

UNIVERSITY OF MYSORE
Postgraduate Entrance Examination October-2022

22

**QUESTION PAPER
BOOKLET NO.**

Entrance Reg. No.

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SUBJECT CODE : 22

QUESTION BOOKLET

(Read carefully the instructions given in the Question Booklet)

COURSE : M.Tech.

SUBJECT : Material Science

MAXIMUM MARKS : 50

MAXIMUM TIME : 75 MINUTES

(Including time for filling O.M.R. Answer sheet)

INSTRUCTIONS TO THE CANDIDATES

1. The sealed question paper booklet containing 50 questions enclosed with O.M.R. Answer Sheet is given to you.
2. Verify whether the given question booklet is of the same subject which you have opted for examination.
3. Open the question paper seal carefully and take out the enclosed O.M.R. Answer Sheet outside the question booklet and fill up the general information in the O.M.R. Answer sheet. If you fail to fill up the details in the form as instructed, you will be personally responsible for consequences arising during evaluating your Answer Sheet.
4. During the examination:
 - a) Read each question carefully.
 - b) Determine the Most appropriate/correct answer from the four available choices given under each question.
 - c) Completely darken the relevant circle against the Question in the O.M.R. Answer Sheet. For example, in the question paper if "C" is correct answer for Question No.8, then darken against Sl. No.8 of O.M.R. Answer Sheet using Blue/Black Ball Point Pen as follows:

Question No. 8. (A) (B) ● (D) (Only example) (Use Ball Pen only)
5. Rough work should be done only on the blank space provided in the Question Booklet. Rough work should not be done on the O.M.R. Answer Sheet.
6. If more than one circle is darkened for a given question, such answer is treated as wrong and no mark will be given. See the example in the O.M.R. Sheet.
7. The candidate and the Room Supervisor should sign in the O.M.R. Sheet at the specified place.
8. Candidate should return the original O.M.R. Answer Sheet and the university copy to the Room Supervisor after the examination.
9. Candidate can carry the question booklet and the candidate copy of the O.M.R. Sheet.
10. The calculator, pager and mobile phone are not allowed inside the examination hall.
11. If a candidate is found committing malpractice, such a candidate shall not be considered for admission to the course and action against such candidate will be taken as per rules.
12. Candidates have to get qualified in the respective entrance examination by securing a minimum of 8 marks in case of SC/ST/Cat-I Candidates, 9 marks in case of OBC Candidates and 10 marks in case of other Candidates out of 50 marks.

INSTRUCTIONS TO FILL UP THE O.M.R. SHEET

1. There is only one most appropriate/correct answer for each question.
2. For each question, only one circle must be darkened with BLUE or BLACK ball point pen only. Do not try to alter it.
3. Circle should be darkened completely so that the alphabet inside it is not visible.
4. Do not make any unnecessary marks on O.M.R. Sheet.
5. Mention the number of questions answered in the appropriate space provided in the O.M.R. sheet otherwise O.M.R. sheet will not be subjected for evaluation.

ಗಮನಿಸಿ : ಸೂಚನೆಗಳ ಕನ್ನಡ ಆವೃತ್ತಿಯು ಈ ಪುಸ್ತಕದ ಹಿಂಭಾಗದಲ್ಲಿ ಮುದ್ರಿಸಲ್ಪಟ್ಟಿದೆ.

- 1) Which statement is incorrect?
- (A) at constant pressure, $H = E + PV$
 - (B) the thermodynamic symbol for entropy is S
 - (C) gibbs free energy is a state function
 - (D) for an endothermic process, H is negative
- 2) The Standard Gibb's free energy, ΔG° , is
- (A) the residual energy present in the reactants at equilibrium
 - (B) the residual energy present in the products at equilibrium
 - (C) the difference in the residual energy of reactants and products at equilibrium
 - (D) the energy required to convert one mole of reactants to one mole of products
- 3) Change in enthalpy of a system is due to heat supplied at
- (A) constant volume
 - (B) constant pressure
 - (C) both at constant volume and pressure
 - (D) none of the mentioned
- 4) The enthalpy of a substance (denoted by h), is defined as
- (A) $H = U - PV$
 - (B) $H = U + PV$
 - (C) $H = -U + PV$
 - (D) $H = -U - PV$
- 5) The entropy of an isolated system can never _____
- (A) increase
 - (B) decrease
 - (C) be zero
 - (D) none of the mentioned
- 6) What is the wavelength range for UV spectrum of light?
- (A) 400 nm to 700 nm
 - (B) 700 nm to 1 nm
 - (C) 0.01 nm to 10 nm
 - (D) 10 nm to 400 nm

- 7) What is the correct increasing order of stretching frequencies for $C \equiv C$, $C = C$ and $C - C$?
- (A) $C - C > C = C > C \equiv C$ (B) $C \equiv C > C = C > C - C$
(C) $C - C > C = C < C \equiv C$ (D) $C \equiv C < C - C > C = C$
- 8) Raman effect is scattering of _____
- (A) atoms (B) molecule
(C) protons (D) photons
- 9) Sky looks blue because the sun light is subjected to _____.
- (A) rayleigh scattering (B) compton scattering
(C) both (D) none
- 10) X-ray diffractometers are not used to identify the physical properties of which of the following?
- (A) metals (B) liquids
(C) polymeric materials (D) solids
- 11) Which of the following defines the Mass number of an atom?
- (A) number of protons + number of electrons
(B) number of neutrons + number of electrons
(C) number of protons + number of neutrons
(D) number of electrons
- 12) How many periods and groups are present in the periodic table?
- (A) 7 periods and 18 groups
(B) 8 periods and 7 groups
(C) 7 periods and 7 groups
(D) 8 periods and 8 groups
- 13) Which of the following is the correct order of the atomic radii of the elements oxygen, fluorine and nitrogen
- (A) $O < F < N$ (B) $N < F < O$
(C) $O < N < F$ (D) $F < O < N$

- 14) The outer electron configuration of Gd (Atomic number : 64) is :
- (A) $4f^3 5d^5 6s^2$ (B) $4f^8 5d^0 6s^2$
 (C) $4f^4 5d^4 6s^2$ (D) $4f^7 5d^1 6s^2$
- 15) What happens to the electropositive character of elements on moving from left to right in a periodic table?
- (A) increase (B) decreases
 (C) first increases than decreases (D) first decreases than increases
- 16) Give the IUPAC name for the compound :
- (A) 2-choro-3-methylbutane
 (B) 2-choro-3-methylbutene
 (C) 3-choro-3-methylbutane
 (D) 3-choro-2-methylbutane
- $$\begin{array}{c} \text{CH}_3-\text{C}=\text{CH}_2 \\ | \\ \text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$$
- 17) Choose the correct one which will react faster in the SN2 nucleophilic substitution reaction
- (A) $\text{CH}_2 = \text{CH} = \text{CH}_2 = \text{Br}$ (B) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{Br}$
 (C) $\text{CH}_2 = \text{CH} - \text{CH}_2 = \text{Br}$ (D) $\text{CH} = \text{CH}_2 - \text{CH}_2 - \text{Br}$
- 18) Salicylaldehyde can be prepared from which of the following reactants?
- (A) phenol and chloroform
 (B) phenol, chloroform and sodium hydroxide
 (C) phenol, carbon tetrachloride and naoh
 (D) phenol, carbon tetrachloride
- 19) Which of the following reagents may be used to distinguish between phenol and benzoic acid?
- (A) aqueous naoh (B) tollen's reagent
 (C) molisch reagent (D) neutral FeCl_3
- 20) Name the monomer present in the poly vinyl chloride (PVC) :
- (A) vinyl chloride (B) acetylene
 (C) butane (D) vinyl acetate

- 21) In Avagadro's law volume is directly proportional to :
- (A) pressure (B) temperature
(C) number of moles (D) volume
- 22) What is the freezing point of an aqueous 1.00 M NaCl solution?
($K_f = 1.86 \text{ }^\circ\text{C/m}$) (Assuming complete dissociation of the salt.)
- (A) $-1.86 \text{ }^\circ\text{C}$ (B) $+1.86 \text{ }^\circ\text{C}$
(C) $-3.72 \text{ }^\circ\text{C}$ (D) $-0.93 \text{ }^\circ\text{C}$
- 23) Corrosion of metals involves
- (A) physical reactions (B) chemical reactions
(C) both (D) none
- 24) Chemical formula of Rust is,
- (A) Fe_2O_3 (B) FeO
(C) Fe_3O_4 (D) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$
- 25) The concept of matter wave was suggested by _____
- (A) heisenberg (B) de broglie
(C) schrodinger (D) laplace
- 26) The half-life period of a radioactive element is 100 days. After 400 days, one gm of the element will be reduced to _____ gm.
- (A) 1/2 (B) 1/4
(C) 1/8 (D) 1/16
- 27) What is the size of colloidal particles?
- (A) 10-20 nm
(B) more than 20 nm
(C) less than 10 nm
(D) 30 to 50 nm
- 28) What is called a dispersion phase?
- (A) it is the main layer
(B) it is the secondary layer in which the colloidal particles are dispersed
(C) it is the secondary layer
(D) it is the basic collidal layer

- 29) We can add two matrices having real numbers A and B if their
- (A) order is same (B) rows are same
(C) columns are same (D) elements are same
- 30) Which of the following is a conic section?
- (A) circle (B) rectangle
(C) triangle (D) square
- 31) The differential equation $2\frac{dy}{dx} + x^2y = 2x + 3$, $y(0) = 5$ is
- (A) linear
(B) non linear
(C) linear with fixed constants
(D) undeterminable to be linear or nonlinear
- 32) Differentiation refers to the process whereby we :
- (A) calculate the area underneath a curve
(B) calculate the intercept of a curve with the vertical axis
(C) calculate the gradient to a curve at any point on the curve
(D) calculate the intercept of a curve with the horizontal axis
- 33) If the distance from the focus is 3 units and the distance from the directrix is 3 units, then how much is the eccentricity?
- (A) infinity (B) zero
(C) unity (D) less than one
- 34) Which class of carbohydrates is considered as non-sugar?
- (A) monosaccharides
(B) disaccharides
(C) polysaccharides
(D) oligosaccharides

- 35) Peptide bond is a _____
- (A) covalent bond
 - (B) ionic bond
 - (C) metallic bond
 - (D) hydrogen bond
- 36) Which of the following information is responsible to specify the three-dimensional shape of a protein?
- (A) the protein's peptide bond
 - (B) the protein's amino acid sequence
 - (C) the protein's interaction with other polypeptides
 - (D) the protein's interaction with molecular chaperons
- 37) The degree of unsaturation of lipids can be measured as
- (A) iodine number
 - (B) saponification number
 - (C) reichertmeissel number
 - (D) polenske number
- 38) Fat soluble Vitamins are :
- (A) Vitamin A
 - (B) Vitamin D
 - (C) Vitamin E
 - (D) All of the above
- 39) Vitamin C is present in :
- (A) tomatoes
 - (B) papaya
 - (C) guava
 - (D) all of the above

- 40)** Which is the nitrogen base absent in DNA?
- (A) adenine
 - (B) guanine
 - (C) uracil
 - (D) thiamine
- 41)** How is the secondary structure of a protein stabilized?
- (A) van der Waals forces
 - (B) hydrogen bonding
 - (C) covalent bond
 - (D) hydrophobic bond
- 42)** Which is the nitrogen base absent in RNA?
- (A) thiamine
 - (B) guanine
 - (C) cytosine
 - (D) uracil
- 43)** Name the amino acid which is optically inactive
- (A) glycine
 - (B) alanine
 - (C) valine
 - (D) proline

44) Name an enzyme that digests fat?

- (A) lipase
- (B) sucrase
- (C) maltase
- (D) fructose

45) What is the first step in photosynthesis?

- (A) generation of ATP
- (B) formation of NADPH
- (C) through light, excitement of an electron of chlorophyll pigment
- (D) formation of glucose

46) Which of the following is incorrect?

Algorithms can be represented :

- (A) as pseudo codes
- (B) as syntax
- (C) as programs
- (D) as flowcharts

47) If a, b and c are integers, then according to associative law of multiplication the $(a \times b) \times c$ must be equal to

- (A) $a \times (b + c)$
- (B) $(a - b) \times c$
- (C) $(a + b) + c$
- (D) $a \times b + a \times c$

- 48) What will be the additive inverse of -5 ?
- (A) 6
 - (B) 4
 - (C) 3
 - (D) 5
- 49) The product of a rational and an irrational numbers is :
- (A) always an integer
 - (B) always a rational number
 - (C) always an irrational number
 - (D) sometimes rational and sometimes irrational
- 50) The numbers written to the power of 10 in the representation of decimal numbers are called as _____
- (A) height factors
 - (B) size factors
 - (C) scale factors
 - (D) none of the mentioned



Rough Work

