Studentpad

NEET 2021-22

Time : 120 Min	Bio : Full Portion Paper	Marks : 400

Hints and Solutions

01) Ans: **2)** Weak offsprings

02) Ans: **3)** The statement 1 is true but the statement 2 is false
Sol: Plasmid is extra-chromosomal DNA. Fertility factor is also known and is possessed by prokaryotic cells.

03) Ans: **2)** Karl Von Frisch
Sol: Karl Von Frisch owned the Nobel prize for study of communication methods of honey bees. Honey bees, despite their small size, have one of the most sophisticated communication systems. In a series of classic experiments dating from the 1920s, the Austrian Biologist Karl Von Frisch investigated how honey bees communicate with each other, and other scientists have extended works. He received Nobel prize for Physiology or Medicine, with K. Lorenz and N. Tinbergen for his achievements in comparative behavioural physiology and pioneering work in communication between insects (1973).

04) Ans: **4)** Phytochrome

05) Ans: **1)** Inside nucleus but outside nucleolus
Sol: Inside nucleus but outside nucleolus; this process is called transcription.

06) Ans: **2)** Tautonym

07) Ans: **2)** O
Sol: The agglutination occurs between a compatible antigen and an antibody. Agglutination of blood cells results in the clumping of them. Here, AB blood antigens are mixed with unknown blood sample that resulted into agglutination and this is possible when AB antigens react with their specific antibodies i.e., anti-a and anti-b. Blood group O is without A and B antigens on the blood cells but have antibodies for both these antigens in the plasma.
Therefore, the unknown blood sample which was mixed with AB blood group is O in blood group.

08) Ans: **3)** Grouping according to evolutionary trends

09) Ans: **2)** Both the statement 1 and statement 2 are true but the statement 2 is not a correct explanation of the statement 1
Sol: Metamorphosis is a process, in which an organism changes its larval characteristics and attains adult form. After swimming for some time, the tornaria larva (through indirect development) sinks down the bottom. Its transparency is lost and the ciliated bands are distinguished into the proboscis, collar and trunk and simultaneously the notochord, gill-slits and coelomic sacs are also formed. Thus the, larva gradually changes into adult.

10) Ans: **2)** Both the statement 1 and the statement 2 are true and the statement 2 is a correct explanation of the statement 1
Sol: In gymnosperms, the xylem consists only of tracheids and xylem parenchyma. There are no wood vessels. The phloem contains sieve tubes with sieve plates out hence no companion cells.

11) Ans: **3)** UAUGC
Sol: Nucleotide sequence of mRNA synthesized after transcription is complementary to the sequence of DNA strand (except that thymine (T) is replaced by uracil (U)). So, if the nucleotide sequence of DNA strand, which participates in transcription is being coded as ATACG, then the nucleotide sequence of mRNA synthesized would be UAUGC.

12) Ans: **3)** Spores
Sol: In asexual reproduction of Mucor three type of non-motile mitospores are produced. i.e., sporangiospores, chlamydospores and oidia.

13) Ans: **2)** Monocyte

14) Ans: **2)** Multiply

15) Ans: **3)** The ecosystem
Sol: A keystone species has disproportionately large effect on its environment relative to its abundance. They play a critical role in maintaining the structure of an ecological community, affecting many other organisms in an ecosystem and helping to determine the types and number of various other species in the community.

16) Ans: **1)** amino acids and glucose
Sol: The absorption of glucose and amino acids is facilitated by carrier ions like Na^+. The concentration of Na^+ is higher in the intestinal lumen as compared to mucosal cells. Na^+, therefore moves into the cells along its concentration gradient and simultaneously glucose is transported into the intestinal cells.
Therefore, Na^+ diffuses into the cell and it drags glucose along with it. The intestinal Na^+ gradient is the immediate energy source and the mechanism for transport of amino acid is same as glucose. Fructose absorption does not require energy and is independent of Na^+ transport.

17) Ans: **1)** Dominant sporophytic phase

18) Ans: **2)** Vivipary
Sol: Vivipary is undesirable for annual crop plants as seeds cannot be stored for next season.
Seed germinated inside the fruit while attached to

the plant is called viviparous germination. Vivipary is found in halophytes or marshy plants e.g.: Rhizophora and Sonneratia

19) Ans: **2)**

a	b	c	d	e	f
4	6	3	5	1	2

20) Ans: **1)** Species diversity increases as we move away from the equator towards the poles.
Sol: Species diversity on earth is unevenly distributed but shows interesting patterns. It is generally highest in the tropics and decreases towards the poles. Important explanations for the species richness of the tropics are: tropics had more evolutionary time they provide a relatively constant environment and they receive more solar energy which contributes to greater productivity.

21) Ans: **3)** The Statement 1 is true but the Statement 2 is false
Sol: Short term adaptations are changes that develop in response to specific conditions and are meant for overcoming short unfavorable periods. Aestivation (i.e. dormancy during summer or dry weather) and hibernation (i.e. dormancy during winter season) is an example of short term adaptation. Some other examples are as follows:
i) Darkening of skin due to excess exposure to sunlight.
ii) Phototropism and Geotropism.
iii) Formation of spores for perennation and dispersal by many algae, fungi and protozoans.
iv) Annual leaf falling in autumn to reduce injury due to winter.

22) Ans: **1)** Scurvy
Sol: A person who is exclusively feeding on meat, egg and milk is probably to suffer from scurvy. It occurs because of deficiency of vitamin C or ascorbic acid as meat, egg and milk are very poor sources of vitamin C.

23) Ans: **1)** Phototropism
Sol: In photo tropism according to Cholondy Went theory, unilateral light produces more auxin and thus more growth on the shaded side resulting in bending.

24) Ans: **3)** Deforestation

25) Ans: **1)** Vegetative means

26) Ans: **4)** 7 years
Sol: Gregor Johann Mendel (1822-1884) is known as Father of Genetics as he was the first to demonstrate the mechanism of transmission of characters from one generation to the other. He conducted hybridization experiments on Garden pea (Pisum sativum) for 7 years (from 1856-1863). Initially, he selected 34 pairs of varieties of pea plants, then 22, but ultimately worked with only 7 pairs of varieties.

27) Ans: **3)** Both $3' \rightarrow 5'$ and $5' \rightarrow 3'$ direction
Sol: Replication of DNA is in unidirectional as well as Bidirectional.

28) Ans: **1)** Imbibition
Sol: Because of adsorption of water molecules into wooden furniture it get swelled.

29) Ans: **3)** Semipermeable membrane
Sol: Which allow all solvents but no solute to pass through are known as semipermeable membranes, e.g. parchment paper.

30) Ans: **3)** Conversion of pyruvate to acetyl CoA
Sol: Oxidative decarboxylation is the link reaction or gateway step as it links glycolysis with Krebs' cycle and pyruvate which is formed in cytoplasm by glycolysis produce $CO_2, NADH_2$ and acetyl CoA by oxidative decarboxylation reaction. Acetyl CoA functions as substrate entrant for Krebs' cycle.

31) Ans: **4)** All of these
Sol: Chemicals such as CMU and DCMU are photosynthetic inhibitors. These inactivate PS II (noncyclic photo -phosphorylation) so inhibiting the Hill reaction, by inhibiting release of O_2 . PAN (peroxyacyl nitrates) damaged chloroplasts blocks PS II and inhibit electron controlling cellular metabolism. So it also affect photosynthesis is plants.

32) Ans: **4)** Melvin Calvin

33) Ans: **1)** Lateral meristem

34) Ans: **1)** Translation begins when mRNA attaches to small subunit of ribosome.
Sol: The cellular factor responsible for synthesising proteins is known as ribosome. The ribosome consists of structural RNAs and about 80 different proteins.
In its inactive state, it exists as two subunits; a large subunit and a small subunit.
When the small subunit encounters an mRNA, the process of translation of the mRNA to protein begins.

35) Ans: **1)** Apical meristem
Sol: This meristem is located at the growing apices of main and lateral shoots and roots and these cells are responsible for linear growth of an organ.

36) Ans: **2)** uricotelic
Sol: The phenomenon of excretion of uric acid is called as uricotelism and animals which excrete their nitrogenous wastes mainly in the form of uric acid are called as uricotelic animals. Uricotelic animals include most insects (e.g., cockroach), some land crustaceans (e.g. Oniscus commonly known as "wood louse"), land snails, land reptiles (e.g., lizards and snakes) and birds.

37) Ans: **4)** Rho factor
Sol: Synthesis of RNA molecule (transcription) is terminated by a signal recognised by Rho factor.

38) Ans: **1)** tetany
Sol: Low Ca^{++} in the body fluid may be the cause of tetany disease. Tetany is a spasm and twitching of the muscles, particularly those of the face, hands, and feet. It is usually caused by a reduction in the blood calcium level, which may be because of underactive parathyroid glands (hypoparathyroidism).

39) Ans: **2)** sarcomas

40) Ans: **3)** Runner
Sol: Runners is the subaerial stem modification with long internode. They have long and thin internodes and branches creep over the surface of soil. There branches develop adventitious roots at nodes on lower side. Scaly leaves are present on nodes, from the axil of which arise aerial branches. When long branches break up by any method they form new plants. In this way large number of new plants are formed. Some examples are Doob grass, Oxalis, Hydrocotyle.

41) Ans: **1)** Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1
Sol: Immunity means ability of animal or plant to resist infection by parasites and effects of other harmful agents. In animals there are two functional divisions of immune system-innate (non specific) and adaptive (specifically acquired) immunity. The former includes several barriers to pathogen entry (e.g., lysozyme, mucus, intact skin/cuticle, sebum, stomach acid, ciliary respiratory lining and commensal gut competitors) as well as non specific cellular responses (e.g., release of antimicrobial peptides).

42) Ans: **1)** Young cells

43) Ans: **4)** At high altitude O_2 level is less hence more RBCs were required to absorb enough oxygen

44) Ans: **3)** In females, FSH first binds with specific receptors on ovarian cell membrane.
Sol: Hormone action involves their reception by target cells, specific proteins known as hormone receptors that are located in target tissues only bind with these hormones. Hormone receptors may be of two types: membrane bound receptors and intracellular receptors. Steroid hormones etc., bind with intracellular receptors while some hormones e.g., bind pituitary hormones like FSH etc., bind with membrane bound receptors.

45) Ans: **3)** At a concentration of 1 million/ml of ejaculate will fertilize the ovum

46) Ans: **3)** Two

47) Ans: **3)** anterior pituitary
Sol: Secretion of anterior pituitary is under the control of neurosecretory nerve cells. The neurosecretory cells (neurons) of hypothalamus secrete hormones known as neurohormones or releasing factors which are carried to the anterior pituitary via hypophysial portal vein. These hormones regulate the secretion of hormones from anterior pituitary.

48) Ans: **1)** LH
Sol: Ovulation takes place under the influence of LH from pituitary gland.

49) Ans: **2)** Energy
Sol: Because at each trophic level only 10% energy is left. Hence, the amount of energy decreases and pyramid will be straight and cannot be inverted in any condition.

50) Ans: **1)** Filaments of all united in one group but anthers are free
Sol: In monoadelphous condition, filaments of all the stamens are fused to form a tube around the gynaecium. Anthers are free. e.g. China rose.

51) Ans: **4)** Both a and b
Sol: Microbes produce different types of gaseous end products during growth and metabolism. The type of the gas produced depends upon the microbes and organic substrates utilised by microbes.

52) Ans: **2)** Absence of a head

53) Ans: **4)** sedatives

54) Ans: **1)** Rhizome

55) Ans: **3)** Decrease in concentration of ozone

56) Ans: **4)** Both the statements A and B are correct and B is not the reason for A.
Sol: A pair of much branched accessory or collaterial glands lies behind and above the ovaries and left gland is opaque and more developed while right one is transparent and less developed. Secretion of 2 collaterial glands form hard egg case around group of eggs. Development of cockroach is simple direct known as paurometabolus.

57) Ans: **1)** Amphibians
Sol: Threatened species are liable to become extinct if not allowed to realise its full biotic potential by providing protection from exotic species, human exploitation and other activities. As per IUCN red list, during the last two decades, the maximum increases in the number of threatened species is among amphibians.

58) Ans: **2)** Enhanced absorption of nutrients from soil

59) Ans: **4)** In the liver, but eliminated mostly through kidneys
Sol: The principal nitrogenous excretory compound in humans is synthesised in the liver, but eliminated mostly through kidneys. When a cell metabolically breaks down amino acids, ammonia, a toxic compound formed as byproduct. Ammonia is toxic in even small amounts and must be removed from the body. The urea cycle or the ornithine cycle describes the conversion reactions of ammonia into urea. As these reactions occur in the liver, the urea is then transported to the kidneys where it is excreted.
The overall urea formation reaction is:
2 ammonia +carbon dioxide+3ATP $\rightarrow$ urea+water+3ADP.

60) Ans: **2)** Chemical energy is changed into mechanical energy

61) Ans: **2)** Choline acetylase

62) Ans: **4)** The Statement 1 is false but the Statement 2 is true
Sol: Lysosome does not help in photorespiration. It is the 'suicidal bag' of cell containing acidic

hydrolytic enzymes.

63) Ans: **4)** short day plant
Sol: The condition (in the two given sets) shows that the plant requires the photoperiod shorter than the critical day length (which is 12 hour in this case). This plant needs uninterrupted dark period for flowering. So, it is a short-day plant. Short-day plants do not flower if they get photoperiod of more than critical day length or less than the critical dark period.

64) Ans: **4)** $(iii) \rightarrow (v) \rightarrow (iii) \rightarrow (iv) \rightarrow (i)$
Sol: $(iii) \rightarrow (v) \rightarrow (iii) \rightarrow (iv) \rightarrow (i)$

65) Ans: **1)** Tracheids
Sol: Trachieds are mainly found in gymnosperms whereas vessels are found in angiosperms.

66) Ans: **4)** gaseous exchange
Sol: The process of exchange of O_2 from the atmosphere with CO_2 produced by the cells is known as gaseous exchange. The diffusion of gases from an area of higher concentration to an area of lower concentration, especially the exchange of O_2 and CO_2 between the living cells of an organism and its environment, is known as gaseous exchange. In plants, gaseous exchange occurs during photosynthesis and respiration whereas in animals, gaseous exchange occurs during respiration.

67) Ans: **2)** I_2, C_1, P_2, M_3
Sol: Dental formula of human is $\frac{2,1,2,3}{2,1,2,3} = \frac{8}{8} x2 = 32$ which shows the number of incisor 2, canine 1, premolar 2 molar 3 in each half upper and half lower jaw with 32 teeth in buccal cavity.

68) Ans: **2)** (a)-(iv), (b)(iii), (c)-(i), (d)-(ii)
Sol: $(a) - (iv)$, $b - (iii)$, $(c) - (i)$, $(d) - (ii)$

69) Ans: **1)** Xylem is blocked
Sol: Xylem is responsible for transport of water. If xylem is blocked, plant will undergo wilting because of the lack of proper transport of water.

70) Ans: **2)** noise
Sol: The Air (Prevention and Control of Pollution) Act, came into frce in 1981, which was amended in 1987 to remove the difficulties encountered during implementation, to give more powers on the implementing agencies and to impose more stringent penalties for violation of the provisions of the Act. The main oncern was also to amend the definition of air pollutants to include noise also. This is also known as the Air (Pollution and Control of Pollution) Amendment Act, 1987.

71) Ans: **3)** Vestibular apparatus
Sol: Vestibular apparatus is a part of inner ear, present above the cochlea. It comprises of three semicircular canals, which detect movements of the head, and the utriculus and sacculus which detect the position of head. It does not play any role in hearing but is responsible for maintaining the balance of the body and posture, thus necessary.

72) Ans: **4)** Algae and fungi

73) Ans: **4)** Net primary productivity and secondary productivity respectively
Sol: Productivity is the rate of biomass production. It can be divided into gross primary productivity (GPP) and net primary productivity (NPP). Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis and a considerable amount of GPP is utilized by plants in respiration. Net primary productivity is the available biomass for the consumption to heterotrophs (herbivores and decompsers). Secondary productivity is defined as the rate of formation of new organic matter by consumers.

74) Ans: **2)** Striped

75) Ans: **2)** Maximum number of individuals which an environment can sustain
Sol: Carrying capacity is maximum number of individuals which the environment can sustain.

76) Ans: **2)** Secondary pollutant
Sol: Pollutant formed by chemical interaction of primary pollutants with atmospheric gas and moisture, often catalysed by sunlight are known as secondary pollutants. PAN is one such substance.

77) Ans: **2)** Bateson
Sol: Term genetics was first used by W.Bateson (1905)

78) Ans: **1)** Eri silkworm
Sol: Eri silk also called as Endi or Errandi is produced by Philosamia ricini which is commonly known as eri silkworm. It primarily feeds on castor leaves and is thus reared on castor plants. The manufacturing process of eri allows the pupae to develop into adults and only the open ended cocoons are used for turning into silk. So, it is also popularly known as non-violent silk.

79) Ans: **3)** areolar tissue
Sol: Areolar tissue is the most widely distributed connective tissue in the animal body and it is named so as it takes the form of fine threads crossing each other in every direction leaving small spaces known as areolae. The areolar tissue consists of ground substance, the matrix, white, yellow and reticular fibres and cell like fibroblasts, mast cells, macrophages, lymphocytes, plasma cells, mesenchyme cells, chromatophores.

80) Ans: **2)** Both the statement 1 and the statement 2 are true and the statement 2 is a correct explanation of the statement 1
Sol: In mitochondria ATP production takes place. Hence, mitochondria is known as Power house.

81) Ans: **4)** Krebs' cycle
Sol: In cellular respiration glucose is firstly converted into a 3 carbon compound (pyruvic acid) by a series of reactions known as glycolysis. The pyruvic acid enters the mitochondria for its

complete oxidation into CO_2 and water. This conversion involves a series of reactions under a cyclic pathway which is known as Krebs' cycle or citric acid cycle or tricarboxylic acid cycle.

82) Ans: **1)** Ca^{2+}
Sol: Ca^{2+} is the main ion involved in nerve impulse transmission. When an impulse arrives at a presynaptic knob, calcium ions from the synaptic cleft enter the cytoplasm of the presynaptic knob. The calcium ions responsible for the movement of synaptic vesicles to the surface of the knob. The synaptic vesicles are fused with the presynaptic membrane and get ruptured to discharge their contents (neurotransmitter)into the synaptic cleft. So, Ca^{2+} ions are required during nerve- impulse transmission.

83) Ans: **1)** Ectoderm

84) Ans: **1)** Haldane
Sol: Through chemical evolution biologically important organic molecules are formed in the sea, to which Haldane described as pre biotic soap or the hot diluted soap.

85) Ans: **1)** Non-competitive inhibitors

86) Ans: **4)** none of these
Sol: Starch sheath is also known as endodermis, a single layer of compactly arranged cells which are generally Parenchymatous, but have distinct wall characteristics clearly seen in roots. In some stems it is identifiable by innermost layer of cortex. Caspary (1865-66) intrduced a band of the wall material in the radial and transverse walls of endodermis. This particular wall material is chemically different from the rest of the wall. It is known as casparian strip or starch sheath and it is believed to be made of suberin and found in roots.

87) Ans: **1)** Glucose

88) Ans: **1)** two-celled
Sol: In over 60 % of angiosperms (mostly dicots), pollen grains are shed at 2-celled stage. In the remaining species, the generative cell divise mitotically to produce the two male hametes before pollen grains are shed (3-celled stage).

89) Ans: **1)** NO_2

90) Ans: **2)** Carnivores
Sol: Carnivores are the top carnivores who represents the penultimate trophic level.

91) Ans: **2)** Require presence of water for fertilization

92) Ans: **2)** A = r, B = p, C = s, D = q

93) Ans: **1)** it does not cause immunological problems
Sol: Earlier, insulin for curing diabetes was used to be extracted from pancreas of slaughtered pigs and cattle which is conventional insulin was slightly different from human insulin and its over use resulted in some undesirable side effects, e.g. certain immunological problems such as allergy. Whereas humulin produced through rDNA technique is similar to that of human insulin and does not cause any immunological problems.

94) Ans: **1)** Both the statement 1 and the statement 2 are true and the statement 2 is a correct explanation of the statement 1
Sol: Sycon shows simplest type of canal system in which surrounding water enters the canal system through ostia.This water of sea enters into the spongocoel and pushed out readily through osculum. Course taken by the water current in the body of sponge may be shown as under.

Ingressing $\xrightarrow[\text{Ostia}]{\text{Through}}$ Spongocoel $\xrightarrow[\text{Osculum}]{\text{Through}}$ To outside

This type of canal system is called ascon type

95) Ans: **4)** Mushroom
Sol: Mushroom is a basidiomycetes fungus, which is grow on dead and decay matter.

96) Ans: **4)** A=r,B=p, C=q

97) Ans: **4)** cells of trophoblast, in contact with inner cell mass of blastocyst
Sol: The blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast known as the inner cell mass. The trophoblast does not take part in the formation of the embryo proper and it remains external to the embryo and gives rise to the extraembryonic membranes, namely, chorion and amnion, for the protection and nourishment of the embryo. The trophoblast cells in contact with the embryonal knob are known as cells of the Rauber.

98) Ans: **1)** First child will survive
Sol: Rh^- woman married with Rh^+ man, become sensitized simply by carrying a Rh^+ child within her body. Some of the cells from the embryo may mix into her own blood stream in development. The first child of the parents with this genetic back ground is nearly always normal.

99) Ans: **2)** Malvaceae
Sol: An additional whorl of 3 – 9 leafy structures is present out side calyx, known as epicalyx (hypocalyx) which is modification of bracteoles is characteristic of the Malvaceae flowers.

100) Ans: **3)** muscles
Sol: Myoglobin is present in muscles. Myoglobin is an iron containing globular protein resembling haemoglobin. It comprises a single polypeptide chain and a haem group (like haemoglobin) which reversibly with oxygen, hence it acts as an oxygen reservoir within the muscles fibres and provides oxygen when muscle oxygen demand outpaces supply from the blood, e.g., during strenuous exercise.