

# UNIVERSITY OF LUCKNOW

## D.Pharm Entrance Examination

### Biology Group — Model Test Paper Set 15

Total Questions: 100 | Section A: Chemistry & Physics (50) + Section B: Biology (50)

LUUPDATE

#### SECTION A — Chemistry & Physics [50]

##### Chemistry

1. The structure of monomer unit in 'neoprene' rubber is 'neoprene' :

- (a)  $\text{CH} = \text{C}(\text{CH}_3)$  (b)  $\text{CH} = \text{CH}$   
(c)  $\text{CH}(\text{Cl}) = \text{CH}$  (d)  $\text{CH} = \text{C}(\text{Cl})$

Answer: (d)  $\text{CH} = \text{C}(\text{Cl})$

2. Which of the following statements is incorrect with respect to a carbanion?

- (a) It is diamagnetic (b) Its hybridization is  $\text{sp}^2$  and geometry is planar  
(c) It behaves as a charged nucleophile (d) It is formed by heterolytic bond fission

Answer: (b) Its hybridization is  $\text{sp}^2$  and geometry is planar

3. Which of the following is not the mineral of magnesium?

- (a) Magnesite (b) Magnetite  
(c) Kieserite (d) Dolomite

Answer: (b) Magnetite

4. A refining method called "Cupellation" is mainly used in the metallurgy of  $\text{Cu}$  &  $\text{Ag}$  (Cupellation) :

- (a) Copper (b) Calcium  
(c) Aluminium (d) Silver

Answer: (d) Silver

5. The anode mud in the electrolytic refining of silver contains :

- (a) Au (b) Au, Pb  
(c) Zn, Sn, Au (d) Zn, Cu, Au

Answer: (a) Au

6. The metallic lustre exhibited by freshly cut sodium piece is explained by :

- (a) excitation of free protons of sodium metal (b) diffusion of sodium ions on the surface  
(c) conversion of metal atoms to its shining oxide (d) oscillations of loosely bound electrons

Answer: (d) oscillations of loosely bound electrons

7. Which of the following materials contains the highest percent of iron?

- (a) Wrought iron (b) Pig iron  
(c) Steel (d) Cast iron

Answer: (a) Wrought iron

8. The IUPAC name of  $[\text{Pt}(\text{NH}_3)_4(\text{NO})_2(\text{Cl})]\text{SO}_4$  is :

- (a) chloronitrotetrammineplatinum (IV) sulphate (b) tetramminechloronitroplatinum (IV) sulphate  
(c) tetramminechloronitroplatinum (II) sulphate (d) chlorotetramminenitroplatinum (IV) sulphate

Answer: (b) tetramminechloronitroplatinum (IV) sulphate

9. Which of the following complex ion is diamagnetic?

- (a)  $[\text{NiCl}_4]^{2-}$  (b)  $[\text{Ni}(\text{CN})_4]^{2-}$

(c)  $[\text{CoF}]_3$  (d)  $[\text{Ni}(\text{NH})]_2^+$

Answer: (b)  $[\text{Ni}(\text{CN})]_2$

10. The most stable complex among the following is

(a)  $[\text{CdCl}]_2$  (b)  $[\text{CdI}]_2$

(c)  $[\text{Cd}(\text{CN})]_2$  (d)  $[\text{CdBr}]_2$

Answer: (c)  $[\text{Cd}(\text{CN})]_2$

11. Vitamin B is a complex of

(a) Chromium (III) ion (b) Cobalt (II) ion

(c) Cobalt (III) ion (d) Chromium (II) ion

Answer: (c) Cobalt (III) ion

12. Transition metal compounds are usually colored. This is because of the electronic transition :

(a) from d-orbital to s-orbital (b) from d-orbital to p-orbital

(c) from d-orbital to f-orbital (d) within d-orbitals

Answer: (d) within d-orbitals

13. Which of the following hydrated transition metal ions is colorless?

(a)  $\text{Ti}(\text{III})$  (b)  $\text{Fe}(\text{III})$

(c)  $\text{Fe}(\text{II})$  (d)  $\text{Ti}(\text{IV})$

Answer: (d)  $\text{Ti}(\text{IV})$

14. Which of the following sequences of electron affinity about halogens is correct?

(a)  $\text{F} > \text{Cl} > \text{Br}$  (b)  $\text{F} > \text{Cl} < \text{Br}$

(c)  $\text{F} < \text{Cl} > \text{Br}$  (d)  $\text{F} < \text{Cl} < \text{Br}$

Answer: (b)  $\text{F} > \text{Cl} < \text{Br}$

15. In hydrogen peroxide, the hybridization involved in oxygen atoms is :

(a)  $\text{sp}^3\text{d}^2$  (b)  $\text{sp}^3$

(c)  $\text{sp}$  (d)  $\text{sp}^2$

Answer: (b)  $\text{sp}^3$

16. The volume of ammonia obtained when 60 litres of dry hydrogen reacts with excess of dry nitrogen when all volumes measured at STP, would be

(a) 0.04  $\text{m}^3$  (b) 0.02  $\text{m}^3$

(c) 0.06  $\text{m}^3$  (d) 0.03  $\text{m}^3$

Answer: (a) 0.04  $\text{m}^3$

17. Orthophosphorus acid is

(a) tribasic (b) monobasic

(c) dibasic (d) neutral

Answer: (c) dibasic

18. Mohr' salt is a primary standard reagent because :

(a) it is cheaper and readily available (b) it is stable

(c) its molecular weight is fairly high (d) it has light green color

Answer: (b) it is stable

19. Galvanized iron is obtained by coating iron with a thin film of

(a) Sn (b) Al

(c) Cu (d) Zn

Answer: (d) Zn

**20. Generally nitric acid is not used in the preparation of hydrogen from metals because**

- (a) metal becomes passive so that further reaction stops (b) it is a very strong oxidizing agent  
(c) it is very difficult to handle nitric acid (d) it forms an explosive metal nitrate

**Answer: (b) it is a very strong oxidizing agent**

**21. A fluoride of xenon formed by the reaction of Xe with excess of F at high pressure and 25 :**

- (a) a trigonal bipyramidal structure with two lone pairs (b) a tetrahedral structure with one lone pair  
(c) a capped octahedral structure with one lone pair (d) a capped octahedral structure with two lone pairs

**Answer: (c) a capped octahedral structure with one lone pair**

**22. The reducing power of Al, Ga, In and Tl are in the order of Al, Ga, In Deewj Tl :**

- (a)  $\text{In} > \text{Ga} > \text{Al} > \text{Tl}$  (b)  $\text{Al} > \text{Ga} > \text{In} > \text{Tl}$   
(c)  $\text{Ga} > \text{In} > \text{Al} > \text{Tl}$  (d)  $\text{Tl} > \text{In} > \text{Ga} > \text{Al}$

**Answer: (b)  $\text{Al} > \text{Ga} > \text{In} > \text{Tl}$**

**23. The geometry of stannic chloride :**

- (a) square pyramidal (b) tetrahedral  
(c) octahedral (d) square planar

**Answer: (b) tetrahedral**

**24. The metal lead is readily soluble in**

- (a) nitric acid (b) sulphuric acid  
(c) hydrochloric acid (d) acetic acid

**Answer: (a) nitric acid**

**25. EDTA complexometric titration involving estimation of hardness of water, makes use of EDTA :**

- (a) redox indicator (b) metal ion indicator  
(c) acid base indicator (d) adsorption indicator

**Answer: (b) metal ion indicator**

## Physics

**26. The first law of thermodynamics is a special case of :**

- (a) Charles' law (b) the law of heat exchange  
(c) Newton's law (d) the law of conservation of energy

**Answer: (d) the law of conservation of energy**

**27. In an adiabatic process the quantity which remains constant is :**

- (a) Volume (b) Temperature  
(c) Pressure (d) Total heat energy of the system

**Answer: (d) Total heat energy of the system**

**28. A 10 V battery of negligible internal resistance is connected to 50 ohm resistance coil. The heat energy produced in 1 hour in joules will be:**

- (a) 8000 J (b) 4500 J  
(c) 6500 J (d) 7200 J

**Answer: (d) 7200 J**

**29. The laser material in He-Ne laser is activated by ?**

- (a) optical pumping (b) electrical discharge  
(c) chemical reaction (d) supersonic gas explosion

**Answer: (b) electrical discharge**

**30. The population inversion between energy states in a Ruby laser is achieved through ?**

- (a) vacuum pumping (b) raising of temperature
- (c) lowering of temperature (d) optical pumping

**Answer: (d) optical pumping**

**31. Fraunhofer spectrum is a ?**

- (a) Line emission spectrum (b) Band absorption spectrum
- (c) Line absorption spectrum (d) Band emission spectrum

**Answer: (c) Line absorption spectrum**

**32. Consider : A. The wavelength of scattered light may be greater or less than that of incident light. B. Above statement A is true for scattering of photons by electrons :**

- (a) A, B both are true (b) A is true, B is false
- (c) A is false, B is true (d) A, B both are false

**Answer: (b) A is true, B is false**

**33. The thermal conductivities of brick and pine wood are respectively 0.6 and 0.13W/(mOC). What thickness of brick has the same insulating ability at 5 cm of pine ?**

- (a) 30 cm (b) 5 cm
- (c) 4.6 cm (d) 23 cm

**Answer: (d) 23 cm**

**34. Transference of molecules from the vapour phase to the liquid phase is called ?**

- (a) None of these (b) Evaporation
- (c) Condensation (d) Sublimation

**Answer: (c) Condensation**

**35. A parallel plate capacitor has two layers of different dielectrics as shown in figure. The ratio of potential difference across the dielectric layers when connected to the battery is  $K K_a$  ?**

- (a) 2 (b) 1
- (c) 1 : 1  $K_b$  (d) 1  $K K_b$  2 2  $K_a$

**Answer: (a) 2**

**36. Water rises to a height of 10 cm in a capillary. Mercury falls to a depth of 3.42 cm in same capillary. If the relative density of mercury is 13.6 g/cc and its angle of contact is  $135^\circ$ , the ratio of surface tension of water and mercury is :**

- (a) 0.10 (b) 0.20
- (c) 0.05 (d) 0.15

**Answer: (d) 0.15**

**37. If density of earth increased by 2% and radius by 1% the acceleration due to gravity  $g$  will change as follows :**

- (a) Increase 3% (b) Decrease 5%
- (c) Decrease 3% (d) Increase 5%

**Answer: (a) Increase 3%**

**38. The same retarding force is applied to stop a train. If the speed is doubled, then the distance will be :**

- (a) half (b) The same
- (c) doubled (d) four times

**Answer: (d) four times**

39. The speed of a boat in still water is 10 km/hr. If the boat crosses a 2 km wide river in 15 min along the shortest possible route, the water velocity in the river is :

- (a) 6 km/hr (b) 3 km/hr
- (c) 5 km/hr (d) 4 km/hr

Answer: (a) 6 km/hr

40. The gauge transformation in which  $\nabla \cdot \mathbf{A} = 0$ , is called ?

- (a) Coulomb gauge (b) Longitudinal gauge ,
- (c) Gauss gauge (d) Lorentz gauge

Answer: (a) Coulomb gauge

41. Anderson's Bridge is used for measurement of ?

- (a) Capacitance (b) Self-inductance
- (c) Frequency of AC supply (d) Resistance

Answer: (b) Self-inductance

42. The given circuit diagram is equivalent to ?

- (a) T Flip-flop (b) D Flip-flop
- (c) Clocked RS Flip-flop (d) JK Flip-flop

Answer: (b) D Flip-flop

43. The amount of work done in rotating a magnet 180° of moment M through from its position along the magnetic meridian is:

- (a) 2MB (b) 1/2 MB
- (c) zero (d) MB

Answer: (a) 2MB

44. A galvanometer connected in series with a high resistance is called :

- (a) Voltmeter (b) Ammeter
- (c) Wattmeter (d) None of these

Answer: (a) Voltmeter

45. The temperature of Sun is 6000 K and the  $2.88 \times 10^{-3}$  Wien's constant is mK. Assuming Sun to be a perfectly black body, the wavelength corresponding to the maximum intensity in the solar radiation must be ?

- (a) 480 nm (b) None of the above
- (c) 172.8 nm (d) 290 nm

Answer: (a) 480 nm

46. When a metal rod is heated it expands because ?

- (a) The distance among its atom increase (b) The actual cause is unknown
- (c) The size of its atoms increase (d) None of these

Answer: (a) The distance among its atom increase

47. The expansion of a string, obeying Hooke's law is  $x$ . The velocity of sound in this expanded string is  $v$ . If the expansion is increased to  $1.5x$ , then the velocity of sound in the string will be :

- (a)  $1.50v$  (b)  $1.22v$
- (c)  $0.61v$  (d)  $0.75v$

Answer: (b)  $1.22v$

48. Unit of surface tension is ?

- (a) Dyne  $\text{cm}^{-1}$  (b) Dyne cm
- (c) Dyne  $\text{cm}^{-2}$  (d) None of these

Answer: (a) Dyne cm-1

49. A metal in which even Iron can float is :

- (a) magnesium (b) maganese
- (c) sodium (d) mercury

Answer: (d) mercury

50. The ratio of mass of a planet to that of the earth, if its radius is half that of the earth and acceleration due to gravity on its surface is twice that on earth's surface, is ?

- (a) 0.5 (b) 0.33
- (c) 2 (d) 0.25

Answer: (a) 0.5

## SECTION B — Biology [50]

### Zoology

51. Prokaryotic cells are generally ..... and multiply ..... than the eukaryotic cells ?

- (a) Centromere (b) Mitochondria
- (c) Nucleoid (d) Smaller, faster

Answer: (d) Smaller, faster

52. Longest portion of bacterial flagella is ?

- (a) Filament (b) Ribosome
- (c) Active transport (d) Quasifluid

Answer: (a) Filament

53. X is a structure found in prokaryotes that is concerned with storage of reserve food materials like cyanophycean granules, X could be ?

- (a) 50S and 30S (b) Centrioles
- (c) Inclusion body (d) Absence of nucleus

Answer: (c) Inclusion body

54. The type of ribosomes found in prokaryotes is ?

- (a) Nuclear envelope (b) Inclusion body
- (c) 70S type (d) Eukaryotic cell

Answer: (c) 70S type

55. Slime layer forms is ?

- (a) Mitochondria (b) Quasifluid
- (c) Glycocalyx (d) Cell membrane

Answer: (c) Glycocalyx

56. Cell wall of algae is made up of ?

- (a) At the outer surface (b) Both structural & functional
- (c) Mannans, CaCO<sub>3</sub>, Galactans (d) The cell would burst

Answer: (c) Mannans, CaCO<sub>3</sub>, Galactans

57. The genetic material of prokaryotic cells is called ?

- (a) Nucleoid (b) Calcium pectate
- (c) Golgi bodies (d) Leucoplasts

Answer: (a) Nucleoid

58. Structures is an organelle within an organelle ?

LUUPDATE

www.luupdate.com

- (a) Ribosome (b) Eukaryotic cell  
(c) Plasmids (d) Prokaryotic cell

**Answer: (a) Ribosome**

**59. .... structures perform the function of mitochondria in bacteria is ?**

- (a) Mesosomes Eukaryotic Cells (b) Virus Prokaryotic Cells  
(c) Squamous epithelium (d) Passive transport 8

**Answer: (a) Mesosomes Eukaryotic Cells**

**60. Secretory cell is true for ?**

- (a) Have no role in protein synthesis (b) Cell wall is made up of peptidoglycans  
(c) All cells arise from pre-existing cells (d) RER is easily observed in the cell

**Answer: (d) RER is easily observed in the cell**

**61. Eukaryotic cell is not true for ?**

- (a) All cells arise from pre-existing cells (b) Have no role in protein synthesis  
(c) Cell wall is made up of peptidoglycans (d) RER is easily observed in the cell

**Answer: (c) Cell wall is made up of peptidoglycans**

**62. Plastids differ from mitochondria on the basis of is ?**

- (a) Presence of thylakoids (b) Inclusion body  
(c) Ribosome, RER, SER (d) Mesosomes Eukaryotic Cells

**Answer: (a) Presence of thylakoids**

**63. That stains is not used for staining chromosomes, is ?**

- (a) Centrosome (b) Cytoplasm  
(c) Calcium carbonate (d) Safranin

**Answer: (d) Safranin**

**64. Common features of prokaryotes and many eukaryotes is ?**

- (a) Mesosomes Eukaryotic Cells (b) Singer and Nicolson  
(c) Cell wall present (d) a nucleus

**Answer: (c) Cell wall present**

**65. A common characteristic feature of plant sieve tube cells and most of mammalian erythrocytes is ?**

- (a) Virus Prokaryotic Cells (b) Absence of nucleus  
(c) Rough endoplasmic reticulum (d) The cell would burst

**Answer: (b) Absence of nucleus**

**66. The best material for the study of structure of cell membrane is ?**

- (a) RBCs of human (b) RNA & proteins  
(c) Constituent to cell wall (d) Nuclear envelope

**Answer: (a) RBCs of human**

**67. That chemical property is shared by all types of lipids forming the plasma membrane ?**

- (a) Calcium carbonate (b) Eukaryotic cell  
(c) Hydrophobic region (d) Rough endoplasmic reticulum

**Answer: (c) Hydrophobic region**

**68. The head of phospholipid molecule is ?**

- (a) Virus Prokaryotic Cells (b) At the outer surface  
(c) Presence of thylakoids (d) Both structural & functional

**Answer: (b) At the outer surface**

**69. Energy dependent process is ?**

- (a) Fluid mosaic model (b) Active transport
- (c) Rough endoplasmic reticulum (d) Quasifluid

**Answer: (b) Active transport**

**70. The latest model of cell membrane is the ?**

- (a) Calcium pectate (b) Prokaryotic cell
- (c) Golgi bodies (d) Fluid mosaic model

**Answer: (d) Fluid mosaic model**

**71. According to the modern concept, cell membrane is ?**

- (a) Lysosomes (b) Active transport
- (c) Hydrophobic region (d) Quasifluid

**Answer: (d) Quasifluid**

**72. The fluid mosaic model explains ..... aspects of a cell membrane is ?**

- (a) Cells will die (b) The cell would burst
- (c) Both structural & functional (d) Fluid mosaic model

**Answer: (c) Both structural & functional**

**73. Many molecules can move briefly across the membrane without any requirement of energy and special membrane proteins. This is called ?**

- (a) RNA & proteins (b) Prokaryotic cell
- (c) At the outer surface (d) Passive transport

**Answer: (d) Passive transport**

**74. Middle lamella is mainly composed of ?**

- (a) Filament (b) Lysosome
- (c) Calcium pectate (d) Passive transport

**Answer: (c) Calcium pectate**

**75. Cell wall of algae have ?**

- (a) Active transport (b) Calcium carbonate
- (c) Lysosomes (d) Calcium pectate

**Answer: (b) Calcium carbonate**

**Botany**

**76. Cell wall of diatoms are composed with ?**

- (a) Silica (b) Siliceous wall
- (c) Protista (d) Chlorophyll a

**Answer: (a) Silica**

**77. Decomposer protists are ?**

- (a) Heterotrophs (b) Slime moulds
- (c) Virus, Viroids, Lichens (d) Malaria

**Answer: (b) Slime moulds**

**78. A dinoflagellate which forms red tide is ?**

- (a) Monera (b) Protista
- (c) Paramecium caudatum (d) Gonyaulax

**Answer: (d) Gonyaulax**

**79. In Dinoflagellates, the two flagella are ?**

- (a) One transverse and the other longitudinal (b) Archaeobacteria Virus, Viroids and Virion  
(c) Having two types of nuclei (d) Pathogenic both to plants and animals

**Answer: (a) One transverse and the other longitudinal**

**80. A protein rich layer which makes the body of euglenoids flexible is called ?**

- (a) Pellicle (b) Plasmodium  
(c) Protista (d) Capsomeres

**Answer: (a) Pellicle**

**81. During unfavourable conditions, the plasmodium differentiates to form fruiting bodies bearing spores at their tips. This group is ?**

- (a) Plasmodium (b) Paramecium caudatum  
(c) Protista (d) Slime moulds

**Answer: (d) Slime moulds**

**82. The photosynthetic protists are ?**

- (a) Euglenoids, Diatoms and Dinoflagellates (b) Venus fly trap bladderwort  
(c) Archaeobacteria Virus, Viroids and Virion (d) Amoeba, Paramecium and Dinoflagellates

**Answer: (a) Euglenoids, Diatoms and Dinoflagellates**

**83. Protista contains is ?**

- (a) Plantae, Fungi, Animalia (b) Venus fly trap bladderwort  
(c) Amoeba, Paramecium and Dinoflagellates (d) Having two types of nuclei

**Answer: (c) Amoeba, Paramecium and Dinoflagellates**

**84. The marine organisms responsible for killing fishes by producing toxins belong to the kingdom of Whittaker ?**

- (a) Protein coat and no nucleic acid (b) Citrus canker and tetanus  
(c) Protista Kingdom Plantae and Animalia (d) One transverse and the other longitudinal

**Answer: (c) Protista Kingdom Plantae and Animalia**

**85. The smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen ?**

- (a) Bacteria (b) Protista  
(c) Dinoflagellates (d) Mycoplasma

**Answer: (d) Mycoplasma**

**86. Smallest living cells are ?**

- (a) Protein coat and no nucleic acid (b) Pathogenic both to plants and animals  
(c) Mumps & small pox, Herpes & influenza (d) Protista Kingdom Plantae and Animalia

**Answer: (b) Pathogenic both to plants and animals**

**87. Ciliates differ from all other protozoans in is ?**

- (a) Euglenoids, Diatoms and Dinoflagellates (b) Having two types of nuclei  
(c) Bladderwort, Venus fly trap (d) Hot and sulphur spring

**Answer: (b) Having two types of nuclei**

**88. An association between roots of higher plants and fungi is called ?**

- (a) Mycorrhiza (b) Paramecium caudatum  
(c) A dikaryon (d) Protista

**Answer: (a) Mycorrhiza**

**89. When the two haploid cells do not fuse immediately, it formed ?**

(a) Gonyaulax (b) Kingdom Plantae

(c) Aquatic (d) A dikaryon

**Answer: (d) A dikaryon**

**90. Organisms living in salty areas are called as ?**

(a) Siliceous wall (b) A dikaryon

(c) Halophiles (d) Protista

**Answer: (c) Halophiles**

**91. Insectivorous plants is ?**

(a) Venus fly trap bladderwort (b) Euglenoids, Diatoms and Dinoflagellates

(c) Archaeobacteria Virus, Viroids and Virion (d) Single stranded RNA

**Answer: (a) Venus fly trap bladderwort**

**92. The major difference between plant cell and an animal cell is ?**

(a) Cell wall (b) Protista

(c) Bacteriophages (d) T. O. Diener

**Answer: (a) Cell wall**

**93. The phenomenon of alternation of generation is found in ?**

(a) Single stranded RNA (b) Bacteria

(c) Halophiles (d) Kingdom Plantae

**Answer: (d) Kingdom Plantae**

**94. Insectivorous plants examples is ?**

(a) Bladderwort, Venus fly trap (b) Citrus canker and tetanus 8

(c) Having two types of nuclei (d) Single stranded RNA

**Answer: (a) Bladderwort, Venus fly trap**

**95. .... are important decomposers that cause decay and decomposition of dead bodies of plants and animals ?**

(a) Thermoacidophiles (b) Saprophytic bacteria

(c) Halophiles (d) Decomposers

**Answer: (b) Saprophytic bacteria**

**96. The pair that consists of plant or animal bacterial diseases is ?**

(a) Euglenoids, Diatoms and Dinoflagellates (b) Citrus canker and tetanus 8

(c) Protein coat and no nucleic acid (d) Naked RNA molecules only

**Answer: (b) Citrus canker and tetanus 8**

**97. Sole member of kingdom monera are ?**

(a) Dinoflagellates 7 (b) Protista

(c) A dikaryon (d) Bacteria

**Answer: (d) Bacteria**

**98. This bacteria oxidise various inorganic substances such as nitrates, nitrites and ammonia and use the released energy for their ATP production is ?**

(a) Chemosynthetic autotrophic bacteria (b) Hot and sulphur spring

(c) Euglenoids, Diatoms and Dinoflagellates (d) Heterotrophic bacteria

**Answer: (a) Chemosynthetic autotrophic bacteria**

**99. This types of bacteria play a great role in recycling nutrients is ?**

(a) Chemosynthetic autotrophic bacteria (b) Bladderwort, Venus fly trap

(c) Euglenoids, Diatoms and Dinoflagellates (d) Single stranded RNA

**Answer: (a) Chemosynthetic autotrophic bacteria**

**100. Bacteria whose cell has only a curve/comma is ?**

(a) Heterotrophs (b) Chrysophytes

(c) Gonyaulax group (d) Vibrio

**Answer: (d) Vibrio**

