SCIENCE
Solved Paper-3 (Biology), 2015
(One hour and a half)

Answers to this paper must be written on the paper provided separately.
*You will **not** be allowed to write during the first **15** minutes.*
This time is to be spent in reading the Question Paper.
The time given at the head of this Paper is the time allowed for writing the answers.

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*Attempt **all** questions from **Section I** and any **four** questions from **Section II.**.*
The intended marks for questions or parts of questions are given in brackets [ ].

SECTION I (40 Marks)
Attempt ***all*** questions from this section

QUESTION 1

(a) Name the following: **[5]**

(i) The process of uptake of mineral ions against the concentration gradient using energy from cell.
Ans. Active transport.

(ii) The from in which glucose is stored in liver.
Ans. Glycogen.

(iii) The vein that carries oxygenated blood.
Ans. Pulmonary vein.

(iv) The cross between two parents having one pair of contrasting characters.
Ans. Monohybrid cross.

(v) The structure formed by the villi of the embryo and the uterus of the mother.
Ans. Placenta.

(b) The statements given below are False. **Rewrite the correct form of the statement** by changing the word which is underlined : **[5]**

(i) Alpha cells of pancreas secrete Insulin.
Ans. Alpha cells of pancreas secrete **glucagon**.

(ii) Formalin is an example of an Antiseptic.
Ans. Formalin is an example of an **disinfectant**.

(iii) CNG is mainly responsible for the formation of acid rain.
Ans. Sulphur dioxide is mainly responsible for the formation of acid rain.

(iv) Sulphadiazine is an example of an Antiseptic.
Ans. Sulphadiazine is an example of an **antibiotic / sulpha drug**.

(v) Cretinism is caused due to deficiency of Adrenaline.
Ans. Cretinism is caused due to deficiency of **thyroxine**.

(c) Choose the correct answer from the four options given below : **[5]**

(i) A single highly coiled tube where sperms are stored, gets concentrated and mature is known as :

(a) Epididymis (b) Vas efferentia
(c) Vas deferens (d) Seminiferous tubule.

Ans. (a) Epididymis

(ii) Chromosomes get aligned at the center of the cell during :

(a) Metaphase (b) Anaphase
(c) Prophase (d) Telophase.

Ans. (a) Metaphase

(iii) BCG vaccine is effective against :

(a) Cholera (b) Mumps

(c) Tuberculosis (d) Measles.

Ans. (c) Tuberculosis

(iv) Which one of the following is mainly associated with the maintenance of the posture ?

(a) Cerebrum (b) Cerebellum

(c) Thalamus (d) Pons.

Ans. (b) Cerebellum

(v) An example of non-biodegradable waste is :

(a) Vegetable peels (b) Sewage

(c) Livestock waste (d) DDT.

Ans. (d) DDT

(d) Mention the exact location of the following structures : **[5]**

(i) Thylakoids.

Ans. In the Chloroplast / In the stroma of chloroplast.

(ii) Organ of Corti.

Ans. On the basilar membrane in the cochlea.

(iii) Lenticels.

Ans. On the surface of young stems / bark of old stems.

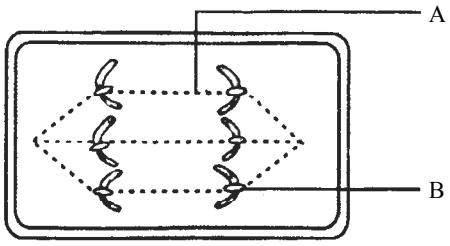
(iv) Bicuspid valve.

Ans. In between the left auricle and left ventricle.

(v) Loop of Henle.

Ans. In the medulla region of the kidney.

(e) The diagram given below represents a certain stage of mitosis : **[5]**



(i) Identify the stage of cell division.

Ans. Early Anaphase / Anaphase.

(ii) Name the parts labelled A and B.

Ans. A-Spindle fibres B-Centromere.

(iii) What is the unique feature observed in this stage ?

Ans. Centromere has split and sister chromatids are pulled apart.

(iv) How many daughter cells are formed from this type of cell division ?

Ans. Two cells.

(f) Given below is an example of a certain structure and its special functional activity. On a similar pattern fill in the blanks with suitable functions :

Example : Chloroplast and Photosynthesis : **[5]**

(i) Xylem and _____ .

Ans. Xylem and ***transport of water and mineral salts***.

(ii) Ciliary Body and _____ .

Ans. Ciliary body and ***altering the shape of the lens***.

(iii) Seminiferous Tubule and _____ .

Ans. Seminiferous tubule and ***production of sperms***.

(iv) Thyroid gland and _____ .

Ans. Thyroid gland and ***secretion of thyroxine***.

(v) Eustachian Tube and _____ .

Ans. Eustachian tube and ***equalizing of air pressure on either side of tympanum***.

(g) **Rewrite and complete** the following sentences by inserting the correct word in the space indicated : **[5]**

(i) The phenomenon of loss of water through a cut stem or injured part of plant is called _____ .

Ans. The phenomenon of loss of water through a cut stem or injured part of a plant is called ***bleeding***.

(ii) _____ is the scientific name of garden pea, which Mendel used for his experiments.

Ans. ***Pisum Sativum*** is the scientific name of garden pea , which Mendel used for his experiments.

(iii) A fluid that occupies the large cavity of the eye ball behind the lens is _____ .

Ans. A fluid that occupies the larger cavity of the eye ball behind the lens is ***vitreous humour***.

(iv) Oxygen combines with haemoglobin present in RBC and forms _____ .

Ans. Oxygen combines with haemoglobin present in RBC and forms ***oxyhaemoglobin***.

(v) _____ causes corrosion of the marble or brick surface.

Ans. ***Acid rain*** causes corrosion of the marble or brick surface.

(h) Match the items in Column 'A' with those which are most appropriate in Column 'B'. **Rewrite the matching pairs** as shown in the example : **[5]**

Column A	**Column B**
(1) Allele	(a) Control of automobile exhaust
(2) Leydig cells	(b) Tourniquet
(3) Utriculus	(c) Alternate forms of genes
(4) Snake bite	(d) Dynamic equilibrium
(5) Euro IV norms	(e) Testosterone
	(f) Sudden change in genes
	(g) Static equilibrium

Ans. (i) Allele — Alternate forms of genes.

(ii) Leydig cells — Testosterone.

(iii) Utriculus — Static equilibrium.

(iv) Snake bite — Tourniquet

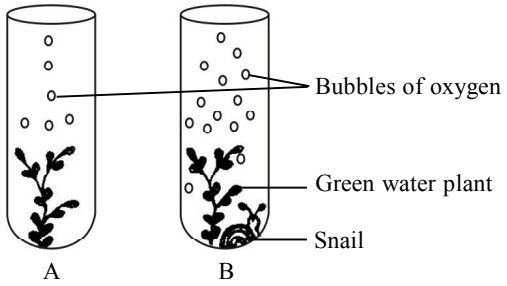
(v) Euro IV norms — Control of automobile exhaust.

SECTION II (40 Marks)

*Attempt any **four** questions from this Section*

QUESTION 2

(a) The diagram below shows two test-tubes A and B. Test-tube A contains a green water plant. Test-tube B contains both a green water plant and a snail. Both Test-tubes are kept in sunlight. Answer the questions that follow : **[5]**



(i) Name the physiological process that releases the bubbles of oxygen.

Ans. Photosynthesis.

(ii) Explain the physiological process as mentioned above in Q.2(a) (i).

Ans. The process by which green parts/ leaves of the plant manufacture starch in the presence of sunlight, carbon dioxide and water.

(iii) What is the purpose of keeping a snail in test-tube 'B' ?

Ans. The snail in test tube B was as a source of Carbon dioxide.

(iv) Why does test-tube 'B' have more bubbles of oxygen ?

Ans. Photosynthesis occurs more rapidly since Carbon dioxide was available.

(v) Give an example of a water plant that can be used in the above experiment.

Ans. Elodea / Hydrilla.

(vi) Write the overall chemical equation for the above process.

Ans. $6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{sunlight}} C_6H_{12}O_6 + 6CO_2 + 6H_2O$

(b) Give the biological / technical terms for the following : **[5]**

(i) A mixture of smoke and fog.

Ans. Smog.

(ii) Capacity of our body to resist diseases.

Ans. Immunity.

(iii) Fixing of developing zygote on the uterine wall.

Ans. Implantation.

(iv) The permanent stoppage of menstruation at about the age of 45 years in a female.

Ans. Menopause.

(v) The hormone increasing reabsorption of water by kidney tubules.

Ans. Vasopressin / ADH / Antidiuretic hormone.

(vi) A thin membrane covering the entire front part of the eye.

Ans. Conjunctiva.

(vii) The lens of eye losing flexibility resulting in a kind of long-sightedness in middle aged people.

Ans. Presbyopia.

(viii) The number of persons living per square kilometre at any given time.

Ans. Population density.

(ix) The sound produced when the atrio-ventricular valves close in the heart.

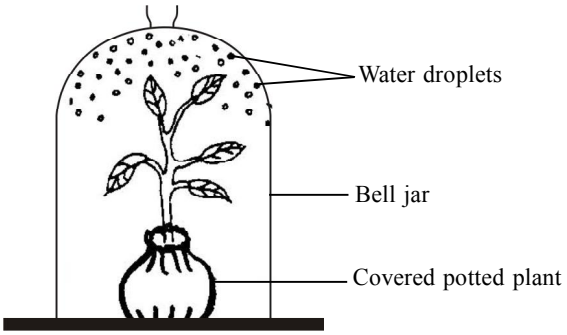
Ans. Lubb

(x) The process by which white blood cells engulf bacteria.

Ans. Phagocytosis.

QUESTION 3

(a) An apparatus as shown below was set up to investigate a physiological process in plants. The setup was kept in sunlight for two hours. Droplets of water were then seen inside the bell jar. Answer the questions that follow : **[5]**



(i) Name the process being studied.

Ans. Transpiration.

(ii) Explain the process named above in Q.3 (a) (i).

Ans. The loss of water in the form of water **vapour from** the aerial parts / leaves of a plant.

(iii) Why was the pot covered with a plastic sheet ?

Ans. To ensure that the water droplets collected on the inner surface of the bell jar is from the plant.

(iv) Suggest a suitable control for this experiment.

Ans. Place an empty **dry** bell jar in the sunlight.

(v) Mention two ways in which this process is beneficial to plants.

Ans. 1. It creates a cooling effect.
2. It helps in the ascent of sap by creating a suction force.
3. It helps in the distribution of water and mineral salts (any two).

(vi) List three adaptations in plants to reduce the above mentioned process.

Ans. 1. Sunken stomata.
2. Leaves reduced in size or to spines.
3. Leaves have thickened cuticle.
4. Narrow leaves …….etc. (any three).

(b) Briefly answer the following questions : **[5]**

(i) State two reasons for the increase of population in India.

Ans. Illiteracy, Traditional beliefs, Desire for male child, Religious and social Customs, Mortality rate is high among infants, ….. etc.

(ii) What is the significance of amniotic fluid ?

Ans. Protects the embryo from mechanical shock, Keeps even pressure all round the embryo, Prevents the foetus from sticking to the amnion.

(iii) What is the function of ear ossicles ?

Ans. To transmit the vibrations from the tympanum to the cochlea / membrane of the oval window.

(iv) Mention any two activities of the WHO.

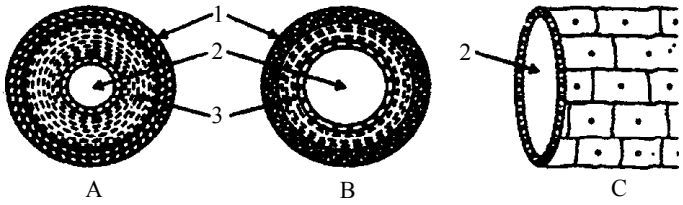
Ans. Collect and supply information on epidemic diseases, To support and promote projects for research on diseases, to suggest quarantine measures to prevent spread of diseases, to lay Pharmaceutical standards for important drugs …… etc.

(v) State Mendel's law of Dominance.

Ans. Out of a pair of contrasting characters present together only one is able to express itself while the other is suppressed.

QUESTION 4

(a) The diagrams given below are cross sections of blood vessels : **[5]**



(i) Identify the blood vessels A, B and C.

Ans. A-Artery B-Vein C-Capillary.

(ii) Name the parts labelled 1 to 3.

Ans. 1. Connective tissue / Tunica externa, 2. Lumen, 3. Endothelium / Muscular layer / Tunica interna

(iii) Name the type of blood that flows through A.

Ans. Oxygenated blood.

(iv) Mention one structural difference between A and B.

Ans. A — Small lumen, thick wall, valves are not present.

B — Large lumen, wall is thin, valves are present (any one set).

(v) In which of the above vessels does exchange of gases actually take place ?

Ans. Exchange of gases takes place in 'C'.

(b) Differentiate between the following pairs on the basis of what is mentioned within brackets : **[5]**

(i) Diffusion and Osmosis (Definition).

Ans. Diffusion — Movement of molecules from a region of high concentration to a region of low concentration.

Osmosis — Movement of water molecules from their region of high concentration to their region of low concentration through a semipermeable membrane // Movement of **water molecules** from a solution of low concentration to a solution of high concentration through a semipermeable membrane.

(ii) RBC and WBC (Shape).

Ans. RBC — Biconcave discs WBC — Amoeboid in shape

(iii) Tubectomy and Vasectomy (Part cut and tied).

Ans. Tubectomy — Oviduct Vasectomy — Sperm duct

(iv) Vasopressin and Insulin (Deficiency disorder).

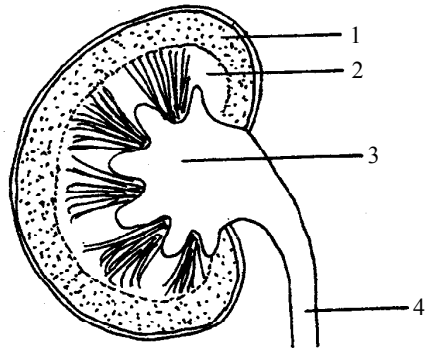
Ans. Vasopressin — Diabetes insipidus Insulin — Diabetes mellitus

(v) Rods and Cones of Retina (Type of pigment).

Ans. Rods — Rhodopsin Cones — Iodopsin

QUESTION 5

(a) The diagram given below shows a section of a human kidney. Study the diagram carefully and answer the questions that follow : **[5]**



(i) Label the parts numbered 1 to 4.

Ans. 1-Cortex 2-Medulla 3-Pelvis 4-Ureter.

(ii) Why does part '2' have a striped appearance ?

Ans. '2' has a striped appearance as the tubules or pyramids are found in the medulla.

(iii) What is the fluid that passes down part '4' ? Name the main nitrogenous waste present in it.

Ans. The fluid is 'glomerular filtrate'. The main nitrogenous waste is urea.

(iv) Mention the structural and functional units of kidneys.

Ans. Nephron / Uriniferous tubule / Renal tubules.

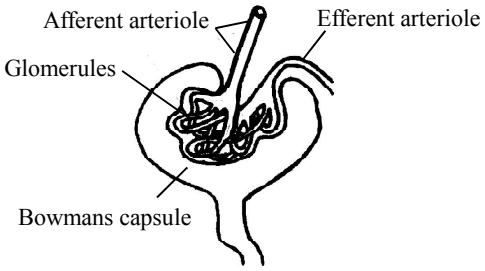
(v) Name the two major steps in the formation of the fluid mentioned in Q. 5(a) (iii).

Ans. 1. Ultrafiltration 2. Re absorption.

(b) Draw neat and labelled diagrams of the following : **[5]**

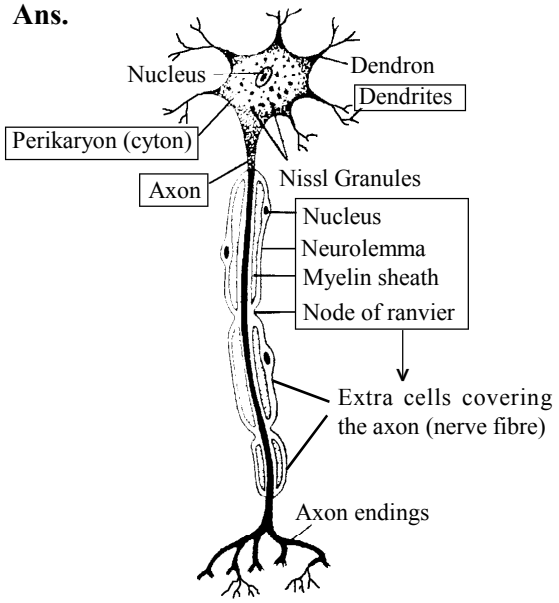
(i) Malpighian Capsule.

Ans.



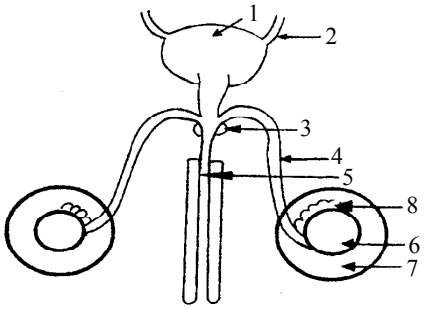
(ii) A Myelinated Neuron.

Ans.



QUESTION 6

(a) The diagram given below shows the male urinogenital system of a human being. Study the diagram and answer the questions that follow : **[5]**



(i) Label the parts numbered 1 to 8.

Ans. 1. Urinary bladder 2. Ureter 3. Prostate gland /Seminal vesicle 4. Sperm duct
5. Urethra 6. Testis 7. Scrotal sac 8. Epididymis

(ii) Name the corresponding structure of part (4) in female reproductive system.

Ans. Fallopian tube / Oviduct.

(iii) What is the role of part 7 ?

Ans. Keeps the testis at the right temperature.

(b) In a homozygous plant round seeds (R) are dominant over wrinkled seeds (r) : **[5]**

(i) Draw a Punnett square to show the gametes and offspring when both the plants have heterozygous round seeds (Rr).

Ans.

	R	r
R	RR	R r
r	r R	r r

(ii) Mention the Phenotype and Genotype ratios of the offsprings in F_2 generation.

Ans. Phenotype — 3 : 1 Genotype — 1 : 2 : 1

(iii) Name the sex chromosomes in human males and females.

Ans. Male — X Y Female — X X

(iv) Briefly explain the term 'Mutation'.

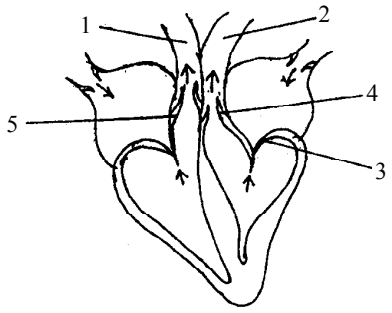
Ans. Mutation is a sudden change in one or more genes, or in the structure of chromosomes.

(v) What is the number of chromosomes in the gametes of human beings ?

Ans. The number of chromosomes is 23.

QUESTION 7

(a) The diagram below represents the human heart in one phase of its functions. Study the diagram carefully and answer the questions that follow : **[5]**



(i) Name the phase.

Ans. Ventricular systole.

(ii) Which part of the heart is contracting in this phase ? Give a reason to support your answer.

Ans. Ventricles, Tricuspid and bicuspid valves are closed, semilunar valves are open permitting blood to enter the aorta and pulmonary artery.

(iii) Name the parts labelled 1 to 4.

Ans. 1. Pulmonary artery 2. Aorta 3. Bicuspid /Mitral valve 4. Semilunar valve.

(iv) What type of blood flows through '2' ?

Ans. Oxygenated blood.

(v) State the function of the part numbered '5' ?

Ans. The semilunar valves in the pulmonary artery prevents the blood that has entered it from returning to the right ventricle.

(vi) Name the membrane that covers the heart.

Ans. The membrane covering the heart is the **Pericardium**.

(b) Explain the following terms : **[5]**

(i) Greenhouse effect.

Ans. *Green House effect :* Accumulation of gases like Carbon dioxide and methane in the atmosphere, preventing the heat from escaping and warming the air / raising the temperature of the atmosphere is termed green house effect.

(ii) Turgor pressure.

Ans. *Turgor pressure :* The pressure exerted by the contents of a **turgid** cell on the cell wall.

(iii) Selective reabsorption.

Ans. *Selective reabsorption :* The absorption of useful substances like glucose and salts from the glomerular filtrate passing through the tubule by the blood in the capillary network surrounding it so as to maintain the normal concentration of blood is termed selective reabsorption.

(iv) Natality.

Ans. *Natality :* The number of live births per thousand people of the population per year is termed natality.

(v) Pulse

Ans. *Pulse :* The recorded beat of the heart felt along a superficial artery is termed pulse // The alternate expansion and elastic recoil of the wall of the artery during ventricular systole.