UNIVERSITY OF MYSORE
Postgraduate Entrance Examination June/July 2017

SUBJECT CODE : **0 7**

Entrance Reg. No.

QUESTION BOOKLET NO.

105651

<u>QUESTION BOOKLET</u>
(Read carefully the instructions given in the Question Booklet)

COURSE : **M.Tech.**   SUBJECT : **Materials Science**

MAXIMUM MARKS : 50   **MAXIMUM TIME : ONE HOUR**

(Including initial 10 minutes for filling O.M.R. Answer sheet)

INSTRUCTIONS TO THE CANDIDATES

1. The sealed questions 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 of alphabet and signs as instructed, you will be personally responsible for consequences arising during scoring of 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. Ⓐ Ⓑ ⬤ Ⓓ (Only example) (Use Ball Pen only)

5. Rough work should be done only on the blank space provided in the Question Booklet. <u>Rough work should not be done on the O.M.R. Answer Sheet.</u>
6. <u>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.</u>
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.**

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 stray marks on O.M.R. Sheet.

ಗಮನಿಸಿ : ಸೂಚನೆಗಳ ಕನ್ನಡ ಆವೃತ್ತಿಯು ಈ ಪುಸ್ತಕದ ಹಿಂಭಾಗದಲ್ಲಿ ಮುದ್ರಿಸಲ್ಪಟ್ಟಿದೆ.

M-2344

1) To which kingdom do the cyanobacteria belong?

(A) Fungi

(B) Eubacteria

(C) Protista

(D) Plantae

2) A unicellular heterotroph with a nucleus but possess 70 S ribosomes and lack golgi apparatuses should be placed in which kingdom.

(A) Fungi

(B) Eubacteria

(C) Archezoa

(D) Chromista

3) Which is NOT true of the name Escherichia coli.

(A) Escherichia is the genus to which it belongs

(B) Coli is the strain to which it belongs

(C) It is a scientific name

(D) the name is based on binomial nomenclature

4) Which kingdom would an organism with the following characteristics most likely belong: true nucleus, non-photosynthetic, non-motile, absorb nutrients, and reproduce by forming spores?

(A) Fungi

(B) Eubacteria

(C) Protista

(D) Animalia

5) What is being compared during DNA hybridization studies of two bacteria?

(A) Rate of DNA replication

(B) Mechanism of RNA synthesis from DNA

(C) Ratio of nitrogenous base to all other bases

(D) Similarity of base sequences

6) Which of the following is the arrangement of organisms into groups or taxa?

(A) Nomenclature

(B) Identification

(C) Classification

(D) Phylogeny

7) Which of the following disinfectant is effective against viruses?

   (A) Hydrogen peroxide
   (B) Hypochlorite
   (C) Formaldehyde
   (D) All of these

8) Viruses largely lack metabolic machinery of their own to generate energy or to synthesize.

   (A) Protein
   (B) Carbohydrate
   (C) Alcohol
   (D) Lipids

9) Reverse transcriptase is a useful enzyme to have when.

   (A) An RNA virus converts its RNA to DNA
   (B) There are no host cells present
   (C) Nutrients are scarce
   (D) Spikes are forming in the new virus

10) Orbital angular momentum is associated with motion of body along.

   (A) Circular path
   (B) Straight path
   (C) Central point
   (D) Pivot axis

11) If no external torque is applied on a body then total angular momentum remain constant stated law is called.

   (A) Law of conservation of angular velocity
   (B) Law of conservation of angular acceleration
   (C) Law of conservation of angular momentum
   (D) Law of conservation of angular speed

12) GHz of frequency is equal to the.

   (A) 10^7 Hz
   (B) 10^{-7} Hz
   (C) 10^9 Hz
   (D) 10^{-9} Hz

13) The angle between centripetal acceleration and tangential acceleration is?

   (A) 180°   (B) 90°

   (C) 0°   (D) 45°

14) When there are no external forces, the shape of a liquid drop is determined by.

   (A) Surface tension of the liquid

   (B) Density of liquid

   (C) Viscosity of liquid

   (D) Temperature of air only

15) When the angle of contact between a solid and a liquid is 90°, then.

   (A) Cohesive force > Adhesive force

   (B) Cohesive force < Adhesive force

   (C) Cohesive force = Adhesive force

   (D) Cohesive force >> Adhesive force

16) Young's modulus is defined as.

   (A) Tensile Strain/ Tensile Stress

   (B) Tensile Stress/ Tensile Strain

   (C) Tensile Stress×Tensile Strain

   (D) Length / Area

17) Which of the following is not an IR vibrational mode?

   (A) Stretching   (B) Scissoring

   (C) Rocking   (D) Rolling

18) In the equation, $A = \varepsilon\, bc$, what quantity is represented by "ε"?

   (A) Absorbtivity   (B) Molar absorbtivity

   (C) Path length   (D) None of these

19) The wave number of a carbonyl (C=0) stretch appear in an IR spectrum?
   (A) 1740-1720
   (B) 1870-1650
   (C) 3640-3250
   (D) 160-110

20) Which of the following components of a monochromator is the dispersing element?
   (A) The collimating lens
   (B) The entrance slit
   (C) The diffraction grating
   (D) None of these

21) A simple harmonic oscillator may absorb energy.
   (A) At anytime.
   (B) When the frequencies match exactly
   (C) When the amplitudes are the same.
   (D) At no time.

22) UV-Vis spectroscopy of organic compounds is usually concerned with which electronic transition(s)?
   (A) $\sigma \rightarrow \sigma^*$
   (B) $n \rightarrow \sigma^*$
   (C) $n \rightarrow \pi^*$ and $\pi \rightarrow \pi^*$
   (D) none of these

23) Beer's Law states that.
   (A) Absorbance is proportional to both the path length and concentration of the absorbing species
   (B) Absorbance is proportional to the log of the concentration of the absorbing species
   (C) Absorbance is equal to p0 / p
   (D) None of the above

24) Which of the following techniques would be most useful to identify and quantify the presence of a known impurity in a drug substance?
   (A) NMR
   (B) MS
   (C) IR
   (D) HPLC

25) Which of the following wavelength ranges is associated with UV spectroscopy?

(A) 0.8 - 500µm

(B) 400 - 100nm

(C) 380 - 750nm

(D) 0.01 - 10nm

26) When placed in a magnetic field, all the random spins of the nuclei.

(A) Stop

(B) Reverse direction

(C) Align with the magnetic field

(D) Rotate to 90° away from the induced field

27) X-ray diffraction can only be applied to:

(A) Gaseous or vapor materials.

(B) Liquids.

(C) Solid, crystalline materials.

(D) All of the above.

28) Coupling causes the peaks in 1H NMR spectra to be split into.

(A) Two peaks

(B) Multiple peaks equal to the number of hydrogens on surrounding atoms

(C) Multiple peaks equal to the number of surrounding carbon atoms

(D) Multiple peaks equal to the number of hydrogen on surrounding atoms, plus one

29) All hydrogen atoms.

(A) have the same resonance frequency

(B) resonate at different frequencies depending on their environment.

(C) are attached to carbon

(D) resonate at about the same frequency as carbon

30) To perform product of maxterms Boolean function must be brought into.

    (A) and terms   (B) or terms

    (C) not terms   (D) nand terms

31) $(AB)^t = ?$

    (A) $B^t A^t$ (B) $A^t B^t$

    (C) AB   (D) BA

32) When determining the efficiency of algorithm, the space factor is measured by.

    (A) Counting the maximum memory needed by the algorithm

    (B) Counting the minimum memory needed by the algorithm

    (C) Counting the average memory needed by the algorithm

    (D) Counting the maximum disk space needed by the algorithm

33) The matrix $A = \begin{bmatrix} 9 & 0 \\ 0 & 9 \end{bmatrix}$ is a ?

    (A) Scalar matrix

    (B) Identity matrix

    (C) Even matrix

    (D) Odd matrix

34) A sound wave is modeled by the curve $y = 3\sin 4x$. What is the period of this curve?

    (A) π (B) $\pi/2$

    (C) 3   (D) 4

35) Which value of x is not in the domain of the function defined by $y = \tan x$?

    (A) π (B) $\pi/2$

    (C) $\pi/3$ (D) $2\pi/3$

36) Differentiation refers to the process whereby we:

(A) Calculate the gradient to a curve at any point on the curve

(B) Calculate the intercept of a curve with the horizontal axis

(C) Calculate the intercept of a curve with the vertical axis

(D) Calculate the area underneath a curve

37) The input of a computer.

(A) Feeds the data in CPU

(B) Retrieves the data from CPU

(C) Directs all other units

(D) All of these

38) Which of the following computer is least powerful?

(A) Minicomputer

(B) Microcomputer

(C) Mainframe computer

(D) Super computer

39) A temporary memory is destroyed.

(A) In a few milli seconds   (B) In a few seconds

(C) In a few minutes   (D) When power is switched off

40) Give the correct order to;

(1) Computer program

(2) Desired output

(3) Flow chart

(4) Algorithm

(A) 4,3,1,2

(B) 3,4,1,2

(C) 1,3,4,2

(D) 3,2,1,4,

41) Soap removes grease by.

    (A) Emulsification   (B) Coagulation

    (C) Adsorption   (D) None of these

42) Which of the following statement is wrong about electron?

    (A) It has wave like property

    (B) It is a particle

    (C) It emits energy while moving in orbit.

    (D) Its motion is affected by magnetic field.

43) Hydrolysis of oils with KOH leads to the generation is.

    (A) Washing soap   (B) Toilet soap

    (C) Fatty acids   (D) Fatty alcohols

44) The two ring systems present in nicotine are.

    (A) Pyridine and Pyrrole

    (B) Pyridine and Pyrrolidine

    (C) Piperidine and pynole

    (D) Piperidine and pyrrolodin

45) In a triangle ABC, If a cos A = b cos B, the triangle is either isosceles or?

    (A) Equilateral   (B) Right-angled

    (C) Obtuse angle triangle   (D) None of these

46) A parallelogram is cut by two sets of two line parallel to its sides, the number of parallelogram thus formed.

    (A) 24

    (B) 36

    (C) 06

    (D) 04

47) Electromagnetic radiation with minimum wave length is

    (A) Ultraviolet rays

    (B) X-rays

    (C) Infrared rays

    (D) Gamma rays

48) The continuous X-ray spectrum produced by an X-ray machine at constant voltage as which of the following?

    (A) Maximum wavelength

    (B) Minimum wavelength

    (C) Single wavelength

    (D) Minimum frequency

49) To how many crystal systems, the crystal lattices are classified.

    (A) 5

    (B) 6

    (C) 7

    (D) 8

50) To which crystal lattice does KCl belongs?

    (A) Monoclinic

    (B) Tetrahedral

    (C) Orthorhombic

    (D) Face centered Cubic

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ROUGH WORK

ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಸೂಚನೆಗಳು

1. ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯ ಜೊತೆಗೆ 50 ಪ್ರಶ್ನೆಗಳನ್ನು ಹೊಂದಿರುವ ಮೊಹರು ಮಾಡಿದ ಪ್ರಶ್ನೆ ಪುಸ್ತಕವನ್ನು ನಿಮಗೆ ನೀಡಲಾಗಿದೆ.

2. ಕೊಟ್ಟಿರುವ ಪ್ರಶ್ನೆ ಪುಸ್ತಕವು, ನೀವು ಪರೀಕ್ಷೆಗೆ ಆಯ್ಕೆ ಮಾಡಿಕೊಂಡಿರುವ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ್ದೇ ಎಂಬುದನ್ನು ಪರಿಶೀಲಿಸಿರಿ.

3. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮೊಹರನ್ನು ಜಾಗ್ರತೆಯಿಂದ ತೆರೆಯಿರಿ ಮತ್ತು ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯಿಂದ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯನ್ನು ಹೊರಗೆ ತೆಗೆದು, ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಸಾಮಾನ್ಯ ಮಾಹಿತಿಯನ್ನು ತುಂಬಿರಿ. ಕೊಟ್ಟಿರುವ ಸೂಚನೆಯಂತೆ ನೀವು ನಮೂನೆಯಲ್ಲಿನ ವಿವರಗಳನ್ನು ತುಂಬಲು ವಿಫಲರಾದರೆ, ನಿಮ್ಮ ಉತ್ತರ ಹಾಳೆಯ ಮೌಲ್ಯಮಾಪನ ಸಮಯದಲ್ಲಿ ಉಂಟಾಗುವ ಪರಿಣಾಮಗಳಿಗೆ ವೈಯಕ್ತಿಕವಾಗಿ ನೀವೇ ಜವಾಬ್ದಾರರಾಗಿರುತ್ತೀರಿ.

4. ಪರೀಕ್ಷೆಯ ಸಮಯದಲ್ಲಿ:

   a) ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯನ್ನು ಜಾಗ್ರತೆಯಿಂದ ಓದಿರಿ.

   b) ಪ್ರತಿ ಪ್ರಶ್ನೆಯ ಕೆಳಗೆ ನೀಡಿರುವ ನಾಲ್ಕು ಲಭ್ಯ ಆಯ್ಕೆಗಳಲ್ಲಿ ಅತ್ಯಂತ ಸರಿಯಾದ/ ಸೂಕ್ತವಾದ ಉತ್ತರವನ್ನು ನಿರ್ಧರಿಸಿ.

   c) ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯಲ್ಲಿನ ಸಂಬಂಧಿಸಿದ ಪ್ರಶ್ನೆಯ ವೃತ್ತಾಕಾರವನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬಿರಿ. ಉದಾಹರಣೆಗೆ, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆ 8ಕ್ಕೆ "C" ಸರಿಯಾದ ಉತ್ತರವಾಗಿದ್ದರೆ, ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್ ಬಳಸಿ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯ ಕ್ರಮ ಸಂಖ್ಯೆ 8ರ ಮುಂದೆ ಈ ಕೆಳಗಿನಂತೆ ತುಂಬಿರಿ:

   ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆ 8.Ⓐ Ⓑ ● Ⓓ (ಉದಾಹರಣೆ ಮಾತ್ರ) (ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರ ಉಪಯೋಗಿಸಿ)

5. ಉತ್ತರದ ಪೂರ್ವಸಿದ್ಧತೆಯ ಬರವಣಿಗೆಯನ್ನು (ಚಿತ್ತು ಕೆಲಸ) ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ಒದಗಿಸಿದ ಖಾಲಿ ಜಾಗದಲ್ಲಿ ಮಾತ್ರವೇ ಮಾಡಬೇಕು (ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಮಾಡಬಾರದು).

6. <u>ಒಂದು ನಿರ್ದಿಷ್ಟ ಪ್ರಶ್ನೆಗೆ ಒಂದಕ್ಕಿಂತ ಹೆಚ್ಚು ವೃತ್ತಾಕಾರವನ್ನು ಗುರುತಿಸಲಾಗಿದ್ದರೆ, ಅಂತಹ ಉತ್ತರವನ್ನು ತಪ್ಪು ಎಂದು ಪರಿಗಣಿಸಲಾಗುತ್ತದೆ ಮತ್ತು ಯಾವುದೇ ಅಂಕವನ್ನು ನೀಡಲಾಗುವುದಿಲ್ಲ. ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯಲ್ಲಿನ ಉದಾಹರಣೆ ನೋಡಿ.</u>

7. ಅಭ್ಯರ್ಥಿ ಮತ್ತು ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರು ನಿರ್ದಿಷ್ಟಪಡಿಸಿದ ಸ್ಥಳದಲ್ಲಿ ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯ ಮೇಲೆ ಸಹಿ ಮಾಡಬೇಕು.

8. ಅಭ್ಯರ್ಥಿಯ ಪರೀಕ್ಷೆಯ ನಂತರ ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರಿಗೆ ಮೂಲ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆ ಮತ್ತು ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ಪ್ರತಿಯನ್ನು ಹಿಂದಿರುಗಿಸಬೇಕು.

9. ಅಭ್ಯರ್ಥಿಯ ಪ್ರಶ್ನೆ ಪುಸ್ತಕವನ್ನು ಮತ್ತು ಓ.ಎಂ.ಆರ್. ಅಭ್ಯರ್ಥಿಯ ಪ್ರತಿಯನ್ನು ತಮ್ಮ ಜೊತೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.

10. ಕ್ಯಾಲ್ಕುಲೇಟರ್, ಪೇಜರ್ ಮತ್ತು ಮೊಬೈಲ್ ಫೋನ್‌ಗಳನ್ನು ಪರೀಕ್ಷಾ ಕೊಠಡಿಯ ಒಳಗೆ ಅನುಮತಿಸಲಾಗುವುದಿಲ್ಲ.

11. **ಅಭ್ಯರ್ಥಿಯ ದುಷ್ಕೃತ್ಯದಲ್ಲಿ ತೊಡಗಿರುವುದು ಕಂಡುಬಂದರೆ, ಅಂತಹ ಅಭ್ಯರ್ಥಿಯನ್ನು ಕೋರ್ಸ್‌ಗೆ ಪರಿಗಣಿಸಲಾಗುವುದಿಲ್ಲ ಮತ್ತು ನಿಯಮಗಳ ಪ್ರಕಾರ ಇಂತಹ ಅಭ್ಯರ್ಥಿಯ ವಿರುದ್ಧ ಕ್ರಮ ಕೈಗೊಳ್ಳಲಾಗುವುದು.**

ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯನ್ನು ತುಂಬಲು ಸೂಚನೆಗಳು

1. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಗೆ ಒಂದೇ ಒಂದು ಅತ್ಯಂತ ಸೂಕ್ತವಾದ/ಸರಿಯಾದ ಉತ್ತರವಿರುತ್ತದೆ.

2. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಒಂದು ವೃತ್ತವನ್ನು ಮಾತ್ರ ನೀಲಿ ಅಥವಾ ಕಪ್ಪು ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್‌ನಿಂದ ಮಾತ್ರ ತುಂಬತಕ್ಕದ್ದು. ಉತ್ತರವನ್ನು ಮಾರ್ಪಡಿಸಲು ಪ್ರಯತ್ನಿಸಬೇಡಿ.

3. ವೃತ್ತದೊಳಗಿರುವ ಅಕ್ಷರವು ಕಾಣದಿರುವಂತೆ ವೃತ್ತವನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬುವುದು.

4. ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯಲ್ಲಿ ಯಾವುದೇ ಅನಾವಶ್ಯಕ ಗುರುತುಗಳನ್ನು ಮಾಡಬೇಡಿ.

Note : English version of the instructions is printed on the front cover of this booklet.