to an external magnetic field is the basis of NMA (Nuclear Magnetic resonance) spectroscopy .
- 17.(B) During adsorption chromatography, a single substance separating is multiple peaks is due to channelling
- 18.(A) Positive selection of T-cells ensure MHC (major histo compatibility complex) restriction.
- 19.(B) Glutamic acid is not a neurotransmitter but Dopamine, Histidine and Glycine are the neurotransmitters.
- 20.(C) In tryptophan operon, tryptophan acts as Corepressor.

## K : Microbiology

- 1.(C) Micro- organisms commonly causing diarrhoeal diseases are E.coli, G. shigella, campylobacter and salmonella.

- 2.(B) Ultra structure of a cell organelle can be best studied through electron microscope. Electron microscope employs electromagnetic lenses and has a high resolution power due to short wavelength of electrons.
- 3.(C) Phylogeny and inter-relationship found between taxa on the basis of number, type and arrangement of chromosomes is karyotaxonomy.
- 4.(C) Ion channels always remain fluctuating between open and closed state
- 5.(D) Cell wall is made up of cellulose, hemicellulose, fatty substances and minerals. It provides shape and mechanical strength to the cell.
- 6.(C) Golgi body functions in acrosome formation, synthesis of lipids, lysosome formation and in protein glycosylation.
- 7.(B) Acids lowers pH and denature proteins. They are used in food preservation.
- 8.(D) The isocitrate dehydrogenase-catalyzed reaction in the tricarboxylic acid cycle is inhibited by increased levels of ATP, by increased levels of reduced NAD and stimulated by increased levels of ADP.
- 9.(D) There is oozing of semi solid material which forms a tough membrane over air passage. The disease is Diphtheria which is caused by *Corynebacterium diphtheria*.
- 10.(B) Growth may be defined in simple words as an irreversible change in mass and volume.
- 11.(C) 'Illudin', an antibiotic is produced by *clitocybe illudens*.
- 12.(C) Walking pneumonia (atypical pneumonia ) affects human beings in the age group of 5- 25 years. The main causative agent of this disease is *mycoplasma pneumonia*.
- 13.(D) For infection of E.coli with the lambda phage, the E.coli is usually grown in a medium containing maltose because the presence of maltose induces maltose binding protein which also serves as a receptor for the lambda phage.
- 14.(B) Organelles protein synthesis occurs in mitochondria as well as in chloroplasts.

- 15.(B) Nitrobacter are capable of oxidizing nitrite to nitrate in the soil and thus play a major role in the nitrogen cycle.
- 16.(C) Chloramphenicol is not a peptide antibiotic. It is an inhibitor of protein synthesis .
- 17.(D) 38 ATP molecules in total are generated in complete biological oxidation of one molecule of glucose.
- 18.(A) The replication of the polio virus positive strand RNA genome requires virus encoded RNA dependent RNA polymerase.
- 19.(D) Photoautotrophs are the group of organisms which uses light as the energy source and CO<sub>2</sub> as the principal carbon source.
- 20.(B) Hepatitis c viral infection often leads to hepatocellular carcinoma in humans.

## J : BOTANY

- 1.(C) In dominant epistasis the dominant allele masks the activity of allele of another gene and gives a ratio of 12 : 3 : 1.
- 2.(B) Carrying capacity is the number of individuals of a particular species that a particular environment can support indefinitely. The logistic equation

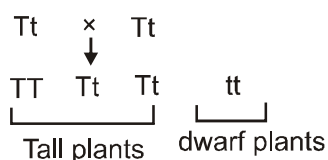
$$\frac{dN}{dt} = \frac{rN(K-N)}{K}$$

$$\frac{(K-N)}{K} \text{ shows available resources}$$

$$\frac{dN}{dt} = rN \text{ is normal exponential growth equation.}$$

- 3.(A) The auxin Indole acetic acid (IAA) is synthesized from tryptophan via tryptophan dependent pathway.
- 4.(B) Triticum octoploids is an allopolyploidy between hexaploid wheat (Triticum aestivum) and Rye (Secale cereale).

- 5.(C) Tropical rain forest are characterized by broad leave evergreen forest.
- 6.(C) Thigmonasty are moved induced by touch. Seismonasty are plant movement that develop on shaking.
- 7.(B) Xenia is effect of pollens on endosperm and Metaxenia is effect of pollens outside the endosperm i.e. fruit wall, testa, etc.
- 8.(C) Since the member of Tall plants is more than dwarf and dwarf plants are also presents parents must be Tt, Tt.



- 9.(D) The incorrect statement is consuming meat gives more energy. The plants have maximum energy which progressively in successive trophic levels like herbivore, carnivore, consumer, etc. So, plants have maximum energy.
- 10.(C)

Plants	Oils obtained	Family
Elaeis guineensis	Oil palm	Palmae
Olea europea	Olive oil	Oleaceae
Cocos nucifera	Coconut oil	Palmae
Carthamus tinctorius	Safflower oil	Compositae

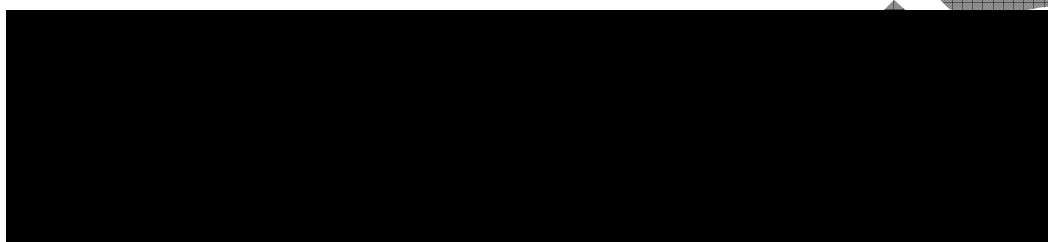
- 11.(B) The correct statements are that caryopsis fruit is found in the cereals. Scutellum is another name for reduced cotyledon. Bacterio rhodopsin is found in archae and ratio of  $CO_2$  : ATP :  $NADPH_2$  in  $C_3$  plant is 1 : 3 : 2.
- 12.(B) Quinolizidine alkaloid are commonly called as lupins.
- Datura is the main source of scopolamine.
- Indole alkaloids derived from secologanin.

Crotonic acid is a precursor of rubber.

13.(C) The correct answer is : P-3, Q-1, R-4, S-2.

14.(A) The correct option are : P-2, Q-4, R-1, S-3.

15.(C) The correct matches are as below:



16.(B) The given structure I is lactose (glucose + galactose) with  $\beta$ -1, 4 - glucosidic bond and structure II is cellobiose (glucose + glucose) with  $\beta$  0,4 - glycosidic bond.

17.(D) All the option are correct with regard to ethylene receptor.

18.(D) The electron transport system contains the following :

$\text{NAD} \rightarrow \text{FAD} \rightarrow \text{Fe-S} \rightarrow \text{UbQ} \rightarrow \text{Cyto b} \rightarrow \text{Fe-S} \rightarrow \text{Cyto C}_1 \rightarrow \text{Cyto C} \rightarrow \text{Cyto a} \rightarrow \text{Cyto a}_3$ .

19.(A) In meiotic Telophase I number of chromosome will be 46. In meiosis I nucleus divides in two and chromosome are halved. In mitotic anaphase II sister chromatids will produce two cells with half chromosome number ie 23. In Mitotic anaphase it will be 92 and 24 during aneuploid meiotic telophase II.

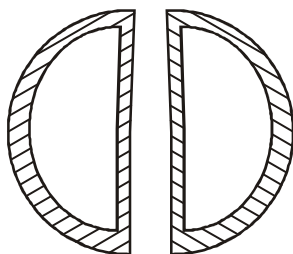
20.(C) 5' capping of mRNA. 7- methyl guanosine. Ribozyme are catalytic RNA. Promoter is the site where RNA polymerase binds starts transcription, poly a tail requires poly adenylate transferase enzyme.

## L : Zoology

1.(B) Homologous organs are similar or dissimilar in structure and function but are of similar origin and development. Eg-wings of birds, flippers of whale, legs of horse, hands of man.

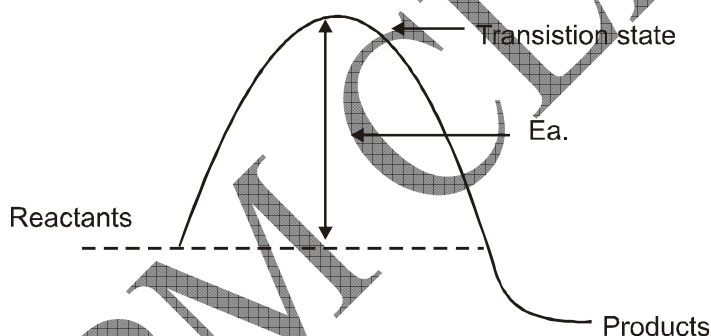
2.(D) Such a coelom is known as schizocoel.





Schizocoel

- 3.(B) Millipede, locust, crab, centipede, cockroach, scorpion all belong to class Arthropoda.
- 4.(D) Coevolution is when 2 or more species reciprocally affect each other's evolution. Example change in plant morphology affects the animals feeding on that plant.
- 5.(C) All are progressive modifications except formation of simplified nervous system which is a retrogressive modification.
- 6.(B) The transition state is an unstable state thus its free energy will be much more than reactants and products both.



- 7.(A) Pleiotropy is effect of single gene on more than one character/trait. For example one gene product is used in many different metabolic pathways.
- 8.(D) Radioactive thymidine will label both euchromatin and heterochromatin.
- 9.(B) Adaptor proteins bind to an activated receptor, other proteins bind to them and become substrates for receptors. Example is Grb 2 protein.



- 10.(D) Punctuated equilibrium is evolution with jerks in which species will show little change for most of their geological history.
- 11.(A) During cleavage cell division is rapid and daughter cell don't under go growth thus volume of embryo doesn't change.
- 12.(B) There will be  $(3)^3$  triplets i.e 27 triplets will be produced.
- 13.(C) Drugs like Mifepristone inhibit the effects of progesterone and thus used for abortion.
- 14.(D) Keystone species are important in controlling relative abundance of other species.
- 15.(B) HAT medium, is Hypoxanthine Aminopterin, Thymidine containing medium. Aminopterin is a inhibitor of major nucleic acid pathway. Cells can grow in HAT medium only when they have thymidine kinase and hypoxanthine guanine phosphoribosyl transferase.
- 16.(A) Phosphorous cycle differs in the absence of gaseous phase and is a open cycle because mineral P is carried from land to oceans.
- 17.(D) All the characters are of advanced vertebrates like paired appendages, Jaws, circular mouth, no pineal eye.
- 18.(C) The phenotypic variation which are retained when different attitudinal plants grown under same environment are genotypic variations.
- 19.(D) The probability will be :
- $$\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{1}{64}$$
- 20.(A) Lysis of nucleated cell require formation of multiple membrane attack complexes while a single MAC can lyse an RBC. Many nucleated cells can endocytosis the MAC.