

Technical Graduates Selection Examination
PAPER II: General Subject Knowledge

Time – 90 minutes

Section A: Multiple Choice Questions.

Circle the ONE most correct or appropriate answer.

(1 mark each)

1. Osmosis is:
 - a) Diffusion of a solvent through a permeable membrane from a concentrated solution to a dilute solution.
 - b) Diffusion of a solvent through a semi-permeable membrane from a concentrated solution to a dilute solution.
 - c) Diffusion of a solvent through a semi-permeable membrane from a dilute solution to a concentrated solution.
 - d) Diffusion of a solvent through a permeable membrane from a dilute solution to a concentrated solution.

2. Transpiration is not affected by:
 - a) Intensity of sunlight
 - b) Amount of rainfall
 - c) Temperature
 - d) Velocity of wind

3. Photosynthesis:
 - a) Has two major phases- dark reaction and light reaction
 - b) Releases carbon dioxide as a waste product
 - c) Uses oxygen, water and light energy
 - d) Can take place in the absence of chlorophyll

4. One gram molecule of glucose on complete oxidation yields:
 - a) 28 molecules of ATP
 - b) 38 molecules of ATP
 - c) 18 molecules of ATP
 - d) 48 molecules of ATP

5. Mitosis:
 - a) Occurs in reproductive cells
 - b) The chromosomes and the genes in the daughter cells are not identical
 - c) Produces two daughter cells
 - d) Half the number of chromosomes is passed onto each daughter cell

6. The following category of white blood cells do not contain granules:
 - a) Neutrophils
 - b) Eosinophils
 - c) Basophils
 - d) Lymphocytes

7. Veins:
 - a) Have valves
 - b) Carry blood to an organ
 - c) Usually carry oxygenated blood
 - d) Have narrower lumen compared to arteries

8. Anaerobic respiration in animals:
 - a) Produces lactic acid
 - b) Produces carbon dioxide
 - c) Produces ethanol
 - d) Produces glucose

9. Cerebrum is the seat of :
 - a) Intelligence
 - b) Muscular coordination
 - c) Involuntary actions
 - d) Temperature control

10. The accessory glands in the male are:
 - a) Seminal vesicles
 - b) Prostate gland
 - c) Cowper's gland
 - d) All of the above

11. Over secretion of thyroid hormone leads to:
 - a) Myxedema
 - b) Cretinism
 - c) Exophthalmic goiter
 - d) Simple goiter

12. Which of the following is not a derivative of the skin?
 - a) Sebaceous gland
 - b) Sweat gland
 - c) Bartholin gland
 - d) Mammary gland

13. The cones of the retina are:
- Mostly located in the centre of the retina
 - Very sensitive to low levels of illumination
 - More numerous than the rods
 - Of only one type
14. Gonadotrophic hormones are produced in:
- Posterior part of thyroid
 - Adrenal cortex
 - Adenohypophysis of pituitary
 - Interstitial cells of testis
15. Reflex action in a vertebrate is an essential display exhibited by:
- Autonomic response
 - Sensory nerve
 - Motor nerve
 - Sympathetic nerve
16. The ear ossicles of a mammal are arranged in one of the following orders starting from the tympanum inwards:
- Malleus, incus, stapes
 - Malleus, stapes, incus
 - Incus, malleus, stapes
 - Stapes, incus, malleus
17. The function of kidney in mammals is to excrete:
- Extra water, extra salts and extra sugar
 - Extra salts, urea and excess water
 - Extra urea, extra water and extra amino acids
 - Extra urea, extra carbohydrates and extra water
18. Which statement is correct with reference to the circulation of blood in a mammal?
- Venous blood is returned to the left auricle
 - Pulmonary vein carries blood venous blood from the right auricle to the lungs
 - Pulmonary artery returns oxygenated blood from the lungs to the left auricle
 - Left auricle receives oxygenated blood from the lungs
19. Water will be absorbed by the root hairs when the external solution is:
- Hypertonic
 - Viscous
 - Hypotonic
 - Isotonic

20. Which of the following underground fleshy structure is a stem?
- Sweet potato
 - Potato
 - Turnip
 - Carrot
21. The dark reaction in photosynthesis is so called because:
- It cannot occur in daytime
 - Can occur only in the shade
 - Does not require light
 - Occurs more rapidly at night
22. The essential organs in a flower are:
- The sepals and stamens
 - The petals and pistils
 - The stamens and pistils
 - The sepals and petals
23. Which one of these is body building material?
- Sugar
 - Mineral salts
 - Fats
 - Protein
24. Charge carriers in conductors are:
- Electrons
 - Positrons
 - Photons
 - Mesons
25. When the body is positively charged by friction, it has:
- Lost some electrons
 - Gained some protons
 - Gained some electrons
 - Lost some protons
26. Solid angle is an entity which is:
- One dimensional
 - Two dimensional
 - Three dimensional
 - None of the above

27. Steradian is the unit of:
a) Length
b) Mass
c) Angle
d) None of these
28. If a glass plate is placed between two charged bodies, the force between them will:
a) Increase
b) Decrease
c) Remain same
d) Be zero
29. Increasing the charge on the plates of a capacitor means:
a) Increasing the capacitance
b) Increasing the potential difference between the plates
c) Both
d) None
30. Two cells of 1.25V and 0.75V are connected in parallel. The effective voltage will be:
a) 0.75V
b) 1.25V
c) 2.00V
d) 0.50V
31. The best instrument for the accurate measurement of e.m.f. of a cell is:
a) A voltmeter
b) An ammeter
c) A potentiometer
d) Wheatstone bridge
32. Production of heat due to an electric current flowing through a conductor is given by:
a) Joule's effect
b) Joule-Thomson's effect
c) See-beck effect
d) Peltier effect
33. The ratio of resistance of 40W and 60W electric bulbs is:
a) $1/2$
b) $3/2$
c) $2/3$
d) $9/4$

34. Thermopile is a device used for the detection of:
- Heat radiation
 - Light radiation
 - Electric current
 - Atomic energy
35. Unit of magnetic intensity at any point in the magnetic field in the C.G.S. system is:
- tesla
 - gauss
 - henry
 - farad
36. Which one of the following substances is not magnetic?
- Brass
 - Cobalt
 - Nickel
 - Iron
37. A strong magnetic field is applied to a stationary electron, then
- the electron moves in the direction of the field
 - the electron moves in an opposite direction
 - the electron remains stationary
 - the electron starts spinning
38. Lenz's law is a consequence of law of conservation of:
- charge
 - momentum
 - mass
 - energy
39. A.C. is used in homes because
- it is not dangerous
 - it is easily reproducible
 - it is cheap
 - it is economical in transmission
40. A transformer steps up or steps down
- a.c. only
 - d.c. only
 - either a.c. or d.c.
 - a.c. mixed with d.c.

41. When viewed in white light, soap bubbles show colour because of:
- Interference
 - Scattering
 - Diffraction
 - Dispersion
42. Polarisation is characteristic of:
- Light wave
 - Sound wave
 - Water wave
 - None of the above
43. "Photometry" is the branch of Physics which deals with the measurement of:
- heat
 - light
 - sound
 - electricity
44. The optical centre of a bi-convex lens lies:
- inside the lens exactly at the centre of the lens
 - inside the lens not at the centre
 - outside the lens
45. Which of the following is correct for the order of colours present in white light?
- VIYGOBR
 - VIBGYOR
 - VBIYORG
 - VIGBOYR
46. Cathode ray consists of particles carrying the charge same as that of:
- proton
 - electron
 - alpha particle
 - they do not carry any charge
47. Distance of distinct vision for a normal eye is:
- 5cm
 - 25cm
 - 50cm
 - Infinity

48. In which of the following is energy stored in the cells?
- ATP
 - Amino acid
 - Glucose
 - Lipids
49. Hydrolysis of adenosine triphosphate involves rupture of:
- sugar-phosphate bond
 - the whole molecule
 - base-sugar bond
 - P-O-P bond
50. Vitamin C is:
- rabinose
 - thiamine
 - riboflavin
 - ascorbic acid
51. Glycolysis involves the break down of:
- glucose to pyruvate
 - phosphoglycerate
 - glucose to carbon dioxide
 - glucose to glyceraldehyde phosphate
52. The process of cellular respiration is:
- aerobic
 - anaerobic
 - metabolic
 - anabolic
53. The Y-shaped protein molecules involved in the immune system are:
- imunoglobins
 - antigens
 - pathogens
 - lipase
54. A cell that lacks chloroplast does not:
- require water
 - liberate carbon dioxide
 - utilize carbohydrate
 - evolve oxygen

55. Which one of the following is not present in RNA?
a) uracil
b) thymine
c) ribose
d) phosphate
56. The purine base present in nucleic acid is:
a) uracil
b) cytosine
c) guanine
d) thymine
57. The simplest form of amino acid is:
a) cysteine
b) alanine
c) glycine
d) valine
58. Ozone layer is depleted in the stratosphere by man-made chemical which is:
a) Bakelite
b) Teflon
c) Ethylene
d) CFC
59. The radioactive and nuclear wastes are hazardous in the environment because:
a) bacteria are killed
b) viruses and parasites proliferate
c) only somatic damage to the organism are caused
d) both somatic and genetic damage are caused to the organism
60. Which of the following statements is incorrect regarding benzaldehyde?
a) It is known as oil of bitter almonds
b) It is used in perfumery
c) On oxidation it gives benzoic acid
d) On reduction it gives phenol
61. Phenol is also called:
a) salicylic acid
b) benzyl alcohol
c) carboic acid
d) salol

62. Aniline is separated from a mixture by:
- fractional crystallization
 - fractional distillation
 - steam distillation
 - vacuum distillation
63. By Wurtz-Fittig reaction chlorobenzene can be converted to:
- benzoic acid
 - benzene
 - toluene
 - butane
64. To become a carbohydrate, a compound must contain at least:
- 2 carbon atoms
 - 3 carbon atoms
 - 4 carbon atoms
 - 6 carbon atoms
65. The digestion of fat in the intestine is aided by:
- Diffusion
 - Absorption
 - Peptisation
 - Emulsification
66. Urea is a diamide of:
- acetic acid
 - carbonic acid
 - formic acid
 - none of the above
67. The reaction of acetamide with water is called:
- alcoholysis
 - hydrolysis
 - ammonolysis
 - saponification
68. What makes a lemon sour?
- oxalic acid
 - tartaric acid
 - citric acid
 - hydrochloric acid

69. Isomers have the same:
- a) structural formula
 - b) chemical properties
 - c) molecular formula
 - d) physical properties
70. Which of the following statements is incorrect?
- a) hydrogen peroxide can act as an oxidizing agent
 - b) hydrogen peroxide can act as a reducing agent
 - c) hydrogen peroxide has acidic properties
 - d) hydrogen peroxide has basic properties

Section B: Short answer questions.

Write short answers to each of these questions.

(3 marks each)

1. Differentiate between plasmolysis and deplasmolysis.
2. What is the difference between a hormone and an enzyme? Give one example of each.
3. What are first class proteins? Name two first class proteins.
4.
 - a) What is greenhouse effect?
 - b) Name two common gases which are responsible for causing greenhouse effect.
 - c) What are the main effects of global warming caused by the green house effect?
5. Explain the meaning of each of the following terms giving one illustrative example in each case.
 - a) sulphonation
 - b) arenes
6. What are carbohydrates and how are they classified?
7. What is the importance of cadmium rods in a nuclear reactor?
8. Why do we get shadows in place of bones when X-rays are allowed to pass through our body?
9. A newton disc when rotated fast enough appears white. What is the reason?
10. If we look at the sun through narrowed eyelids we see colours. Why is it so?