श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकीसंस्थान, तिरुवनंतपुरम्-11
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY
THIRUVANANTHAPURAM—695 011

ENTRANCE EXAMINATION - ACADEMIC SESSION AUGUST 2018

PROGRAMME: MPHIL (Biomedical Technology)- **CHEMISTRY**

Time:60 Minutes **Max. Marks: 60**

(Select the most appropriate answer)
(There are **no negative** marks for wrong answers)

Sl. No	QUESTIONS
1	The smallest particle that takes part in a chemical reaction is a) Atom b) Molecule c) Proton d) Neutron
2	A material having different properties in different directions is known as: a) Amorphous b) Austenite c) Anisotropic d) Crystalline
3	National Science day is celebrated on 28th February to honour a) Sir C. V. Raman b) Homi Bhabha c) S.N.Bose d) Vikram Sarabhai
4	The device which converts heat into mechanical work is a) Motor b) Generator c) Heat Engine d) Energy Converter
5	The short wavelength limit of X-rays depend upon a) nature of the target b) voltage across the x-ray tube c) nature of the filament used d) none of these

6 Which of the following is not a biopolymer?
   a) Keratin
   b) Collagen
   c) Polyisoprene
   d) Polyethylene terephthalate

7 Which bond in the list has the highest bond energy?
   a) H-H
   b) H-O
   c) H-F
   d) H-I

8 Which of the following is a polymer?
   a) Glucose
   b) Sucrose
   c) Fructose
   d) Cellulose

9 In gel permeation chromatography, the separation of polymers is determined by
   a) size of the molecule
   b) mass of the molecule
   c) flow rate of the mobile phase
   d) nature of the mobile phase

10 Dry ice is
   a) solid ammonia
   b) solid carbon dioxide
   c) solid nitrogen
   d) solid carbon monoxide

11 Components of 'Bordeaux mixture' are
   a) Copper sulphate and lime
   b) Potassium permanaganate and lime
   c) Magnesium sulphate and Calcium carbonate
   d) None of these

12 One Dalton is equal to
   a) 10^{-9} gm
   b) 10^{-12} gm
   c) 3.32×10^{-24} gm
   d) 10^{-10} gm

13 Relation between amino acid and protein is similar to one that found in between
   a) Glucose and chitin
   b) Thymine and uracil
   c) Nucleosides and nucleic acid
   d) Nucleotides and nucleic acid

14 Km of an enzyme is
   a) One half of Vmax
   b) Dissociation constant
   c) Normal physiological substrate concentration
   d) Substrate concentration that gives half maximum velocity

15 Doctors recommend Suflower oil as it is a rich source of:
a) Vitamins
b) Unsaturated fatty acids
c) Rich in energy and reduce weight gain
d) Rich in saturated fatty acids

16 Which of the following has the same atomic number and atomic weight
a) Chlorine
b) Nitrogen
c) Helium
d) Hydrogen

17 A solution with pH = 5 is _____ than a solution with pH = 7.
a) 1/100 times more acidic
b) 1/10 times more acidic
c) 10 times more acidic
d) 100 times more acidic

18 In a solar cell, light energy is converted into
a) Heat Energy
b) Sound Energy
c) Electrical Energy
d) Nuclear Energy

19 The GSAT satellite was launched from:
a) Vikram Sarabhai Space Centre, Trivandrum
b) Satish Dhawan Space Centre, Sriharikota
c) Space Applications Centre, Ahmedabad
d) Liquid Propulsion Space Centre, Valiamala, Trivandrum

20 Which of the following radiation is ionizing?
a) Lasers
b) Microwave radiation
c) X rays
d) Infrared radiation

21 Auger effect involves the emission of
a) Electron
b) Proton
c) Photon
d) Neutron

22 A compound provides characteristic infra red absorption peaks:
a) When its dipole moment is zero
b) When its polarizability is zero
c) If the dipole moment is greater than zero
d) When its polarizability is less than zero

23 What is the hybridization of the xenon atom in XeF_4?
a) sp^2
b) sp^3
c) sp^3d
d) sp^3d^2

24 In polyvinyl chloride degradation occurs mainly due to -

a) Ozone attack
b) Dehydrochlorination
c) Oxidation reaction
d) Ultra violet attack

25 The glass transition temperature Nylon 6 is higher than polyethylene because of -

a) Higher crystallinity
b) Hydrogen bonding
c) Higher dipole moment
d) Presence of polar groups

26 Which of the following technique is used for molecular weight determination

a) Differential scanning colorimetry
b) Gel permeation chromatography
c) Thermogravimetric analysis
d) Nuclear magnetic resonance spectroscopy

27 The amount of energy absorbed or released in a nuclear reaction is known as

a) Q value
b) M value
c) Mass constant
d) Heat of reaction

28 The temperature at which the polymerization reaction is in equilibrium with reverse reaction is called:

a) Equilibrium temperature
b) Critical temperature
c) Ceiling temperature
d) Curie temperature

29 The higher density of HDPE is due to:

a) High molecular weight
b) Lower molecular weight
c) Lower amount of branching
d) Higher amount of branching

30 The bond strength of carbon fluorine bond is:

a) 350 KJ/mole
b) 485 KJ/mole
c) 435 KJ/mole
d) 410 KJ/mole

31 If a crystal has intercepts on the three axes of crystal in the ratio **3/2 : 2: 1**, the Miller indices of the plane is

a) 4:3:6
b) 3:2:1
c) 6:4:2
d) 4:2:2

32 Identify the correct variation in electronegativities
a) F>N>O>C
b) F>N<O<C
c) F<N<O>C
d) F>N<O>C

33 The number of proton NMR signals obtained from cyclohexane is
a) 1
b) 2
c) 4
d) 6

34 The equilibrium constant for cell with standard EMF –0.381 V is
a) 3.666×10^{-7}
b) 3.66×10^{-5}
c) 7.32×10^{-7}
d) 7.32×10^{-5}

35 Balbach process is used to separate
a) Gold and Silver
b) Sodium and Silver
c) Copper and Manganese
d) Sodium and Potassium

36 Grignard degradation is used to
a) Degrade a diazo compound
b) Degrade polycyclic compound
c) Remove halogen atoms from a polyhalo compound
d) Remove methyl group from an aromatic compound

37 Living polymers are prepared by:
a) Cationic polymerization
b) Anionic polymerization
c) Free radical polymerization
d) Condensation polymerization

38 If the dipole moment of chlorobenzene is 1.73, that of para-dichlorobenzene would be
a) Zero
b) 1.0
c) 1.73
d) 3.46

39 Tin content in Bronze is:
a) 5 %
b) 25 %
c) 20 %
d) 40 %

40 Monomers with electron donating substituent group form stable:
a) Free radicals
b) Carbanion

c) Carbenium ions
d) Coordination complex

41 Bisphenol A is prepared from:
a) Phenol and Ammonia
b) Phenol and Acetone
c) Phenol and Acetic acid
d) Phenol and Acetaldehyde

42 What do the following have in common?

^{20}Ne $^{19}F^-$ $^{24}Mg^{2+}$

a) They are isotopes of each other.
b) They are isomers of each other.
c) They are isoelectronic with each other.
d) They are different elements and nothing in common.

43 Which of the following transitions is the highest energy transition?
a) σ to σ^*
b) n to σ^*
c) π to π^*
d) n to π^*

44 How many moles of CO_2 are present in 220 mg?
a) 5 moles
b) 0.005 mole
c) 5000 moles
d) 10 moles

45 The life times that can be investigated by ESR is
a) 10^{-18} second
b) 10^{-11} second
c) - 10^{-8} second
d) - 10^{-5} second

46 Air bags in cars get filled with nitrogen gas arising from the decomposition of sodium azide (NaN_3) based on the reaction

$$2\ NaN_3\ (s) \longrightarrow 2\ Na\ (s) + 3\ N_2\ (g)$$

If the air bag needs 44.8 L of gas when filled, how many grams of NaN_3 are needed at standard temperature and pressure?

Clue : One mole of any gas will occupy 22.4 L at STP.

a) 56 grams
b) 87 grams
c) 130 grams
d) 1.3 grams

47 What is the total pressure, in atmospheres, of a 10 L container that contains 10 moles of nitrogen gas and 10 moles of oxygen gas at 300K?

a) 24.6 L

b) 49.3 L
c) 2460 L
d) 4930 L

48 Which of the following polymer is known by the trade name **Teflon**:

a) Poly chloro trifluoro ethylene
b) Poly tetrafluoro ethylene
c) Polyvinylidene fluoride
d) Poly hexafluoro propylene

49 What is the hybridization of the oxygen atom in water?

a) sp
b) sp^2
c) sp^3
d) Not hybridized.

50 Which of the following atoms has the largest diameter?

a) Iodine
b) Bromine
c) Chlorine
d) Fluorine

51 The highest occupied molecular orbit in CO is

a) π bonding
b) σ bonding
c) π antibonding
d) σ antibonding

52 Which of the following will not give rotational spectra

a) CH_4
b) HCl
c) CH_3Cl
d) CO

53 'No two electrons will have all the four quantum numbers equal'. This statement is known as –

a) Hund's rule
b) Aufbau's principle
c) Uncertainty principle
d) Pauli's exclusion principle

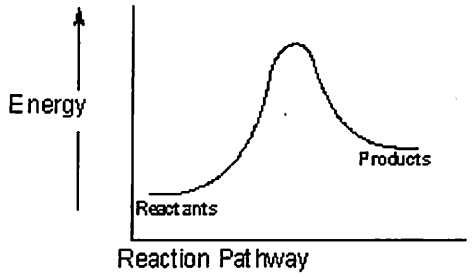
54 In a theta solvent, a polymer molecular chain

a) Contracts
b) Expands
c) Dissolves
d) Acts like an ideal chain

55 For a certain reaction the equilibrium constant does not change with temperature. The value of $\Delta H°$ for the reaction is

a) Positive
b) Negative
c) Zero
d) Infinite

56 Carefully examine the following reaction coordinate diagram and tell what it represents:



a) an endothermic reaction.
b) an exothermic reaction.
c) an isothermic reaction.
d) a reaction in which a catalyst is used.

57 Metathesis polymerization is employed for:

a) Ring opening polymerisation of lactam
b) Ring opening polymerisation of cyclo olefins
c) Unsaturated monomers with high mol. wt. side chains
d) Monomers with aromatic substituent groups

58 What is the oxidation number of chromium in the ionic compound $Na_2Cr_2O_7$?

a) 2
b) 6
c) 7
d) 12

59 The amino acid which is not optically active is

a) Glycine
b) Alanine
c) Serine
d) Lactic acid

60 Which of the following test detects the presence of halogen in organic compounds

a) Duma's test
b) Kjeldahl test
c) Beilstien's test
d) Leibig's test

END

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PROGRAMME: MPHIL Biomedical Technology- **CHEMISTRY ANSWER KEY**

Sl. No	Answers		
1	A	32	D
2	C	33	A
3	A	34	A
4	C	35	A
5	B	36	C
6	D	37	B
7	C	38	A
8	D	39	A
9	A	40	C
10	B	41	B
11	A	42	C
12	C	43	A
13	D	44	B
14	D	45	C
15	B	46	B
16	D	47	B
17	D	48	B
18	C	49	C
19	B	50	A
20	C	51	D
21	A	52	A
22	C	53	D
23	D	54	D
24	B	55	C
25	B	56	A
26	B	57	B
27	A	58	B
28	C	59	A
29	C	60	C
30	B	END	
31	A		