BIOLOGY TEST PAPER WITH ANSWER & SOLUTIONS
FINAL NEET(UG)–2019 (EXAMINATION)

91. The Earth Summit held in Rio de Janeiro in 1992 was called

(1) to reduce CO_2 emissions and global warming

(2) for conservation of biodiversity and sustainable utilization of its benefits

(3) to assess threat posed to native species by invasive weed species

(4) for immediate steps to discontinue use of CFCs that were damaging the ozone layer

Answer (2)

Sol. Earth Summit (Rio Summit)-1992, called upon all nations to take appropriate measures for conservation of biodiversity and sustainable utilisation of its benefits

92. Colostrum the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the new born infants because it contains

(1) Natural killer cells

(2) Monocytes

(3) Macrophages

(4) Immunoglobulin A

Answer (4)

Sol. Colostrum, the yellowish fluid secreted by the mother during initial days of lactation is very essential to impart immunity to the new born infant because it contains Immunoglobulin A. It will impart naturally acquired passive immunity to the newborn

93. Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following

(1) Closure of stomata

(2) Flaccidity of bulliform cells

(3) Shrinkage of air spaces in spongy mesophyll

(4) Tyloses in vessels

Answer (2)

Sol. Bulliform cells become flaccid due to water loss. This will make the leaves to curl inward to minimise water loss

94. The shorter and longer arms of a submetacentric chromosome are referred to as

(1) s-arm and l-arm respectively

(2) p-arm and q-arm respectively

(3) q-arm and p-arm respectively

(4) m-arm and n-arm respectively

Answer (2)

Sol.
- Sub metacentric chromosome is Heterobrachial.
- Short arm designated as 'p' arm

  (p = petite *i.e.* short)
- Long arm designated as 'q' arm

95. Respiratory Quotient (RQ) value of tripalmitin is

(1) 0.9

(2) 0.7

(3) 0.07

(4) 0.09

Answer (2)

Sol. $\text{Respiratory Quotient (RQ)} = \dfrac{\text{Amount of } CO_2 \text{ released}}{\text{Amount of } O_2 \text{ consumed}}$

$2(C_{51}H_{98}O_6) + 145O_2 \rightarrow 102CO_2 + 98H_2O$

Tripalmitin + Energy

$$RQ = \frac{102\ CO_2}{145\ O_2} = 0.7$$

96. Which of the following is a commercial blood cholesterol lowering agent?

(1) Cyclosporin A

(2) Statin

(3) Streptokinase

(4) Lipases

Answer (2)

Sol.
- Statin is obtained from a yeast (Fungi) called *Monascus purpureus*
- It acts by competitively inhibiting the enzyme responsible for synthesis of cholesterol.

97. Match the following structures with their respective location in organs

(a)	Crypts of Lieberkuhn	(i)	Pancreas
(b)	Glisson's Capsule	(ii)	Duodenum
(c)	Islets of Langerhans	(iii)	Small intestine
(d)	Brunner's Glands	(iv)	Liver

Select the correct option from the following

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(ii)	(iv)
(2)	(ii)	(iv)	(i)	(iii)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iii)	(ii)	(i)	(iv)

Answer (3)

Sol. Crypts of Lieberkuhn are present in small intestine. Glisson's capsule is present in liver. Islets of langerhans constitutes the endocrine portion of pancreas. Brunner's glands are found in submucosa of duodenum.

98. Which of the following is the most important cause for animals and plants being driven to extinction?

(1) Habitat loss and fragmentation

(2) Drought and floods

(3) Economic exploitation

(4) Alien species invasion

Answer (1)

Sol. Habitat loss and fragmentation is the most important cause driving animals and plants to extinction.

eg: Loss of tropical rainforest reducing the forest cover from 14 % to 6 %.

99. Which part of the brain is responsible for thermoregulation?

(1) Cerebrum

(2) Hypothalamus

(3) Corpus callosum

(4) Medulla oblongata

Answer (2)

Sol. Hypothalamus in the thermoregulatory centre of our brain. It is responsible for maintaining constant body temperature.

100. Consider following features

(a) Organ system level of organisation

(b) Bilateral symmetry

(c) True coelomates with segmentation of body

Select the correct option of animal groups which possess all the above characteristics

(1) Annelida, Arthropoda and Chordata

(2) Annelida, Arthropoda and Mollusca

(3) Arthropoda, Mollusca and Chordata

(4) Annelida, Mollusca and Chordata

Answer (1)

Sol. True segmentation is present in Annelida, Arthropoda and Chordata. They also have organ system level of organisation, bilateral symmetry and are true coelomates

101. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth

(1) Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum

(2) Pharynx → Oesophagus → Gizzard → Crop → Ileum → Colon → Rectum

(3) Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum

(4) Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum

Answer (1)

Sol. The correct sequence of organs in the alimentary canal of cockroach starting from mouth is :

Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum

102. Which of the following pairs of gases is mainly responsible for green house effect?

(1) Ozone and Ammonia

(2) Oxygen and Nitrogen

(3) Nitrogen and Sulphur dioxide

(4) Carbon dioxide and Methane

Answer (4)

Sol. Relative contribution of various greenhouse gases to total global warming is

- CO_2 = 60%
- CH_4 = 20%

- CFC = 14%
- N_2O = 6%

$\Rightarrow$ Therefore CO_2 and CH_4 are the major greenhouse gases

103. Which of the following muscular disorders is inherited?

(1) Tetany

(2) Muscular dystrophy

(3) Myasthenia gravis

(4) Botulism

Answer (2)

Sol. Progressive degeneration of skeletal muscle mostly due to genetic disorder is muscular dystrophy where as tetany is muscular spasm due to low calcium in body fluid. Myasthenia gravis is an anto immume disorder leading to paralysis of skeletal muscles. Botulism is rare and dangerous type of food poisoning caused by bacterium *Clostridium Botulinum*.

104. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in

(1) Bile duct and Bronchioles

(2) Fallopian tubes and Pancreatic duct

(3) Eustachian tube and Salivary duct

(4) Bronchioles and Fallopian tubes

Answer (4)

Sol. Bronchioles and Fallopian tubes are lined with ciliated epithelium to move particles or mucus in a specific direction.

105. Match the **Column-I** with **Column-II**

Column-I	Column-II
(a) P - wave	(i) Depolarisation of ventricles
(b) QRS complex	(ii) Repolarisation of ventricles
(c) T - wave	(iii) Coronary ischemia
(d) Reduction in the size of T-wave	(iv) Depolarisation of atria
	(v) Repolarisation of atria

Select the **correct** option.

	(a)	(b)	(c)	(d)
(1)	(iv)	(i)	(ii)	(iii)
(2)	(iv)	(i)	(ii)	(v)
(3)	(ii)	(i)	(v)	(iii)
(4)	(ii)	(iii)	(v)	(iv)

Answer (1)

Sol. In ECG P-wave represents depolarisation of atria. QRS complex represents depolarisation of ventricles. T-wave represents repolarisation of ventricle *i.e.* return from excited to normal state. Reduction in the size of T-wave *i.e.* if the T-wave represents insufficient supply of oxygen *i.e.* coronary ischaemia.

106. Which one of the following is **not** a method of *in situ* conservation of biodiversity?

(1) Biosphere Reserve

(2) Wildlife Sanctuary

(3) Botanical Garden

(4) Sacred Grove

Answer (3)

Sol. Botanical garden - ex - situ conservation (off-site conservation) i.e. living plants (flora) are conserved in human managed system.

107. In a species, the weight of newborn ranges from 2 to 5 kg. 97% of the newborn with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weight from 2 to 2.5 kg or 4.5 to 5 kg die. Which type of selection process is taking place?

(1) Directional Selection

(2) Stabilizing Selection

(3) Disruptive Selection

(4) Cyclical Selection

Answer (2)

Sol. The given data shows stabilising selection as most of the newborn having average weight between 3 to 3.3 kg survive and babies with less and more weight have low survival rate.

108. The correct sequence of phases of cell cycle is

(1) $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$ (2) $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$

(3) $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$ (4) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$

Answer (4)

Sol. The correct sequence of phases of cell cycle is

$G_1 \rightarrow S \rightarrow G_2 \rightarrow M$

109. How does steroid hormone influence the cellular activities?

(1) Changing the permeability of the cell membrane

(2) Binding to DNA and forming a gene-hormone complex

(3) Activating cyclic AMP located on the cell membrane

(4) Using aquaporin channels as second messenger

Answer (2)

Sol. Steroid hormones directly enter into the cell and bind with intracellular receptors in nucleus to form hormone receptor complex. Hormone receptor complex interacts with the genome

110. Which of the following statements is not correct?

(1) Lysosomes have numerous hydrolytic enzymes

(2) The hydrolytic enzymes of lysosomes are active under acidic pH

(3) Lysosomes are membrane bound structures

(4) Lysosomes are formed by the process of packaging in the endoplasmic reticulum

Answer (4)

Sol. Lysosomes bud off from trans face of Golgi bodies.

Precursor of lysosomal enzymes are synthesised by RER and then send to Golgi bodies for further processing.

111. Which one of the following statements regarding post-fertilization development in flowering plants is incorrect?

(1) Ovary develops into fruit

(2) Zygote develops into embryo

(3) Central cell develops into endosperm

(4) Ovules develop into embryo sac

Answer (4)

Sol. Following are the post-fertilisation changes.

- Ovule $\rightarrow$ Seed
- Ovary $\rightarrow$ Fruit
- Zygote $\rightarrow$ Embryo
- Central cell $\rightarrow$ Endosperm

112. Concanavalin A is

(1) an alkaloid (2) an essential oil

(3) a lectin (4) a pigment

Answer (3)

Sol. Concanavalin A is a secondary metabolite *e.g* is lectin, it has the property to agglutinates RBCs.

113. Which one of the following equipments is essentially required for growing microbes on a large scale, for industrial production of enzymes?

(1) BOD incubator

(2) Sludge digester

(3) Industrial oven

(4) Bioreactor

Answer (4)

Sol. To produce enzyme in large quantity equipment required are bioreactors. Large scale production involves use of bioreactors.

114. Consider the following statement :

(A) Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.

(B) A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.

Select the correct option.

(1) Both (A) and (B) are true.

(2) (A) is true but (B) is false.

(3) Both (A) and (B) are false.

(4) (A) is false but (B) is true.

Answer (2)

Sol. Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group. A complete catalytic active enzyme with its bound prosthetic group is called holoenzyme.

115. Purines found both in DNA and RNA are

(1) Adenine and thymine

(2) Adenine and guanine

(3) Guanine and cytosine

(4) Cytosine and thymine

Answer (2)

Sol. Purines found both in DNA and RNA are Adenine and guanine

116. Select the correct sequence for transport of sperm cells in male reproductive system.

(1) Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra

(2) Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus

(3) Seminiferous tubules → Vasa efferentia → Epididymis → Inguinal canal → Urethra

(4) Testis → Epididymis → Vasa efferentia → Vas deferens → Ejaculatory duct → Inguinal canal → Urethra → Urethral meatus

Answer (2)

Sol. The correct sequence for transport of sperm cells in male reproductive system is Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus

117. Match the hominids with their correct brain size :

(a)	*Homo habilis*	(i)	900 cc
(b)	*Homo neanderthalensis*	(ii)	1350 cc
(c)	*Homo erectus*	(iii)	650-800 cc
(d)	*Homo sapiens*	(iv)	1400 cc

Select the correct option.

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(iv)	(ii)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(iii)	(i)	(ii)

Answer (3)

Sol. The correct match of hominids and their brain sizes are :

Homo habilis	—	650-800 cc
Homo neanderthalensis	—	1400 cc
Homo erectus	—	900 cc
Homo sapiens	—	1350 cc

118. Variations caused by mutation, as proposed by Hugo de Vries are

(1) random and directional

(2) random and directionless

(3) small and directional

(4) small and directionless

Answer (2)

Sol. According to Hugo de Vries, mutations are random and directionless.

Devries believed mutation caused speciation and hence called saltation (single step large mutation).

119. Which of the following pair of organelles does not contain DNA?

(1) Mitochondria and Lysosomes

(2) Chloroplast and Vacuoles

(3) Lysosomes and Vacuoles

(4) Nuclear envelope and Mitochondria

Answer (3)

Sol. Lysosomes and Vacuoles do not have DNA.

120. Due to increasing air-borne allergens and pollutants, many people in urban areas are suffering from respiratory disorder causing wheezing due to

(1) benign growth on mucous lining of nasal cavity

(2) inflammation of bronchi and bronchioles

(3) proliferation of fibrous tissues and damage of the alveolar walls

(4) reduction in the secretion of surfactants by pneumocytes.

Answer (2)

Sol. Asthma is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles. It can be due to increasing air born allergens and pollutants. Asthma is an allergic condition. Many people in urban areas are suffering from this respiratory disorder.

121. Select the **incorrect** statement.

(1) Male fruit fly is heterogametic

(2) In male grasshoppers 50% of sperms have no sex-chromosome

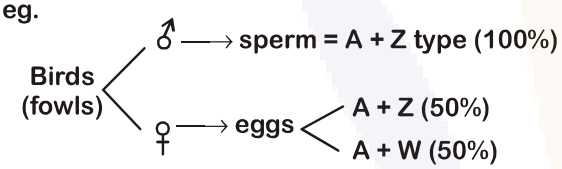
(3) In domesticated fowls, sex of progeny depends on the type of sperm rather than egg

(4) Human males have one of their sex-chromosome much shorter than the other

Answer (3)

Sol. In birds female heterogamety is found thus sex of progeny depends on the types of egg rather than the type of sperm.

eg.



122. DNA precipitation out of a mixture of biomolecules can be achieved by treatment with

(1) Isopropanol

(2) Chilled ethanol

(3) Methanol at room temperature

(4) Chilled chloroform

Answer (2)

Sol. During the isolation of desired gene, chilled ethanol is used for the precipitation of DNA.

123. Select the **correct** group of biocontrol agents.

(1) *Bacillus thuringiensis*, Tobacco mosaic virus, Aphids

(2) *Trichoderma*, *Baculovirus*, *Bacillus thuringiensis*

(3) *Oscillatoria*, *Rhizobium*, *Trichoderma*

(4) *Nostoc*, *Azospirillium*, *Nucleopolyhedrovirus*

Answer (2)

Sol. Fungs *Trichoderma*, Baculoviruses (NPV) and *Bacillus thuringiensis* are used as biocontrol agents.

Rhizobium, *Nostoc*, *Azospirillum* and *Oscillatoria* are used as biofertilisers, whereas TMV is a pathogen and aphids are pests that harm crop plants.

124. Select the **incorrect** statement.

(1) Inbreeding increases homozygosity

(2) Inbreeding is essential to evolve purelines in any animal.

(3) Inbreeding selects harmful recessive genes that reduce fertility and productivity

(4) Inbreeding helps in accumulation of superior genes and elimination of undesirable genes

Answer (3)

Sol. Inbreeding exposes harmful recessive genes that are eliminated by selection. It also helps in accumulation of superior genes and elimination of less desirable genes. Therefore this is selection at each step, increase the productivity of inbred population. Close and continued inbreeding usually reduces fertility and even productivity.

125. Match the following organisms with the products they produce

(a) *Lactobacillus*	(i) Cheese
(b) *Saccharomyces cerevisiae*	(ii) Curd
(c) *Aspergillus niger*	(iii) Citric Acid
(d) *Acetobacter aceti*	(iv) Bread
	(v) Acetic Acid

Select the **correct** option.

	(a)	(b)	(c)	(d)
(1)	(ii)	(iv)	(v)	(iii)
(2)	(ii)	(iv)	(iii)	(v)
(3)	(iii)	(iv)	(v)	(i)
(4)	(ii)	(i)	(iii)	(v)

Answer (2)

Sol. Microbes are used in production of several household and industrial products –

Lactobacillus – Production of curd

Saccharomyces cerevisiae – Bread making

Aspergillus niger – Citric acid production

Acetobacter aceti – Acetic acid

126. What is the direction of movement of sugars in phloem?

(1) Non-multidirectional

(2) Upward

(3) Downward

(4) Bi-directional

Answer (4)

Sol. The direction of movement of sugar in phloem is bi-directional as it depends on source-sink relationship which is variable in plants.

127. In some plants, the female gamete develops into embryo without fertilization. This phenomenon is known as

(1) Autogamy

(2) Parthenocarpy

(3) Syngamy

(4) Parthenogenesis

Answer (4)

Sol. The phenomenon in which female gamete develops into embryo without getting fused with male gamete (fertilisation) is called parthenogenesis.

128. Persistent nucellus in the seed is known as

(1) Chalaza

(2) Perisperm

(3) Hilum

(4) Tegmen

Answer (2)

Sol. Persistent Nucellus is called Perisperm

e.g.: Black pepper, Beet

129. What map unit (Centimorgan) is adopted in the construction of genetic maps?

(1) A unit of distance between two expressed genes representing 10% cross over.

(2) A unit of distance between two expressed genes representing 100% cross over.

(3) A unit of distance between genes on chromosomes, representing 1% cross over.

(4) A unit of distance between genes on chromosomes, representing 50% cross over.

Answer (3)

Sol. 1 map unit represent 1 % cross over.

Map unit is used to measure genetic distance.

This genetic distance is based on average number of cross over frequency.

130. What would be the heart rate of a person if the cardiac output is 5 L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL?

(1) 50 beats per minute

(2) 75 beats per minute

(3) 100 beats per minute

(4) 125 beats per minute

Answer (3)

Sol. Cardiac output = stroke volume × Heart rate

$\Rightarrow$ Cardiac output = 5L or 5000 ml

$\Rightarrow$ Blood volume in ventricles at the end of diastole = 100 ml

$\Rightarrow$ Blood volume in ventricles at the end of systole = 50 ml

Stroke volume = 100 – 50

= 50 ml.

So,

5000 ml = 50 ml × Heart rate

So, Heart rate = 100 beats per minute.

131. *Thiobacillus* is a group of bacteria helpful in carrying out

(1) Nitrogen fixation

(2) Chemoautotrophic fixation

(3) Nitrification

(4) Denitrification

Answer (4)

Sol. *Thiobacillus denitrificans* cause denitrification *i.e.*, conversion of oxides of nitrogen to free N_2.

132. Which of the following factors is responsible for the formation of concentrated urine?

(1) Low levels of antidiuretic hormone

(2) Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys.

(3) Secretion of erythropoietin by Juxtaglomerular complex

(4) Hydrostatic pressure during glomerular filtration

Answer (2)

Sol. The proximity between loop of henle and vasa recta as well as counter current in them help in maintaining an increasing osmolalrity towards the inner medullary interstitium. This mechanism help to maintain a concentration gradient in medullary interstitium so human urine is nearly four times concentrated than initial filtrate formed.

133. Which of the following statements regarding mitochondria is incorrect?

(1) Outer membrane is permeable to monomers of carbohydrates, fats and proteins.

(2) Enzymes of electron transport are embedded in outer membrane.

(3) Inner membrane is convoluted with infoldings.

(4) Mitochondrial matrix contains single circular DNA molecule and ribosomes.

Answer (2)

Sol. In mitochondria, enzymes for electron transport are present in the inner membrane.

134. Xylem translocates.

(1) Water only

(2) Water and mineral salts only

(3) Water, mineral salts and some organic nitrogen only

(4) Water, mineral salts, some organic nitrogen and hormones

Answer (4)

Sol. Xylem is associated with tanslocation of mainly water, mineral salts, some organic nitrogen and hormones.

135. Cell in G_0 phase :

(1) exit the cell cycle

(2) enter the cell cycle

(3) suspend the cell cycle

(4) terminate the cell cycle

Answer (1)

Sol. Cells in G_0 phase are said to exit cell cycle. These are at quiescent stage and do not proliferate unless called upon to do so.

136. Which of the statements given below is not true about formation of Annual Rings in trees?

(1) Annual ring is a combination of spring wood and autumn wood produced in a year

(2) Differential activity of cambium causes light and dark bands of tissue early and late wood respectively.

(3) Activity of cambium depends upon variation in climate.

(4) Annual rings are not prominent in trees of temperate region.

Answer (4)

Sol. Growth rings are formed by the seasonal activity of cambium. In plants of temperate regions, cambium is more active in spring and less active in autumn seasons. In temperate regions climatic conditions are not uniform throughout the year. However in tropics climatic conditions are uniform throughout the year.

137. Which of the following ecological pyramids is generally inverted?

(1) Pyramid of numbers in grassland

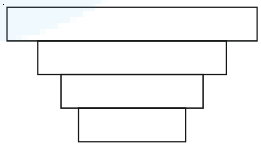
(2) Pyramid of energy

(3) Pyramid of biomass in a forest

(4) Pyramid of biomass in a sea

Answer (4)

Sol. In an aquatic ecosystem, the pyramid of biomass is generally inverted.



138. Placentation in which ovules develop on the inner wall of the ovary or in peripheral part, is

(1) Basal

(2) Axile

(3) Parietal

(4) Free central

Answer (3)

Sol. In parietal placentation the ovules develop on the inner wall of ovary or in peripheral part. eg. Mustard, *Argemone* etc.

139. Which of the following protocols did aim for reducing emission of chlorofluorocarbons into the atmosphere?

(1) Montreal Protocol

(2) Kyoto Protocol

(3) Gothenburg Protocol

(4) Geneva Protocol

Answer (1)

Sol. To control the deleterious effect of the stratospheric ozone depletion an international treaty was signed at Montreal, Canada in 1987. It is popularly known as Montreal protocol.

140. Which of the following contraceptive methods do involve a role of hormone?

(1) Lactational amenorrhea, Pills Emergency contraceptives.

(2) Barrier method, Lactational amenorrhea, Pills.

(3) CuT, Pills, Emergency contraceptives.

(4) Pills, Emergency contraceptives, Barrier methods.

Answer (1)

Sol. → In lactational amenorrhoea, due to high prolactin level, gonadotropin level decreases.

→ Oral pills are either progestogens or progestogen-estrogen combinations used by the females.

→ Emergency contraceptives includes the administration of progestogens or progestogen-estrogen combination or IUDs within 72 hour of coitus.

So, lactational amenorrhoea, oral pills and emergency contraceptives involve a role of hormone.

141. Tidal Volume and Expiratory Reserve Volume of an athlete is 500 mL and 1000 mL, respectively. What will be his Expiratory Capacity if the Residual Volume is 1200 mL?

(1) 1500 mL

(2) 1700 mL

(3) 2200 mL

(4) 2700 mL

Answer (1)

Sol. Tidal Volume = 500 ml

Expiratory Reserve Volume = 1000 ml

Expiratory Capacity = TV + ERV

= 500 + 1000

= 1500 ml

142. What is the fate of the male gametes discharged in the synergid?

(1) One fuses with egg other(s) degenerate (s) in the synergid.

(2) All fuse with the egg.

(3) One fuses with the egg, other(s) fuse(s) with synergid nucleus.

(4) One fuses with the egg and other fuses with central cell nuclei.

Answer (4)

Sol. In flowering plants, out of the two male gametes discharged in synergids, one fuses with the egg and other fuses with the secondary or definitive nucleus present in central cell.

Egg (n) + 1^{st} male gamete (n) $\longrightarrow$ Zygote (2n)

$$\underset{\substack{(2n)\\(\text{central cell nuclei})}}{\text{Secondary nucleus}} + 2^{nd} \text{ male gamete (n)} \longrightarrow \text{PEN (3n)}$$

143. What is the site of perception of photoperiod necessary for induction of flowering in plants?

(1) Lateral buds (2) Pulvinus

(3) Shoot apex (4) Leaves

Answer (4)

Sol. During flowering, photoperiodic stimulus is perceived by leaves of plants.

144. Select the correctly written scientific name of Mango which was first described by Carolus Linnaeus

(1) *Mangifera indica* Car. Linn.

(2) *Mangifera indica* Linn.

(3) *Mangifera indica*

(4) *Mangifera Indica*

Answer (2)

Sol. According to rules of binomial nomenclature, correctly written scientific name of mango is *Mangifera indica* Linn.

145. Following statements describe the characteristics of the enzyme Restriction Endonuclease. Identify the incorrect statement.

(1) The enzyme cuts DNA molecule at identified position within the DNA.

(2) The enzyme binds DNA at specific sites and cuts only one of the two strands.

(3) The enzyme cuts the sugar-phosphate backbone at specific sites on each strand.

(4) The enzyme recognizes a specific palindromic nucleotide sequence in the DNA.

Answer (2)

Sol. Restriction enzymes cut DNA molecules at a particular point by recognising a specific sequence. Each restriction endonuclease functions by inspecting the length of a DNA sequence. Once it finds its specific recognition sequence, it will bind to the DNA and cut each of the two strands of the double helix at specific points in their sugar-phosphate backbone.

146. From evolutionary point of view, retention of the female gametophyte with developing young embryo on the parent sporophyte for some time, is first observed in

(1) Liverworts

(2) Mosses

(3) Pteridophytes

(4) Gymnosperms

Answer (3)

Sol. In Pteridophyte, megaspore is retained for some times in female gametophyte, however the permanent retention is required for seed formation in Gymnosperms.

That's why Pteridophytes exhibit precursor to seed habit only.

147. In *Antirrhinum* (Snapdragon), a red flower was crossed with a white flower and in F_1 generation pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers. Choose the incorrect statement from the following :

(1) This experiment does not follow the Principle of Dominance.

(2) Pink colour in F_1 is due to incomplete dominance.

(3) Ratio of F_2 is $\frac{1}{4}$(Red) : $\frac{2}{4}$(Pink) : $\frac{1}{4}$ (White)

(4) Law of Segregation does not apply in this experiment

Answer (4)

Sol. Genes for flower colour in snapdragon shows incomplete dominance which is an exception of Mendel's first principle *i.e.* Law of dominance.

Whereas Law of segregation is universally applicable.

148. Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalyzed by

(1) Aldolase

(2) Hexokinase

(3) Enolase

(4) Phosphofructokinase

Answer (2)

Sol. Hexokinase catalyse the conversion of Glucose to Glucose-6 phosphate. It is the first step of activation phase of glycolysis.

149. Drug called 'Heroin' is synthesized by

(1) methylation of morphine

(2) acetylation of morphine

(3) glycosylation of morphine

(4) nitration of morphine

Answer (2)

Sol. Heroin, commonly called smack and is chemically diacetylmorphine which is synthesized by acetylation of morphine.

150. Select the hormone-releasing Intra-Uterine Devices.

(1) Vaults, LNG-20

(2) Multiload 375, Progestasert

(3) Progestasert, LNG-20

(4) Lippes Loop, Multiload 375

Answer (3)

Sol. Progestasert and LNG-20 are hormone releasing IUDs which make the uterus

unsuitable for implantation and the cervix hostile to sperms.

151. A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?

(1) 0.36(AA); 0.48(Aa); 0.16(aa)

(2) 0.16(AA); 0.24(Aa); 0.36(aa)

(3) 0.16(AA); 0.48(Aa); 0.36(aa)

(4) 0.16(AA); 0.36(Aa); 0.48(aa)

Answer (3)

Sol. Frequency of dominant allele (say p) = 0.4

Frequency of recessive allele (say q)

= 1 – 0.4 = 0.6

$\therefore$ Frequency of homozygous dominant individuals (AA)

$= p^2 = (0.4)^2 = 0.16$

Frequency of heterozygous individuals (Aa)

$= 2pq = 2(0.4)(0.6) = 0.48$

Frequency of homozygous recessive individuals (aa)

$= q^2 = (0.6)^2 = 0.36$

152. Which of the following is true for Golden rice?

(1) It is Vitamin A enriched, with a gene from daffodil

(2) It is pest resistant, with a gene from *Bacillus thuringiensis*

(3) It is drought tolerant, developed using *Agrobacterium* vector

(4) It has yellow grains, because of a gene introduced from a primitive variety of rice

Answer (1)

Sol. Golden rice is vitamin A enriched rice, with a gene from daffodil and is rich in carotene.

153. Pinus seed **cannot** germinate and established without fungal association. This is because :

(1) its embryo is immature.

(2) it has obligate association with mycorrhizae.

(3) it has very hard seed coat.

(4) its seeds contain inhibitors that present germination.

Answer (2)

Sol. Fungus associated with roots of *Pinus* increases minerals & water absorption for the plant by increasing surface area and in turn fungus gets food from plant. Therefore, mycorrhizal association is obligatory for *Pinus* seed germination

154. Which of the following features of genetic code does allow bacteria to produce human insulin by recombinant DNA technology?

(1) Genetic code is not ambiguous

(2) Genetic code is redundant

(3) Genetic code is nearly universal

(4) Genetic code is specific

Answer (3)

Sol. In recombinant DNA technology bacteria is able to produce human insulin because genetic code is nearly universal.

155. Which of the following sexually transmitted diseases is not completely curable?

(1) Gonorrhoea

(2) Genital warts

(3) Genital herpes

(4) Chlamydiasis

Answer (3)

Sol. Genital herpes is caused by type-II-herpes simplex virus. At present there is no cure for type-II-herpes simplex virus and therefore the disease caused, genital herpes. Other non-curable STIs are hepatitis-B and HIV.

156. Which of the following statements is incorrect?

(1) Viroids lack a protein coat.

(2) Viruses are obligate parasites.

(3) Infective constituent in viruses is the protein coat.

(4) Prions consist of abnormally folded proteins.

Answer (3)

Sol. Infective constituent in viruses is either DNA or RNA, not protein.

157. Match the following organisms with their respective characteristics :

(a) *Pila*	(i) Flame cells
(b) *Bombyx*	(ii) Comb plates
(c) *Pleurobrachia*	(iii) Radula
(d) *Taenia*	(iv) Malpighian tubules

Select the **correct** option from the following :

	(a)	(b)	(c)	(d)
(1)	(iii)	(ii)	(i)	(iv)
(2)	(iii)	(iv)	(ii)	(i)
(3)	(ii)	(iv)	(iii)	(i)
(4)	(iii)	(ii)	(iv)	(i)

Answer (2)

Sol. (a) *Pila* is a Mollusc. The mouth contains a file - like rasping organ for feeding called radula.

(b) *Bombyx* is an Arthropod. In *Bombyx* excretion takes place through malpighan tubules.

(c) *Pleurobrachia* is Ctenophore. The body bears eight external rows of ciliated comb plates, which help in locomotion.

(d) *Taenia* is a platyhelminth specialised cells called flame cells helps in osmoregulation and excretion

158. Expressed Sequence Tags (ESTs) refers to :

(1) Genes expressed as RNA

(2) Polypeptide expression

(3) DNA polymorphism

(4) Novel DNA sequences

Answer (1)

Sol. Expressed Sequence Tags (ESTs) are DNA sequences (genes) that are expressed as mRNA for protein synthesis. These are used in human Genome Project.

159. Which is of the following statements is incorrect?

(1) Morels and truffles are edible delicacies.

(2) *Claviceps* is a source of many alkaloids and LSD.

(3) Conidia are produced exogenously and ascospores endogenously.

(4) Yeasts have filamentous bodies with long thread-like hyphae.

Answer (4)

Sol. Yeast is an unicellular sac fungus. It lacks filamentous structure or hyphae.

160. Match Column - I with Column - II

Column - I	Column - II
(a) Saprophyte	(i) Symbiotic association of fungi with plant roots
(b) Parasite	(ii) Decomposition of dead organic materials
(c) Lichens	(iii) Living on living plants or animals
(d) Mycorrhiza	(iv) Symbiotic association of algae and fungi

Choose the correct answer from the option given below

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(ii)	(i)	(iii)	(iv)
(4)	(ii)	(iii)	(iv)	(i)

Answer (4)

Sol. Saprophytes - Decomposition of dead organic materials

Parasites - Grow on/in living plants and animals

Lichens - Symbiotic association of algae and fungi

Mycorrhiza - Symbiotic association of fungi with plant roots

161. Which of the following glucose transporters is insulin-dependent?

(1) GLUT I

(2) GLUT II

(3) GLUT III

(4) GLUT IV

Answer (4)

Sol. GLUT-IV is insulin dependent and is responsible for majority of glucose transport into muscle and adipose cells in anabolic conditions. Whereas GLUT-I is insulin independent and is widely distributed in different tissues.

162. Which of the following immune responses is responsible for rejection of kidney graft?

(1) Auto-immune response

(2) Humoral immune response

(3) Inflammatory immune response

(4) Cell-mediated immune response

Answer (4)

Sol. The body is able to differentiate self and nonself and the cell-mediated response is responsible for graft rejection.

163. Use of an artificial kidney during hemodialysis may result in :

(a) Nitrogenous waste build-up in the body

(b) Non-elimination of excess potassium ions

(c) Reduced absorption of calcium ions from gastro-intestinal tract

(d) Reduced RBC production

Which of the following options is the most appropriate?

(1) (a) and (b) are correct

(2) (b) and (c) are correct

(3) (c) and (d) are correct

(4) (a) and (d) are correct

Answer (3)

Sol. a and b statements are incorrect because dialysis eliminates urea and potassium from the body whereas, c and d are correct. As phosphate ions are eliminated during dialysis, along with that calcium ions are also eliminated. So, there will be reduced absorption of calcium ions from gastrointestinal tract. RBC production will be reduced, due to reduced erythropoietin hormone.

164. Which of the following statements is correct?

(1) Cornea is an external, transparent and protective proteinacious covering of the eye-ball.

(2) Cornea consists of dense connective tissue of elastin and can repair itself.

(3) Cornea is convex, transparent layer which is highly vascularised.

(4) Cornea consists of dense matrix of collagen and is the most sensitive portion the eye.

Answer (4)

Sol. Cornea consists of dense matrix of collagen and corneal epithelium. It is the most sensitive part of eye.

165. The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by :

(1) T.H. Morgan (2) Gregor J. Mendel

(3) Alfred Sturtevant (4) Sutton Boveri

Answer (3)

Sol. Alfred Sturtevant explained chromosomal mapping on the basis of recombination frequency which is directly proportional to distance between two genes on same chromosome

166. Match the following genes of the Lac operon with their respective products :

(a) i gene	(i) β-galactosidase
(b) z gene	(ii) Permease
(c) a gene	(iii) Repressor
(d) y gene	(iv) Transacetylase

Select the correct option.

	(a)	(b)	(c)	(d)
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iii)	(i)	(ii)	(iv)
(3)	(iii)	(i)	(iv)	(ii)
(4)	(iii)	(iv)	(i)	(ii)

Answer (3)

Sol. In lac operon

i gene — Repressor

z gene — β-galactosidase

y gene — Permease

a gene — Transacetylase

167. It takes very long time for pineapple plants to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?

(1) Auxin and Ethylene

(2) Gibberellin and Cytokinin

(3) Gibberellin and Abscisic acid

(4) Cytokinin and Abscisic acid

Answer (1)

Sol. Plant hormone auxin induces flowering in pineapple. Ethylene also helps in synchronization of flowering and fruit set up in pineapple.

168. Identify the cells whose secretion protects the lining of gastro-intestinal tract from various enzymes.

(1) Chief Cells (2) Goblet Cells

(3) Oxyntic Cells (4) Duodenal Cells

Answer (2)

Sol. Goblet cells secrete mucus and bicarbonates present in the gastric juice which plays an important role in lubrication and protection of the mucosal epithelium from excoriation by the highly concentrated HCl.

169. Which of the following can be used as a biocontrol agent in the treatment of plant disease?

(1) *Trichoderma* (2) *Chlorella*

(3) *Anabaena* (4) *Lactobacillus*

Answer (1)

Sol. Fungus *Trichoderma* is a biological control agent being developed for use in the treatment of plant diseases.

170. Phloem in gymnosperms lacks :

(1) Albuminous cells and sieve cells

(2) Sieve tubes only

(3) Companion cells only

(4) Both sieve tubes and companion cells

Answer (4)

Sol. Phloem in Gymnosperms lacks both sieve tube and companion cells.

171. Extrusion of second polar body from egg nucleus occurs :

(1) after entry of sperm but before fertilization

(2) after fertilization

(3) before entry of sperm into ovum

(4) simultaneously with first cleavage

Answer (1)

Sol. Extrusion of second polar body from egg nucleus occurs after entry of sperm but before fertilization.

The entry of sperm into the ovum induces completion of the meiotic division of the secondary oocyte.

Entry of sperm causes breakdown of metaphase promoting factor (MPF) and turns on anaphase promoting complex (APC).

172. Under which of the following conditions will there be no change in the reading frame of following mRNA?

5′AACAGCGGUGCUAUU3′

(1) Insertion of G at 5th position

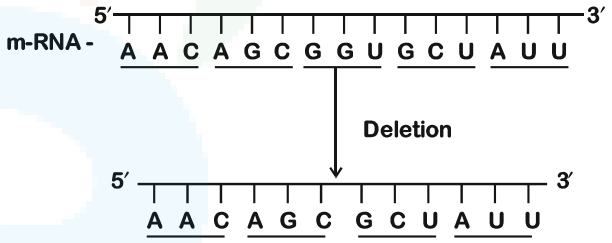
(2) Deletion of G from 5th position

(3) Insertion of A and G at 4th and 5th positions respectively

(4) Deletion of GGU from 7th, 8th and 9th positions

Answer (4)

Sol.



No change in reading frame of m-RNA.

173. The concept of "*Omnis cellula-e cellula*" regarding cell division was first proposed by

(1) Rudolf Virchow

(2) Theodor Schwann

(3) Schleiden

(4) Aristotle

Answer (1)

Sol. Concept of "Omnis cellula-e cellula" regarding cell division was proposed by Rudolph Virchow.

174. What triggers activation of protoxin to active Bt toxin of *Bacillus thuringiensis* in boll worm?

(1) Body temperature

(2) Moist surface of midgut

(3) Alkaline pH of gut

(4) Acidic pH of stomach

Answer (3)

Sol. *Bacillus thuringiensis* forms protein crystals during a particular phase of their growth. These crystals contain a toxic insecticidal protein. These protein exist as inactive protoxins but once an insect ingest the inactive toxin, it is converted into an active form of toxin due to alkaline pH of the gut which solubilize the crystals. The activated toxin binds to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually cause death of insect.

175. Identify the **correct** pair representing the causative agent of typhoid fever and the confirmatory test for typhoid.

(1) *Plasmodium vivax* / UTI test

(2) *Streptococcus pneumoniae* / Widal test

(3) *Salmonella typhi* / Anthrone test

(4) *Salmonella typhi* / Widal test

Answer (4)

Sol. *Salmonella typhi* is the causative agent. Confirmatory test = Widal test, it's based on antigen antibody reaction.

176. What is the genetic disorder in which an individual has an overall masculine development gynaecomastia, and is sterile ?

(1) Turner's syndrome

(2) Klinefelter's syndrome

(3) Edward syndrome

(4) Down's syndrome

Answer (2)

Sol. Individuals with Klinefelter's syndrome have trisomy of sex chromosome as 44 + XXY (47). They show overall masculine development, gynaecomastia and are sterile.

177. Polyblend, a fine powder of recycled modified plastic, has proved to be a good material for

(1) Making plastic sacks

(2) Use as a fertilizer

(3) Construction of roads

(4) Making tubes and pipes

Answer (3)

Sol. Polyblend is a fine powder of recycled modified plastic waste. The mixture is mixed with bitumen that is used to lay roads

178. Which of these following methods is the most suitable for disposal of nuclear waste?

(1) Shoot the waste into space

(2) Bury the waste under Antarctic ice-cover

(3) Dump the waste within rocks under deep ocean

(4) Bury the waste within rocks deep below the Earth's surface

Answer (4)

Sol. Storage of nuclear waste should be done in suitably shielded containers and buried within rocks deep below the earth's surface (500 m deep)

179. Match the following hormones with the respective disease

(a) Insulin	(i) Addison's disease
(b) Thyroxin	(ii) Diabetes insipidus
(c) Corticoids	(iii) Acromegaly
(d) Growth Hormone	(iv) Goitre
	(v) Diabetes mellitus

Select the **correct** option.

	(a)	(b)	(c)	(d)
(1)	(v)	(i)	(ii)	(iii)
(2)	(ii)	(iv)	(iii)	(i)
(3)	(v)	(iv)	(i)	(iii)
(4)	(ii)	(iv)	(i)	(iii)

Answer (3)

Sol.

- Insulin deficiency leads to diabetes mellitus
- Hypersecretion or hyposecretion of thyroxine can be associated with enlargement of thyroid gland called goitre
- Deficiency of corticoids (Glucocorticoid + mineralocorticoid) leads to Addison's disease
- Growth hormone hypersecretion in adults leads to Acromegaly

180. Select the **correct** option.

(1) 8^{th}, 9^{th} and 10^{th} pairs of ribs articulate directly with the sternum.

(2) 11^{th} and 12^{th} pairs of ribs are connected to the sternum with the help of hyaline cartilage.

(3) Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.

(4) There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.

Answer (4)

Sol.
- Vertebrosternal ribs are true ribs, dorsally they are attached to the thoracic vertebrae and ventrally connected to the sternum with the help of hyaline cartilage. First seven pairs of ribs are called true ribs.
- 8^{th}, 9^{th} and 10^{th} pairs of ribs do not articulate directly with the sternum but join the seventh ribs with the help of hyaline cartilage. These are vertebrochondral or false ribs.
- Last 2 pairs (11 & 12) of ribs are not connected ventrally and are therefore, called floating ribs.
- Only first seven pairs of ribs are ventrally connected to the sternum.

❑ ❑ ❑