SOLUTIONS & ANSWERS FOR KARNATAKA NEET-2013

[BIOLOGY, PHYSICS & CHEMISTRY]

PART – A – BIOLOGY

1. Which of the following is not a property ------

Ans: Ambiguous

- Sol: Genetic code is unambiguous and specific.
- 2. Which organization publishes ------
 - Ans: IUCN
 - Sol: International Union for Nature and Natural Resources (IUCN) publishes 'Red Data Book'.
- **3.** Identify the tissue shown in the diagram and match with -----
 - Ans: Skeletal muscle, shows striations and closely attached with the bones of the limbs.
 - Sol: Skeletal muscles are voluntary muscles.
- 4. Climate of the world is -----
 - Ans: Increasing amount of atmospheric carbondioxide.
 - Sol: Increase in the amount of CO₂ leads to global warming.
- 5. Uridine, present only in RNA ----
 - Ans: Nucleoside
 - Sol: Nucleoside contains sugar and nitrogen base.
- 6. Which of the following statements -----
 - Ans: Sporopollenin can withstand high temperatures as well as strong acids and alkalis.
 - Sol: Sporopollenin is one of the most resistant organic material seen in the exine of pollen grains.
- 7. Satellite RNAs are present ------
 - Ans: Plant viruses
 - Sol: In plant virus genetic material is RNA
- 8. Sharks and dogfishes differ from skates ------
 - Ans: Head and trunk are widened considerably.

Sol: Shark and dog-fish show stream-lined body.

- 9. Random unidirectional change in allele ------
 - Ans: Genetic drift
 - Sol: If genetic flow occurs by chance it is genetic drift.
- 10. Among flower of *Calotropis,* tulip, *Sesbania, Asparagus, Colchicine,* Sweet pea, -----
 - Ans: Seven
 - Sol: Sesbania, Indigofera, Soyabean and ground nut belong to Fabaceae, hence corolla is vexillary. Sweet pea shows convoluted twisted.
- 11. The age pyramid with broad base ------
 - Ans: High percentage of young individuals
 - Sol: Base of age pyramid represents prereproductive phase.
- 12. Norepinephrine: -----
 - Ans: (a) and (c)
 - Sol: Norepinephrine released by sympathetic nerves and increase heart rate.
- 13. Which one of the following is not a parasitic -----
 - Ans: Loss of reproductive capacity
 - Sol: Loss of reproductive capacity is not an adaptation.
- 14. Microbe used for biocontrol of pest butterfly -----
 - Ans: Bacillus thuringiensis
 - Sol: *Bacillus thuringiensis* a biocontrol pest used against butterfly caterpillar.
- **15.** Which one is the incorrect statement with regards to the importance of -----
 - Ans: It confirms that DNA is the carrier of genetic information.
 - Sol: Genetic nature of DNA is proved only by microbial experiments.
- **16.** When man eats fish which feeds on zooplankton which have eaten small -----
 - Ans: Small plants
 - Sol: Plants are the producers.

17. Select the option which shows correct matching of animals with excretory organs and -----

Ans:

(4)	Salamander	Kidnev	Urea
· · · /	04.4.1.4.10.0.		0.00

- Sol: Salamander is an amphibian and its excretory organ is kidney and its excretory product is urea.
- 18. The characteristics of class ------
 - Ans: Body covered with dry and cornified skin, scales over the body are epidermal, they do not have external ears.
 - Sol: Reptiles do not have external ears and body is covered with cornified skin.
- 19. Megaspores are produced from the ------
 - Ans: Meiotic division
 - Sol: Megaspores are haploid

20. $(DNA \xrightarrow{C} mRNA \xrightarrow{B} Protein \xrightarrow{Proposed by} A$

The figure gives an important concept in the genetic -----

- Ans: A Francis Crick B – Translation C – Transcription
- Sol: Central dogma of molecular biology proposed by Francis Crick.
- 21. Dinosaurs dominated the world in which ---
 - Ans: Mesozoic
 - Sol: Dinosaurs dominated the world in Mesozoic era at Jurassic period.
- 22. Albuminous seeds store their reserve-----
 - Ans: Endosperm
 - Sol: Albuminous seeds store food in endosperm.
- **23.** Which one of the following statements is correct regarding -----
 - Ans: The chances of a 5 year boy contacting a STD are very little.
 - Sol: STDs mainly transmitted through sexual contact.
- **24.** Select the alternative giving correct identification and function of-----
 - Ans: Mitochondria produce cellular energy in the form of ATP

- Sol: The cell organelle shown in the diagram is mitochondria.
- 25. Which of the following statements about ------
 - Ans: Enzymes are mostly proteins but some are lipids also.
 - Sol: Enzyme are mostly protein and not lipids.
- 26. In a cymose inflorescence the main axis.-----
 - Ans: Terminates in a flower
 - Sol: In cymose inflorescence the main axis terminates in a flower.
- **27.** Select the option which correctly matches the endocrine gland -----
 - Ans:

(1)	Leydig cells	Androgen	Initiates productio	the on of
-----	--------------	----------	------------------------	--------------

- Sol: All the option in one are correctly matched.
- 28. The foetal ejection reflex in humans triggers -----
 - Ans: Oxytocin from foetal pituitary
 - Sol: The foetal ejection reflex in human release oxytocin from maternal pituitary.
- 29. Which of the following statements is not ------
 - Ans: Guard cells are always surrounded by subsidiary cells.
 - Sol: In some species only the guard cells are surrounded by subsidiary cells.
- 30. During the metaphase stage of mitosis ------
 - Ans: Kinetochore
 - Sol: Spindle fibres are attach to the chromosome by disc shaped kinetochore.
- 31. Animals vectors are required for -----
 - Ans: Cucumber
 - Sol: Pollination in cucumber takes place by animal vectors.
- **32.** Which enzymes are likely to act on the baked potatoes eaten by a man, -----
 - Ans: Salivary amylase \rightarrow pancreatic amylase \rightarrow disaccharidases
 - Sol: Potato contains starch that break down by the enzyme given in the first option.

- 33. Which one of the following is a primary -----
 - Ans: Grasshopper
 - Sol: Grass hopper is the primary consumer in a maize field.
- 34. Which one of the following statements is ------
 - Ans: Cleistogamous flowers are always autogamous.
 - Sol: Cleistogamous flowers do not open at all and always autogamous.
- **35.** Which of the following type of plastids does not contain -----
 - Ans: Chromoplasts
 - Sol: In chromoplast fat soluble carotenoid pigments like carotene and Xanthophylls are present.
- 36. What is common in all the three, -----
 - Ans: Presence of archegonia
 - Sol: *Funaria*, *Dryopteris* and *Ginkgo* have the female sex organ, archegonia.
- 37. A sagittal section of human brain is shown -----
 - Ans: A Cerebrum C Pons
 - Sol: Pons consist of fibre tracts that interconnect different regions of the brain.
- 38. The term 'glycocalyx' is used -----
 - Ans: a layer surrounding the cell wall of bacteria.
 - Sol: Glycocalyx could be loose sheath called slime layer or thick and tough, called capsule.
- **39.** The figure shows a section of human ovary. Select the option which gives the correct -----
 - Ans: B Corpus luteum secretes progesterone
 - Sol: Corpus luteum secretes progesterone which is essential to maintain pregnancy.
- 40. Down's syndrome in humans is ------
 - Ans: Three copies of chromosome 21
 - Sol: Down's syndrome is due to trisomy of 21st chromosome.
- 41. Which of the following has maximum ------

Ans: Rice

- Sol: There are more than 50,000 genetically different strains of rice.
- **42.** A healthy person eats the following diet 5 gm raw sugar, 4 gm albumin, 10 gm pure -----
 - Ans: 144
 - Sol: Total calorie can be calculated by multiplying the calorific value of carbohydrate, protein and fats with its specific grams. Lignin is not digested n human body.
- 43. The viability of seeds is tested -----
 - Ans: 2, 3, 5 triphenyl tetrazolium chloride
 - Sol: 2, 3, 5 triphenyl terazolium chloride is used for testing the germination quality of seeds.
- 44. During meiosis I, the chromosome start -----
 - Ans: Zygotene
 - Sol: The process of association of chromosomes is called synapsis.
- 45. Inflorescence is racemose -----

Ans: Soyabean

- Sol: In racemose inflorescence main axis continues to grow, the flowers are borne laterally in an acropetal succession.
- 46. How many plants among China rose, Ocimum, sunflower, mustard, -----
 - Ans: Three
 - Sol: Ocimum, guava and Calotropis have opposite phyllotaxy.
- 47. Which one of the following is true -----
 - Ans: They are heterotrophs
 - Sol: Kingdom fungi includes eukaryotic heterotrophic organisms.
- 48. During the process of isolation of DNA, -----
 - Ans: Precipitate DNA
 - Sol: The process of separating DNA by adding chilled ethanol is called spooling.
- 49. Which one of the following animals is ------

Ans:

(2) Duckbilled platypus	Oviparous	mammalian
----------------------------	-----------	-----------

Sol: Millipede belongs to class Diplopoda.

- 50. Which one of the following is wrongly ------
 - Ans: *Spirogyra* Motile gametes
 - Sol: Spirogyra has non-flagellated gametes.
- 51. Which two distinct microbial processes -----
 - Ans: Anaerobic ammonium oxidation and denitrification.
 - Sol: Ammonia is subjected to oxidation and free N₂ get released.
- **52.** The common characteristics between tomato and potato will be -----
 - Ans: Family
 - Sol: Potato and tomato belong to Solanaceae family.
- 53. Which of the following best illustrates -----
 - Ans: As tissue (X) develops, it secretes something that induces tissue (Y) to develop.
 - Sol: Developing tissues sometimes induce or accelerate the growth of other tissues and results feed back.
- 54. Figure shows blood circulation in humans with labels A to D. -----
 - Ans: D Pulmonary vein takes oxygenated blood to heart $PO_2 = 95 \text{ mmHg}$
 - Sol: Capillary is one cell thick.
- **55.** The finch species of Galapagos Islands are grouped according to their food -----
 - Ans: Carrion
 - Sol: Finches do not feed on carrion or dead flesh.
- 56. During muscle contraction in---
 - Ans: A band remain same
 - Sol: A band remain the same while H zone and I band shorten.
- **57.** Which one of the following is not correct as regards the harmful effects of -----
 - Ans: It can directly enter into our circulatory system.
 - Sol: Particulate matter cannot directly enter into the circulatory system.
- 58. Which of the following elements is a ------
 - Ans: Sulphur

- Sol: sulphur is the main constituent of vitamins like biotin thiamine etc.
- 59. RNA interference -----
 - Ans: Silencing of specific mRNA due to complementary RNA.
 - Sol: RNAi takes place in all eukaryotic organisms as a method of cellular defense.
- **60.** Which one of the following vectors is used to replace the defective -----
 - Ans: Adenovirus
 - Sol: Adenoviruses are the retroviruses, which are used as disarmed vector.
- **61.** In our society women are blamed for producing female children. -----
 - Ans: Due to the genetic make up of the particular sperm which fertilizers the egg.
 - Sol: The type of sperm fusing with the egg determines the sex of the human baby because males are heterogametic.
- 62. Select the correct option with respect to ------
 - Ans: Males bear short anal styles not present in females.
 - Sol: Malpighian tubules convert nitrogenous wastes into uric acid.
- 63. Identify the site where Wuchereria ------
 - Ans: Lymphatic vessels of the lower limbs.
 - Sol: *Wuchereria bancrofti* is normally found in lymphatic vessels of the lower limbs.
- 64. The stage transferred into the uterus -----
 - Ans: Morula
 - Sol: Morula (8-16 celled stage) is introduced into the uterus and the process is called intra uterine transfer (IUT).
- 65. Which of the flowing represents the action -----
 - Ans: Decreases blood glucose levels by forming glycogen.
 - Sol: Insuliln is a hypoglycemic hormone.
- 66. In an inducible operon, the genes are-----
 - Ans: Usually not expressed unless a signal turns them "on".

- Sol: The switching 'on' and 'off' of the inducible operon depends on the presence and absence of the inducer.
- 67. A stage of mitosis is shown in the diagram ------
 - Ans: Metaphase chromosomes moved to spindle equator chromosome made up of two sister chromatids.
 - Sol: Splitting of centromeres and separation of chromatids occur during anaphase.
- 68. Benthic organisms are affected most by: -----
 - Ans: Sediment characteristics of aquatic ecosystems.
 - Sol: The sediment characteristics often determine the type of benthic animals.
- 69. The second commitment period for Kyoto------
 - Ans: Doha
 - Sol: Second commitment period to extent the Kyoto protocol upto 2020 at Doha and known as Cop 18.
- 70. Syngamy can occur outside the body of ------
 - Ans: Algae
 - Sol: In brown algae, syngamy occurs outside the oogonial wall.
- 71. One of the most frequently used techniques-----
 - Ans: VNTR
 - Sol: Satellite DNA with very high degree of polymorphism is called as Variable Number of Tandem Repeats (VNTR).
- 72. Genetic variation in a population arises-----
 - Ans: Mutations as well as recombination
 - Sol: Both mutation and recombination lead to genetic variation in a population.
- **73.** Select the corrects statements with respect to disorders of -----
 - Ans: Accumulation of urea and creatine in the joints cause their inflammation.
 - Sol: Accumulation of urea in joints causes gouty arthritis.
- 74. The largest tiger reserve in India ------
 - Ans: Nagarjunsagar Srisailam
 - Sol: The largest tiger reserve in India is Nagarjunsagar – Srisailam

75. Genes of interest can be selected from a -----

Ans: DNA probes

- Sol: Probes are known labelled segments of DNA which make complimentary with gene of interest and give its sequence.
- **76.** The figure shows an axon terminal and synapse. Select -----

Ans: C – Receptor D – Synaptic vesicles

- Sol: A Axon terminal B Neurotransmitter C – Receptors D – Synaptic vesicles
- **77.** The figure shows a hypothetical tetrapeptide portion of a -----
 - Ans: D is the acidic amino acid glutamic acid.
 - Sol: Glutamic acid consists COOH acidic group.
- 78. Bundle sheath cells -----

Ans: are rich in RuBisCo

Sol: But lack PEP case

79. The pineapple which under natural conditions is difficult to -----

Ans: NAA, 2, 4-D

- Sol: NAA and 2, 4-D are synthetic auxins promote flowering.
- 80. Which one of the following groups of animals reproduce -----

Ans: Ctenophora

- Sol: Protozoa only asexual Cnidaria and porifera both asexual and Ctenophore only sexual.
- **81.** Which of the following statements is not true about somatic -----
 - Ans: The pattern of development of a somatic embryo is comparable to that of a zygotic embryo.
 - Sol: The pattern of development of a somatic embryo is not comparable to that of a zygotic embryo.
- 82. Which one of the following is a hallucinogenic drug -----
 - Ans: Lysergic acid diethyl amide.
 - Sol: LSD induces hallucinations.

- 83. Meristematic tissue responsible for increase------
 - Ans: Lateral meristem
 - Sol: Lateral meristem cause increase in girth.
- 84. Tissue culture technique can produce infinite number of new -----
 - Ans: Genetically uniform population identical to the original parent.
 - Sol: Tissue culture technique produces somaclones.
- **85.** Which one of the following is one of the paths followed by air / O_2 during respiration -----
 - Ans: Spiracle in metathorax, trachea, tracheoles, oxygen diffuses into cells.
 - Sol: The sequence given in option 3 is correct.
- 86. Specialized cells for fixing atmospheric -----
 - Ans: Heterocysts
 - Sol: Heterocyst is seen in Nostoc and Anabaena.
- 87. The plant body is thalloid in-----
 - Ans: Marchantia
 - Sol: Marchantia is a liverwort. In liverwort plant body is thalloid.
- 88. Why is a capsule advantageous to -----
 - Ans: It protects the bacterium from desiccation
 - Sol: Capsule layer gives protection from desiccation, viral attack, phagocytosis etc.
- 89. One of the following is not a method of -----
 - Ans: Pills of a combination of oxytocin and vasopressin.
 - Sol: Contraceptive pills contain progestogen and estrogen.
- 90. The figure shows a human blood cell. -----

Ans:

(2)	Pagaphil	Secrete	serotonin
(3)	вазорпії	inflammatory	response.

Sol: Basophil shows 2, 3 lobed nucleus and fewer coarse granules.

PART - B - PHYSICS

- 91. The reddish appearance of the sun at sunrise ----
 - Ans: the scattering of light

92. A 12 cm wire is given a shape of a right angled triangle ABC having ----

07

Sol:
$$R_{AB} = \frac{3 \times 9}{12} = \frac{27}{12}$$

 $R_{BC} = \frac{4 \times 8}{12} = \frac{32}{12}$
 $R_{AC} = \frac{5 \times 7}{12} = \frac{35}{12}$
Ratio = 27 : 32 : 35

93. α-particles, β-particles and γ-rays are all having same energy ----

Ans: α , β , γ

94. A person holding a rifle (mass of person and rifle together is 100 kg) stands on a ----

Ans: -0.08 m s⁻¹; 16 N

Sol:
$$V = -\frac{mv}{M} = \frac{-0.01 \times 800}{100} = -0.08 \text{ m s}^{-1}$$

F = nmv = 2 × 0.01 × 800
= 16 N

- **95.** The primary of a transformer when connected to a dc battery of 10 volt draws a current of 1 mA. The ----
 - Ans: Zero volt and therefore no current
 - Sol: Transformer gives no output for dc input.
- 96. A parallel beam of light of wavelength λ is incident normally on a narrow slit. A diffraction pattern ----
 - Ans: 4π
 - Sol: Basic concept
- **97.** A long straight wire carries a certain current and produces a magnetic field ----

Ans: 3.2×10^{-16} N

Sol:
$$F = qvB$$

= $1.6 \times 10^{-19} \times 10^7 \times 2 \times 10^{-4}$
= $3.2 \times 10^{-16} N$

98. The length of the wire between two ends of a sonometer is 100 cm ----

Ans:
$$\frac{1500}{23}$$
 cm, $\frac{2000}{23}$ cm

Sol: $n\ell$ = constant Ratio of n = 1 : 3 : 5Ratio of $\ell = \frac{1}{1} : \frac{1}{3} : \frac{1}{5}$ = 15 : 5 : 3

First position =
$$\frac{15}{23} \times 100 = \frac{1500}{23}$$
 cm
Second position
= $\frac{1500}{23} + \frac{5 \times 100}{23} = \frac{2000}{23}$ cm

99. In a vessel, the gas is at a pressure P, if the mass of all the molecules is halved ----

Ans: 2p

Sol:
$$p = \frac{1}{3} nmc^2$$

 $p' = \frac{1}{3} n\frac{m}{2} (2c)^2 = 2p$

100. A charge q is placed at the centre of the line joining two equal charges Q. The system of the _____



- **101**.Two Carnot engines A and B are operated in series. The engine A receives heat from the source ----
 - Ans: $\sqrt{T_1T_2}$

102 An electric dipole of dipole moment p is aligned parallel to a uniform electric field ----

Ans: pE

Sol:
$$U = -pE(\cos\theta_1 - \cos\theta_2) = 0$$

 $U' = -pE(\cos\theta - \cos\theta) = pE$

103. A source of light is placed at a distance of 50 cm from a photo cell and the stopping ----

Ans: V₀

Sol: Intensity increases by factor 4. But frequency remains same. Hence KE same and so stopping potential same.

104.An electron in hydrogen atom makes a transition $n_1 \rightarrow n_2$ where n_1 and n_2 are principal, quantum _----

Ans:
$$n_1 = 4$$
 and $n_2 = 2$

Sol:
$$T \propto n^3$$

 $T = 8T_2$
 $n_1^3 = 8n_2^3$
 $\frac{n_1}{n_2} = 2$
Only for option (2) this is valid.

105. The output from a NAND gate is divided into two in parallel and fed ----

Ans: AND gate

- Sol: Basic concept
- **106.**Two rods are joined end to end, as shown. Both have a cross-sectional area ----

Sol:
$$R = \frac{\rho \ell}{A}$$

 $R_{Cu} = \frac{17 \times 10^{-6} \ \Omega \ cm \times 1 \ m}{0.01 \ cm^2}$
 $= 1.7 \times 10^{-2} \ \Omega$
 $R_{Fe} = 10^{-1} \ \Omega$
 $R_{combination} = R_{Cu} + R_{Fe} = 11.7 \times 10^{-2} \ \Omega$
 $V = IR = 1 \times 11.7 \times 10^{-2}$
 $= 11.7 \times 10^{-2} = 0.117 \ \Omega$

107.Ten identical cells connected in series are needed to heat a wire of length one meter and radius r ----

Ans: 20

Sol:
$$\frac{(10E)^2}{\frac{\rho}{A}} \times t = m \times s \times 10$$
$$\frac{(nE)^2 \times t}{\left(\frac{2\rho}{A}\right)} = 2m \times s \times 10$$
Dividing
$$\frac{10^2 \times 2}{n^2} = \frac{1}{2}$$
$$n = 20$$

108.A particle with total energy E is moving in a potential energy region----

Ans: $U(x) \le E$

Sol: U(x) has to be within energy limit E. If case of oscillation is considered U(x) = E at extreme position. Hence $U(x) \le E$.

- **109.** How does the binding energy per nucleon vary with the increase ----
 - Ans: First increases and then decreases with increase in mass number.



110.Two sources P and Q produce notes of frequency 660 Hz each. A listener moves from P to Q with a ----

Ans: 4

Sol: Receding from P but approaching Q $\upsilon_1 = \upsilon_0 \frac{v - v_L}{v} = \frac{660 \times 329}{330} = 658 \text{ Hz}$ $\upsilon_2 = \upsilon_0 \frac{v + v_L}{v} = 662 \text{ Hz}$

Number of beats =4 s^{-1}

- 111. The pair of quantities having same dimensions
 - Ans: Work and torque
 - Sol: $W = FS = ML^2T^{-2}$ $\tau = r \times F = ML^2T^{-2}$
- **112**. Two discs are rotating about their axes, normal to the discs and passing through the centres of the discs ----

Ans: 100

- Sol: $I_1\omega_1 + I_2\omega_2 = I\omega$ $\frac{M_1R_1^2}{2}\omega_1 + \frac{M_2R_2^2}{2}\omega_2 = (I_1 + I_2)\omega$ $\frac{1}{2} \times 2(0.02)^2 \times 50 + \frac{1}{2} \times 4(0.1)^2 \times 200$ $= (0.04 + 0.02)\omega$ $\Rightarrow \omega = 100 \text{ rad s}^{-1}$
- **113.**A particle of mass m oscillates along x-axis is according to equation $x = a \sin \omega t$, The nature of _____

Ans: Ellipse

Sol:
$$x = a \sin\omega t$$

 $v = a\omega \cos\omega t$
 $p = ma\omega \cos\omega t$
 $\frac{x^2}{a^2} + \frac{p^2}{(ma\omega)^2} = 1$
Ellipse

114.A system is taken from state a to state c by two paths adc and abc as shown in the figure. The internal energy ----

Ans: 6 J

Sol:
$$adc 10 + 50 - 20 = 40 J$$

 $abc 10 + 36 = 46 J$
 $\Delta W = 46 - 40 = 6 J$

115.Two metal rods 1 and 2 of same lengths have same temperature difference between their ends. Their thermal ----

Ans: $K_1A_1 = 4K_2A_2$

Sol:
$$K_1A_1 \frac{d\theta}{\ell} = 4K_2A_2 \frac{d\theta}{2\ell}$$

 $K_1A_1 = 4K_2A_2$

116.One way in which the operation of an-p-n transistor differs ----

Ans: 4

- Sol: The emitter injects holes into the base of pnp and electron into the base region of npn.
- 117. The de-Broglie wavelength of neutrons in thermal

Ans:
$$\frac{0.308}{\sqrt{T}} \mathring{A}$$

Sol: $\lambda = \frac{h}{\sqrt{3mkT}}$
 $\cong \frac{0.308}{\sqrt{T}} \mathring{A}$

118.The displacement x (in meter) of a particle of mass m (in kg) moving in one ----

Ans: 0 m (zero)

Sol:
$$t-3 = \sqrt{x}$$
$$x = t^{2} - 6t + 9$$
$$v = 2t - 6$$
$$0 = 2t - 6 \Rightarrow t = 3$$
$$x = 9 - 18 + 9 = 0$$

119.The density of water at 20 °C is 998 kg/m³ and at 40°C 992 kg/m³ ----

Ans: 3×10^{-4} /°C

Sol:
$$\frac{\rho_1 - \rho_2}{\rho_2 t_1 - \rho_1 t_2} = \frac{998 - 992}{20080}$$

= 3×10^{-4} /°C

- 120.An electromagnetic wave of frequency υ = 3.0 MHz passes from vacuum into ----
 - Ans: Wavelength is halved and frequency remains unchanged.
 - Sol: Basic concept
- **121**.One coolie takes 1 minute to raise a suitcase through a height of 2 m but ----

Ans: 1:2

Sol:
$$P = \frac{W}{t}$$

 $\frac{P_1}{P_2} = \frac{t_2}{t_1} = \frac{30}{60} =$

122. Which of the following relations does not give the equation of a ----

1

2

Ans:
$$P^{\gamma}T^{1-\gamma} = constant$$

Sol:
$$pV^{\gamma} = a \operatorname{constant} - \operatorname{correct}$$

 $pV = RT$
 $\frac{T}{V}V^{\gamma} = \operatorname{constant}$
 $TV^{\gamma-1} = a \operatorname{constant} - \operatorname{correct}$
 $P\left(\frac{T}{P}\right)^{\gamma} = a \operatorname{constant} - \operatorname{correct}$
 $P^{1-\gamma}T^{\gamma} = a \operatorname{constant} - \operatorname{correct}$
 $P^{\gamma}T^{1-\gamma} = \operatorname{constant} - \operatorname{incorrect}$

123.A bar magnet of magnetic moment M is placed at right angles ----

Ans: MB F

- Sol: Torque = MB sin θ F ℓ = MB (Maximum) $\ell = \frac{MB}{F}$
- **124**. Two plane mirrors are inclined at 70°. A ray incident on one mirror at angle, θ ----

Ans: 2





M₂

$$\alpha = 90^{\circ} - \theta \qquad \qquad \gamma = 90^{\circ} - 70^{\circ} = 20^{\circ}$$

$$\begin{split} \beta &= 90^{\circ} - \gamma = 90^{\circ} - 20^{\circ} = 70^{\circ} \\ \alpha &+ \beta + 70^{\circ} = 180^{\circ} \\ \Rightarrow (90 - \theta) + 70^{\circ} + 70^{\circ} = 180^{\circ} \\ \theta &= 50^{\circ} \end{split}$$

125.A circular coil ABCD carrying a current i is placed

Ans: $-\overline{F}$

Sol: Total force = 0

$$F_1 + F_2 = 0$$

 $F_1 = -F_2$
 $F_2 = -F$
[Action and reaction forces]

- **126.**In an unbiased p-n junction, holes diffuse from the ----
 - Ans: The higher concentration of electrons in the n-region than that in the p-region.
 - Sol: Knowledge based
- **127.** A car is moving in a circular horizontal track of radius ----

Ans: $\frac{\pi}{4}$ Sol: $v^2 = rg \tan\theta$

$$\tan \theta = \frac{100}{10 \times 10} = 1$$
$$\theta = 45^{\circ}$$

128.A current of 2.5 A flows through a coil of inductance 5 H ----

129. Vectors \vec{A} , \vec{B} and \vec{C} are such that ----

Ans: $\vec{B} \times \vec{C}$

- Sol: Knowledge based $B\times C \text{ is perpendicular to both } B \text{ and } C.$
- **130.**In Young's double slit experiment the distance between the slits ----

Ans: Becomes four times

Sol:
$$\beta = \frac{\lambda D}{d}$$

 $\beta' = \frac{\lambda 2D}{\frac{d}{2}}$
 $= 4\frac{\lambda D}{d} = 4\beta$

- **131**.A fluid is in streamline flow across a horizontal pipe ----
 - Ans: The velocity is maximum at the narrowest part of the pipe and pressure is maximum at the widest part of the pipe.
 - Sol: Knowledge based
- 132.If the ratio of diameters, lengths and Young's modulus ----

Ans:
$$\frac{7q}{(5sp^2)}$$

Sol: $Y = \frac{MgL}{\frac{\pi d^2}{4}\ell} \Rightarrow \ell = \frac{4Mg\ell}{\pi d^2 Y}$
 $\frac{\ell_S}{\ell_C} = \frac{(M_S + M_C)}{M_C} \times \frac{L_S}{L_C} \times \frac{d_C}{d_S}^2 \times \left(\frac{Y_C}{Y_S}\right)$
 $= \frac{7}{5} \times \frac{q}{n^2 s}$

133. The radius of a planet is twice the radius of earth. Both have----

Ans:
$$V_P = 2V_E$$

Sol: $v_{es} = \sqrt{\frac{2GM}{R}}$
$$= \sqrt{\frac{2G\frac{4}{3}\pi R^3 \rho}{R}}$$
 $v_{es} \propto \sqrt{R^2}$ $v_{es}(p) = 2v_E$

134.A particle of mass m is kept at rest at a height 3R from the ----Ans: $\left(\frac{GM}{2R}\right)^{1/2}$

Ans:
$$\left(\frac{GM}{2R}\right)^{1/2}$$

Sol: $v_{es} = \sqrt{\frac{2GM}{R}}$
 $v_{es} = \sqrt{\frac{2GM}{\frac{4}{2}R}}$
 $= \left(\frac{GM}{2R}\right)^{1/2}$

135.The ratio of radii of gyration of a circular ring and a ----

Ans: $\sqrt{2}$:1

Sol:
$$Mk^2 = MR^2$$

 $k^2 = R^2$ (For ring)

For Disk

$$k^{2} = \frac{R^{2}}{2}$$

$$k = \frac{R}{\sqrt{2}}$$

$$\frac{k(ring)}{k(Disc)} = \frac{R}{\frac{R}{\sqrt{2}}}$$

$$= \sqrt{2} : 1$$

PART C - CHEMISTRY

136. Which is diamagnetic? ----

Ans: [Ni(CN)₄]²⁻

Sol: In [Ni(CN)₄]²⁻ no unpaired e⁻ present

137. Which of the following chemical system is ----



Sol: In this compound total $4\pi e^-$ present; does not obey Huckel's rule

138. Which statement is wrong? ----

- Ans: Feldspars are not aluminosilicates
- $\begin{array}{lll} \text{Sol:} & \text{Feldspars} \\ & \text{KAlSiO}_8 \text{NaAlSi}_3\text{O}_8 \text{CaAl}_2\text{Si}_2\text{O}_8 \end{array}$
- 139. Three thermochemical equations are ----

(iii)

140. What is the hybridisation state of benzyl ----

Ans: sp²

Sp² hybridised

141. The outer electronic configuration of ----

Ans: $4f^7 5d^1 6s^2$

Sol: It is $4f^7 5d^1 6s^2$

142. The correct IUPAC name for ----

- Ans: Difluoridobis (ethylene diamine) chromium (III) chloride
- Sol: Difluoridobis (ethylene diamine) chromium (III) chloride

143. Some reactions of amines are given ----



- 144. The metal oxide which cannot be reduced ----
 - Ans: Al₂O₃
 - Sol: Al₂O₃ cannot be reduced to metal by C
- 145. Which condition is not satisfied by an ideal solution? ----
 - Ans: $\Delta_{mix}S = 0$
 - Sol: During the mixing process, $\Delta S > 0$
- **146.**Arrange the following in increasing order of stability ----
 - Ans: e < d < c < a < b
 - Sol: In case of carbocations greater the number of hyperconjugative structures greater will be the stability. So answer is option 3

147. The dissociation constant of a weak acid is ----

Ans: 10:1

Sol:
$$pH = pK_a + log \frac{[Salt]}{[Acid]}$$

 $pK_a = 4$
 $\therefore log \frac{[Salt]}{[Acid]} = 1$

148. What is the density of N2 gas at ----

Sol:
$$d = \frac{PM}{RT}$$

$$= \frac{5 (\text{atm}) \times 28 (\text{g mol}^{-1})}{0.082 (\text{L} - \text{atm mol}^{-1} \text{K}^{-1}) \times 500 (\text{K})}$$

= 3.41 g / L
= 3.41 × 10⁻³ g / mL

149. Identify the incorrect statement, regarding the ----

Ans: XeO₄ molecule is tetrahedral

Sol:
$$O = Xe = O$$

 $U = O$
Tetrahedral
 (sp^3)

150. Crystal field splitting energy for high spin ----

Ans: Question not clear

- Sol: Question not clear
- **151.**When 5 litres of a gas mixture of methane and propane is perfectly combusted at 0°C ----

Ans: 317

Sol:
$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

 $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
 $CH_4 + C_3H_8 = 0.22$ moles
 $O_2 = 0.71$ moles
 $2x + (0.22 - x)5 = 0.71$
 $x = 0.13$
Heat liberated = $0.13 \times 890 + 0.09 \times 2220$
 $= 317$ kJ

152.Phenol is distilled with Zn dust followed by Friedel-Crafts alkylation with ----

2011 Y



20





air

153.In which of the following pair both the species have ----



154.For a reaction between A and B the order with respect to A is ----

Ans: 32

- Sol: $\frac{dx}{dt} \alpha [A]^2 [B]^3$ $\alpha 2^2 \times 2^3$ Rate becomes 32 times
- **155.**Homolytic fission of the following alkanes forms free radicals ----

Ans:
$$CH_3 - \dot{C}H_2 < CH_3 - \dot{C}H - CH_3 < (CH_3)_2 \dot{C}$$

 $-CH_2 - CH_3 < (CH_3)_3 \dot{C}$

- Sol: The correct order of stability of free radicals is 3° > 2° > 1°. Hence answer is option 4
- 156.Number of isomeric alcohols of molecular formula ----

Ans: 4

- $\begin{array}{cccc} \text{Sol:} & \text{CH}_3\text{CH}(\text{OH})-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3\\ & \text{CH}_3-\text{CH}(\text{OH})-\text{CH}_2-\text{CH}(\text{CH}_3)_2\\ & \text{CH}_3\text{CH}(\text{OH})-\text{C}(\text{CH}_3)_3\\ & \text{CH}_3\text{CH}(\text{OH})-\text{C}(\text{CH}-\text{CH}_2-\text{CH}_3\\ & \text{I}\\ & \text{CH}_3\end{array}$
- 157.In Castner-Kellner cell for production of sodium hydroxide:----
 - Ans: sodium amalgam is formed at mercury cathode

Sol: In Castner Kellner cell sodium amalgam is formed at mercury cathode

158.Given



I and II are:----

- Ans: a pair of conformers
- Sol: I and II are staggered and eclipsed conformers

159. The values of K_{sp} of CaCO₃ and CaC₂O₄ are ----

Sol:
$$CaCO_3 = Ca^{2+} + CO_3^{2-}$$

 $x+y = x^2$
 $CaC_2O_4 = Ca^{2+} + C_2O_4^{2-}$
 $(x + y)x = 4.7 \times 10^{-9}$
 $(x + y)y = 1.3 \times 10^{-9}$
 $\frac{x}{y} = 3.6$
 $x^2 - y^2 = 3.4 \times 10^{-9}$
On solving,
 $x = 6.06 \times 10^{-5}$, $y = 1.68 \times 10^{-5}$
 $x + y = 7.74 \times 10^{-5}M$

160. Accumulation of lactic acid $(HC_3H_5O_3)$, a monobasic acid in tissues ----

Ans: 1.4×10^{-4}

Sol:
$$K_a = C\alpha^2$$

= 0.1 × (3.7 × 10⁻²)²
= 1.4 × 10⁻⁴

161.Which among the following is a paramagnetic complex? ----

Ans: [CoBr₄]²⁻

Sol: [CoBr₄]²⁻ is a paramagnetic complex

- **162.** Sc(Z = 21) is a transition element by Zn(Z = 30) is no because ----
 - Ans: In case of Sc, 3d orbitals are partially filled but in Zn these are filled

163.According to law of photochemical equivalence the energy absorbed ----

Ans:
$$\frac{1.196 \times 10^8}{\lambda}$$

Sol:
$$E = N_A \times h \times \frac{c}{\lambda}$$
$$= \frac{6.02 \times 10^{23} \times 6.62 \times 10^{-27} \times 3 \times 10^{10}}{\lambda}$$
$$= \frac{1.196 \times 10^8}{\lambda} \text{ ergs mol}^{-1}$$

- **164.**In DNA, the linkages between different nitrogenous bases are:----
 - Ans: H-bonding
 - Sol: Nitrogenous bases are connected by H-bonding

- **165.** The outer orbitals of C in ethene molecule can be considered to be ----
 - Ans: 5 sigma (σ) and 1 pi (π) bonds

Sol:
$$H = C = C = C = H$$

 $\sigma - 5 \text{ and } \pi - 1$

166. Which one of the following arrangements represents the correct order of least ----

Ans:
$$Ca < Al < C < O < F$$

- Sol: The correct order of electron gain enthalpy follows the order in option (2)
- **167.** In which of the following ionisation processes the bond energy increases ----
 - Ans: $NO \rightarrow NO^+$

Sol: NO = KK
$$\sigma$$
2s², σ ²s²,
 σ 2p²_z, π 2p²_x, π 2p²_y, π ^{*}2p¹_x
Bond order of NO = $\frac{1}{2}$ [10 - 5] = 2.5
Bond order of NO⁺ = 3

168.A reaction is 50% complete in 2 hours and 75% complete in 4 Hours. ----

Ans: 1

Sol: $100 \xrightarrow{2} 50 \xrightarrow{2} 25$ $t_{\frac{1}{2}}$ is a constant order = 1

169. Consider the half-cell reduction reaction:---

Ans: -2.69 V and no

 $\begin{array}{lll} \text{Sol:} & \text{Mn}^2 + 2e^- \rightarrow \text{Mn} & \text{E}^\circ = -1.18 \text{ V} \\ & 2\text{Mn}^{2+} \rightarrow 2\text{Mn}^{3+} + 2e^- & \text{E}^\circ = -1.51 \text{ V} \\ & \text{For the cell,} \\ & 3\text{Mn}^{2+} \rightarrow \text{Mn} + 2\text{Mn}^{3+} & \text{E}^\circ = -2.69 \text{ V} \\ & \text{Since the E}^\circ \text{ value is negative, } \Delta G^\circ \text{ is +ve} \\ & \text{and the process is non-spontaneous} \end{array}$

170. In a particular isomers of [Co(NH₃)₄Cl₂]⁰, ----

Ans: cis isomer

- Sol: C.N is 6 so octahedral complex CI–Co–CI bond angle 90° means cis isomer
- 171.Nitrogen detection in an organic compound is carried out ----
 - Ans: Fe₄[Fe(CN)₆]₃
 - Sol: It is prussian blue Fe₄[Fe(CN)₆]₃

172. In the following reaction:

$$HC \equiv CH \xrightarrow[H_2SO_4]{Hg^{2+}} 'P' \xrightarrow[Hg^{2+}]{} P'$$

- Ans: Victor Meyer's test
- Sol: The product 'P' is CH₃CHO which is not able to answer Victor Meyer's test a test for alcohols
- **173.**In an experimental is showed that 10 mL of 0.05 M solution of chloride required ----

Ans: XCl₂

- Sol: 0.5 milli moles chloride reacts with 1 milli mole of AgNO₃.
 ∴ Each molecule contains two chlorine atoms
- 174. How many grams of cobalt metal will be deposited when a solution of cobalt(II) ----

Ans: 20.0

Sol: Wt. of Co deposited by 96500 C
= 29.5 g
Wt. of Co deposited by
$$10 \times 109 \times 60$$
 C = $\frac{29.5 \times 10 \times 109 \times 60}{96500}$
= 20 g

175. The pair of species that has the same bond order in the following is:----

Ans: CO, NO

- Sol: Iso electronic species are having same bond order CO, NO^+ , bond order = 3
- **176.** Which one of the following statements is not true?----
 - Ans: When the pH if rain water is higher than 6.5, it is called acid rain
 - Sol: When pH of rain water drops below 5.6 it is called acid rain
- 177. Dettol is the mixture of ----
 - Ans: Chloroxylenol and Terpineol
 - Sol: Dettol is a mixture of chloroxylenol and α -terpineol
- 178.At 100°C the K_w of water is 55 times its value at 25°C. ----

Ans: 6.13

Sol:
$$[H^+] = \sqrt{55} \times 10^{-7}$$

pH = 7 - $\frac{1}{2} \times 1.74$
= 6.13

- **179.** The anion of acetylacetone (acac) forms $Co(acac)_3$ chelate ----
 - Ans: Six membered
 - Sol: It forms a six membered ring
- **180.**On hydrolysis of a "compound", two compounds are obtained. ----
 - Ans: CH₃CH₂CH₂NC
 - Sol: $CH_3CH_2CH_2NC \xrightarrow{H_2O} CH_3CH_2CH_2NH_2 + HCOOH (I) (II)$

