

**SCIENCE**  
**Solved Paper-3 (Biology), 2017**  
**(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 [ ].*

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**SECTION I (40 Marks)**

Attempt **all** questions from this section

**QUESTION 1**

(a) Name the following :

[5]

- (i) The process by which root hairs absorb water from the soil.

**Ans.** Endosmosis

- (ii) The organ which produces urea.

**Ans.** Liver (Kidney)

- (iii) The kind of lens required to correct Myopia.

**Ans.** Concave / biconcave / Diverging

- (iv) The pituitary hormone which stimulates contraction of uterus during child birth.

**Ans.** Oxytocin

- (v) The international health organization which educates people in accident prevention.

**Ans.** Red Cross / Red Cross Society / Indian Red Cross Society (Red Cross operative)

(b) Choose the correct answer from each of the four options given below :

[5]

- (i) The prime source of chlorofluorocarbon is :

(a) Vehicular omissions

(b) Industrial effluents

(c) Domestic sewage

(d) Refrigeration equipments

**Ans.** (d) Refrigeration equipments

- (ii) Penicillin obtained from a fungus is :

(a) Antibiotic

(b) Antiseptic

(c) Antibody

(d) Antiserum

**Ans.** (a) Antibiotic

- (iii) Marine fish when placed in tap water bursts because of :

(a) Endosmosis

(b) Exosmosis

(c) Diffusion

(d) Plasmolysis

**Ans.** (a) Endosmosis

- (iv) Surgical method of sterilization in a woman involves cutting and tying of :

(a) Ureter

(b) Uterus

(c) Urethra

(d) Oviduct

**Ans.** (d) Oviduct

- (v) Synthesis phase in the cell cycle is called so, because of the synthesis of more :-

(a) RNA

(b) RNA and proteins

(c) DNA

(d) Glucose

**Ans.** (c) DNA

(c) The statements given below are incorrect. **Rewrite the correct statement** by changing the underlined words of the statements : [5]

(i) The Graafian follicle, after ovulation turns into a hormone producing tissue called Corpus Callosum.

**Ans.** Corpus luteum

(ii) Deafness is caused due to the rupturing of the Pinna.

**Ans.** Tympanum / Ear drum

(iii) Gyri and Sulci are the folds of Cerebellum.

**Ans.** Cerebrum / Cerebral Cortex

(iv) Free movement of solutes in and out of the cell takes place across the cell membrane.

**Ans.** Cell wall

(v) The solvent used to dissolve the chlorophyll pigments while testing a leaf for starch is Soda lime.

**Ans.** Alcohol / Methylated spirit / Methanol / Methyl alcohol / Absolute alcohol / Acetone

(d) Given below are sets of five terms each. Rewrite the terms in correct order in a logical sequence : [5]

(i) Fibrin, Platelets, Thromboplastin, Fibrinogen, Thrombin.

**Ans.** Platelets, Thromboplastin, Thrombin, Fibrinogen, Fibrin.

(ii) Cochlea, Malleus, Pinna, Stapes, Incus.

**Ans.** Pinna, Malleus, Incus, Stapes, Cochlea.

(iii) Receptor, Spinal cord, Effector, Motor Neuron, Sensory neuron.

**Ans.** Receptor, Sensory neuron, Spinal cord, Motor Neuron, Effector.

(iv) Uterus, Parturition, Fertilisation, Gestation, Implantation.

**Ans.** Fertilisation, Uterus, Implantation, Gestation, Parturition.

(v) Caterpillar, Snake, Owl, Frog, Green leaves.

**Ans.** Green leaves, Caterpillar, Frog, Snake, Owl.

(e) Choose the **ODD** one out of the following terms given and name the **CATEGORY** to which the others belong : [5]

(i) Aqueous humour, Vitreous humour, Iris, Central canal.

**Ans. ODD** — Central canal **CATEGORY** — Parts of eye / Eyeball / Structures of eye

(ii) Formalin, Iodine, DDT, Lime.

**Ans. ODD** — Iodine **CATEGORY** — Disinfectants

(iii) ACTH, TSH, ADH, FSH.

**Ans. ODD** — ADH **CATEGORY** — Trophic hormones / Hormones of anterior pituitary

(iv) Phosphate, RNA, Sugar, Nitrogenous base

**Ans. ODD** — RNA **CATEGORY** — Parts of nucleotide / elements of DNA.

(v) Bile, Urea, Uric acid, Ammonia.

**Ans. ODD** — Bile **CATEGORY** — Nitrogenous wastes / Constituents of urine (urea = 0)  
Excretory waste / Metabolic waste

(f) Given below are groups of terms. In each group the first pair indicates the relationship between the two terms. Rewrite and complete the second pair on a similar basis

*Example* : Oxygen : Respiration :: Carbondioxide : Expiration [5]

(i) Eye : Optic nerve :: Ear : .....

**Ans.** Ear : Auditory nerve / Vestibular nerve / Cochlear nerve

(ii) Cytoplasm : Cytokinesis :: Nucleus : .....

**Ans.** Nucleus : Karyokinesis

(iii) TT; Homozygous :: Tt : .....

**Ans.** Tt : Heterozygous / Hybrid



(iv) Foetus : Amnion : : Heart : .....

**Ans.** Heart : Pericardium / Visceral pericardium / Parietal pericardium

(v) Adenine : Thymine : : Cytosine : .....

**Ans.** Cytosine : Guanine

(g) Match the items given in **Column A** with the most appropriate ones in **Column B** and rewrite the correct matching pairs. [5]

**Column A**

- (i) Sacculus
- (ii) Birth rate
- (iii) DNA and histones — Nucleosome
- (iv) Euro norms
- (v) Diabetes mellitus

**Column B**

- Dynamic body balance
- Hyperglycemia
- Hypoglycemia
- Natality
- Static body balance
- Vehicular standards
- Nucleosome

**Ans.** (i) Sacculus — Static body balance  
(ii) Birth rate — Natality  
(iii) DNA and histones — Nucleosome  
(iv) Euro norms — Vehicular standards  
(v) Diabetes mellitus — Hyperglycemia

(h) The diagram given alongside represents the location and structure of an endocrine gland. Study the same and answer the questions that follow : [5]

(i) Name the endocrine gland shown in the diagram.

**Ans.** Thyroid gland

(ii) Name the secretion of the gland which regulates basal metabolism.

**Ans.** Thyroxine /  $T_3$  / Tri iodo thyroxine /  $T_4$  / tetra iodo thyroxine

(iii) Name the mineral element required for the synthesis of the above mentioned hormone

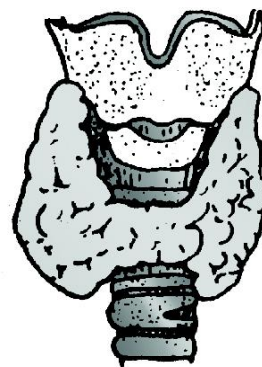
**Ans.** Iodine /  $I_2$

(iv) Name the disease caused due to under secretion of the above mentioned hormone in children.

**Ans.** Cretinism

(v) Name the disease caused due to hypersecretion of the above mentioned hormone.

**Ans.** Exophthalmic goitre / Hyperthyroidism / Grave's disease.



**SECTION II (40 Marks)**

Attempt any **four** questions from this Section

**QUESTION 2**

(a) Study the diagram given alongside which represents a stage during the mitotic cell division and answer the questions that follow : [5]

(i) Identify the stage giving suitable reasons.

**Ans.** **Telophase**, Nuclear membrane present / daughter nuclei formed / nucleolus reappears

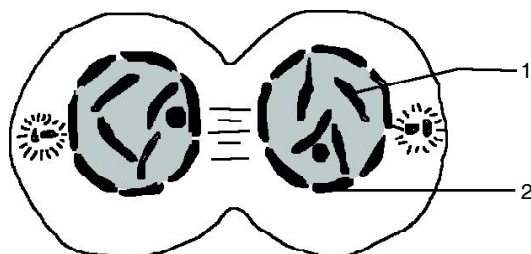
(ii) Name the parts numbered 1 and 2.

**Ans.** 1. Chromatin thread / Chromosome / Chromatid / Sister chromatid / Chromatin fibre.

2. Nuclear membrane / Nucleus

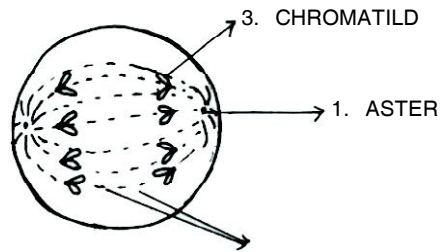
(iii) What is the technical term for division of nucleus ?

**Ans.** Karyokinesis



- (iv) Mention the stage that comes before the stage shown in the diagram. Draw a neat labelled Diagram of the stage mentioned.

**Ans.** Anaphase



- (v) Which is the cell division that results in half the number of chromosomes in daughter cells ?

**Ans.** Meiosis / Meiotic division

- (b) Differentiate between the following on the basis of what is mentioned in brackets : [5]

- (i) Active transport and Diffusion [*significance in plants*]

**Ans.** Active transport — Absorb mineral ions from Soil / Uptake of mineral ions.

Diffusion — Take in  $\text{CO}_2$  for photosynthesis /  $\text{O}_2$  for respiration / removal of  $\text{H}_2\text{O}$  vapour / passive uptake of minerals from soil.

- (ii) Demography and Population density [*Definition*]

**Ans.** Demography — Statistical study of the human population / Scientific study of the human population.

Population density — Number of individuals / people living per square kilometre at any given time.

- (iii) Antibiotic and Antibody [*Source*]

**Ans.** Antibiotic — Microorganisms / Bacteria / Fungi / Mold

Antibody — Lymphocytes / B cells

- (iv) Renal cortex and Renal medulla [*parts of the nephrons present*]

**Ans.** Renal cortex — Bowman's capsule, proximal convoluted tube, Distal convoluted tube.

Renal medulla — loop of Henle, collecting duct

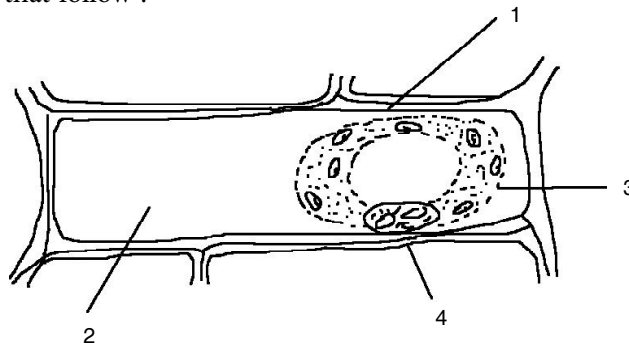
- (v) NADP and ATP [*Expand the abbreviation*]

**Ans.** NADP — Nicotinamide adenine dinucleotide phosphate

ATP — Adenosine tri phosphate (Adenine triphosphate = 0)

### QUESTION 3

- (a) The diagram given below represents a plant cell after being placed in a strong sugar solution. Study the diagram and answer the questions that follow : [5]



- (i) What is the state of the cell shown in the diagram ?

**Ans.** Flaccid / Plasmolysed.

- (ii) Name the structure that acts as a semipermeable membrane.

**Ans.** Plasma membrane / Cell membrane / Plasmalemma.

- (iii) Label the parts numbered 1 to 4 in the diagram.

**Ans.** 1. Cell wall    2. Conc sugar solution / Strong sugar solution  
3. Cell membrane / Plasma membrane    4. Nucleus / Nuclear membrane.

- (iv) How can the above cell be brought back to its original condition ? Mention the scientific term for the recovery of the cell.

**Ans.** Place it in tap water / hypotonic solution / Dilute solution / less concentrated solution. **Deplasmolysis.**

- (v) State any two features of the above cell which is not present in animal cells.

**Ans.** Cell wall / Chloroplast / Large vacuole. (any two)

- (b) Given alongside is a representation of a kind of pollution. Study the same and answer the questions that follow : [5]

- (i) Name the kind of pollution.

**Ans.** Sound / Noise pollution

- (ii) List any three common sources of this pollution .

**Ans.** Loudspeakers / Television / Radio / Loud conversations / Musical bands / Grinder / Air conditioners / Mixie ..... (any three)

- (iii) Mention three harmful effects of this pollution on human health.

**Ans.** Heart problems / Deafness / Loss of concentration / disturbed sleep / damage to tympanum / irritability / Hypertension. (any three)

- (iv) Explain the term 'Pollution'.

**Ans.** Any substance — solid, gas, liquid which when added to air, water, soil changes the natural quality / deteriorates the natural quality of the environment.

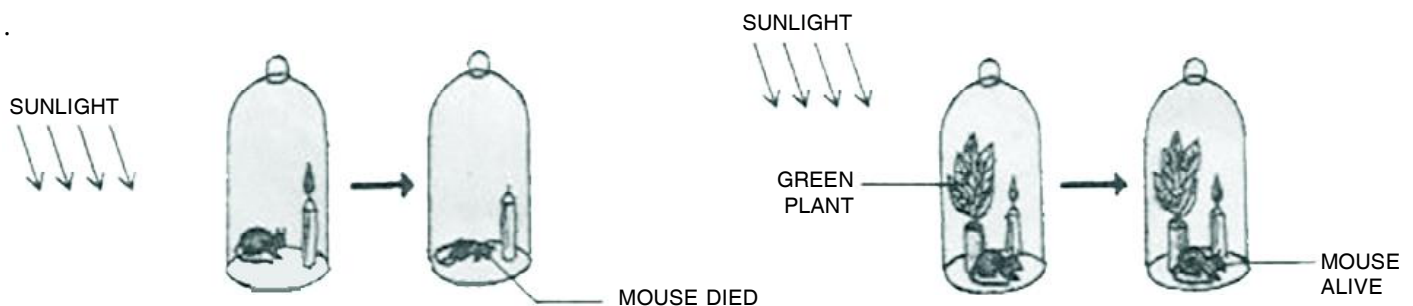
- (v) Name two soil pollutants.

**Ans.** Industrial waste / domestic waste / plastics / pesticides / biomedical waste / heavy metals / acid rain / sewage / excess urea. (any two).



#### QUESTION 4

- (a) The diagrams given below represent the relationship between a mouse and a physiological process that occurs in green plants. Study the diagrams and answer the questions that follow : [5]



- (i) Name the physiological process occurring in the green plant that has kept the mouse alive.

**Ans.** Photosynthesis

- (ii) Explain the physiological process mentioned above.

**Ans.** Process by which **green parts** of a plant manufacture starch in the presence of sunlight, carbon dioxide and water.

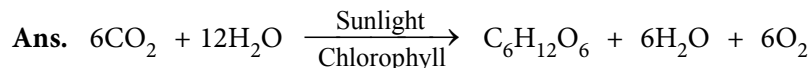
(iii) Why did the mouse die in bell jar B?

**Ans.** Oxygen in the jar was used by the candle to burn / lack of oxygen / asphyxiation.

(iv) What is the significance of this process as stated in (i) for life on earth ?

**Ans.** Provides food / Oxygen for respiration / plant and animal respiration / maintains oxygen level in the atmosphere.

(v) Represent the above mentioned physiological process in the form of a chemical equation.



(b) Mention the exact location of the following :

[5]

(i) Prostate gland.

**Ans.** Surrounding ureter / Close to origin of urinary bladder/in front of rectum.

(ii) Myelin sheath.

**Ans.** Surrounding axon of neuron / Surrounding nerve fibre.

(iii) Islets of Langerhans.

**Ans.** Pancreas.

(iv) Semi-circular canals.

**Ans.** Inner ear / part of membranous labyrinth / internal ear.

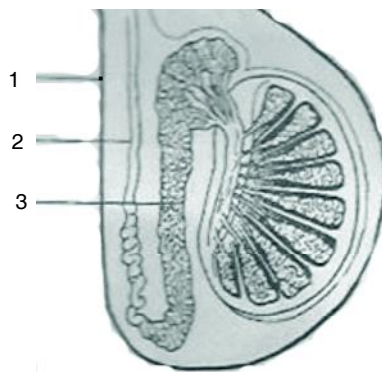
(v) Eustachian tube.

**Ans.** Connecting middle ear to throat / mesopharynx to ear / connect pharynx to middle ear.

## QUESTION 5

(a) The diagram shown below is the longitudinal section of a testis of man. Study it carefully and answer the questions that follow :

[5]



(i) Label the parts numbered 1 to 3 in the diagram.

**Ans.** 1. Scrotum / Scrotal sac

2. Sperm duct / Vas deferens / Spermatic cord

3. Epididymus

(ii) In which part of the testis are the sperms produced ?

**Ans.** Seminiferous tubule

(iii) State the functions of the parts labelled 1 and 3 in the diagram.

**Ans.** 1. Maintains temperature of 95°F / 25°C for sperm maturation / protects testis from mechanical shocks / protects testis from compression / Maintains temperature of 2 to 3° less than body temperature for sperm maturation.

3. Storage of sperm till maturity .

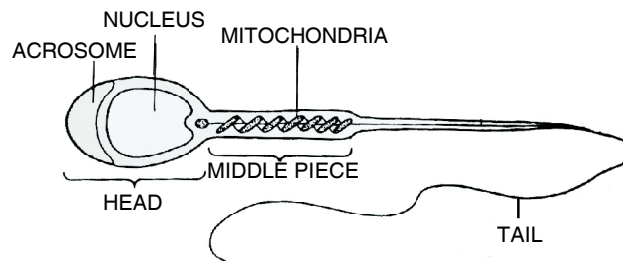


(iv) Name the cells that secrete Testosterone.

**Ans.** Interstitial cells

(v) Draw a neat labelled diagram of a sperm.

**Ans.**



(b) Give biological reasons for the following :

[5]

(i) Some women have facial hair like beard and moustache.

**Ans.** Due to overgrowth of adrenal cortex, increases adrenal androgen level, increase in cortisones due to hyperaction of adrenal gland.

(ii) Cutting of trees should be discouraged.

**Ans.** Cutting down of trees would result in soil erosion, loss of habitat for different species, less water vapour in the atmosphere affecting the water cycle, green house gases increase leading to global warming.

(iii) In some xerophytes leaves are modified to spines.

**Ans.** Xerophytes are plants growing in deserts and arid areas, in order to prevent loss of water due to excessive transpiration, leaves are modified to spines to reduce surface area exposed to sunlight, and to reduce the number of stomata thereby transpiration.

(iv) There is frequent urination in winter than in summer.

**Ans.** Sweat glands are less active in winter and so no water is lost through them. The water has to be sent out of the body only through the kidneys in the form of urine, hence there is frequent urination in winter than in summer.

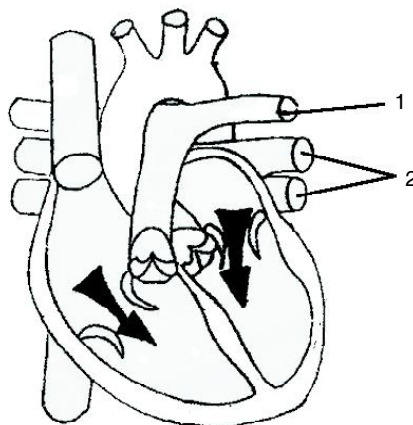
(v) The left ventricle of the heart has a thicker wall than the right ventricle.

**Ans.** The wall of the left ventricle is thicker as it has to pump the blood to the head and the toes, whereas the right ventricle has to pump the blood only till the lungs.

## QUESTION 6

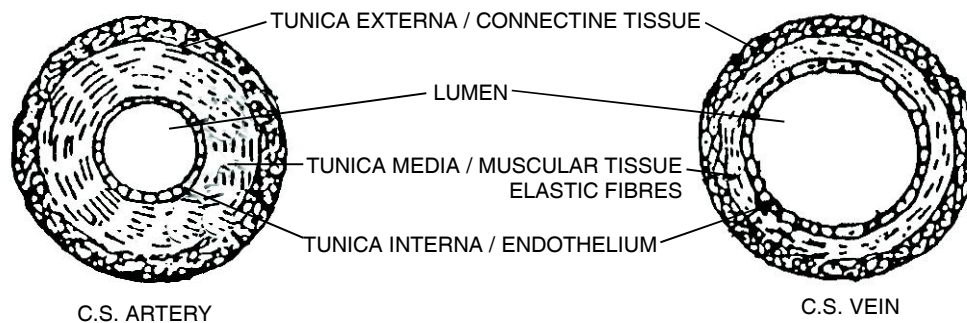
(a) The diagram given below represents a section of the human heart. Answer the questions that follow :

[5]





- (i) Which parts of heart are in the diastolic phase ? Give a reason to support your answer.  
**Ans.** Ventricles of the heart. Tricuspid and Bicuspid valves are open / semilunar valves are closed.
- (ii) Label the parts numbered 1 and 2 in the diagram.  
**Ans.** 1. Pulmonary artery, deoxygenated blood  
 2. Pulmonary vein, Oxygenated blood
- (iii) What causes the heart sounds 'LUB' and 'DUB' ?  
**Ans.** **LUB** — closing of tricuspid and bicuspid valve  
**DUB** — closing of semilunar valves of Pulmonary artery and Aorta
- (iv) Name the blood vessels that supply oxygenated blood to the heart muscles.  
**Ans.** Coronary artery
- (v) Draw neat labelled diagrams of a cross section of an artery and a vein.  
**Ans.**



(b) Give appropriate **biological / technical** terms for the following :

[5]

- (i) The type of immunity that exists in our body due to our genetic make up.  
**Ans.** Innate / Inborn / Natural / Native
- (ii) The suppressed allele of a gene.  
**Ans.** Recessive
- (iii) The accessory gland in human males whose secretion activates the sperms.  
**Ans.** Seminal vesicle
- (iv) An apparatus that measures the rate of water uptake in a cut shoot due to transpiration.  
**Ans.** Ganong's potometer / Darwin's potometer / Potometer.
- (v) The kind of twins formed from two fertilized eggs.  
**Ans.** Fraternal / Dizygotic
- (vi) A pair of corresponding chromosomes of the same size and shape, one from each parent.  
**Ans.** Homologous chromosome
- (vii) The mild chemical substance which when applied on the body kills germs.  
**Ans.** Antiseptic
- (viii) The type of waste generated in hospitals and pathological laboratories.  
**Ans.** Biomedical waste
- (ix) The antiseptic present in tears.  
**Ans.** Lysozyme
- (x) Cellular components of blood containing haemoglobin.  
**Ans.** RBC / Red blood corpuscle / Erythrocyte / Red blood cells.





## QUESTION 7

(a) In a homozygous pea plant, axial flowers (**A**) are dominant over terminal flowers (**a**) : [5]

- (i) What is the phenotype and genotype of the  $F_1$  generation if a plant bearing pure axial flowers is crossed with a plant bearing pure terminal flowers.

**Ans.** Phenotype — All axial flowers      Genotype — Aa

- (ii) Draw a Punnett square board to show the gametes and offsprings when both the parent plants are heterozygous for axial flowers.

**Ans.**

	A	a
A	AA	Aa
a	Aa	aa

- (iii) What is the Phenotypic ratio and genotypic ratio of the above cross shown in (ii) ?

**Ans.** Phenotypic ratio — 3 : 1      Genotypic ratio — 1 : 2 : 1

- (iv) State Mendel's Law of Dominance.

**Ans.** Law of Dominance states that out of a pair of contrasting characters present together only one is able to express itself while the other remains suppressed.

- (v) Name two genetic disorders commonly seen in human males.

**Ans.** Colour blindness, Haemophilia, Baldness, Hypertrichosis.

(b) The diagram given alongside is an external view of the human brain. Study the same and answer the questions that follow : [5]

- (i) Name the parts labelled A, B and C in the diagram.

**Ans.** A. Cerebrum      B. Cerebellum      C. Spinal cord

- (ii) State the main functions of the parts labelled A and B.

**Ans.** A. Seat of memory, Seat of intelligence, Seat of consciousness, Seat of thinking, Seat of reasoning out (any one)

B. Maintains gait / balance of the body, Coordinates muscular activity. (any one)

- (iii) What are the structural and functional units of the brain ? How are the parts of these units arranged in A and C ?

**Ans.** Neuron

A — gray matter outside white matter inside / Cytons outside axons inside

B — gray matter inside white matter outside / Cytons inside axons outside

- (iv) Mention the collective term for the membranes covering the brain.

**Ans.** Meninges

- (v) What is the function of the cerebrospinal fluid ?

**Ans.** Protects the brain / spinal cord, Provides nutrients, Provides for exchange of respiratory gases, Immunological protection. (any one).

