

Total No. of Printed Pages: 07

No. of Questions: 50

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar
PET 2024 (9009) Doctor of Philosophy(Chemistry)

(To be filled by the Candidate)

Candidate Seat Number
(As per Admit card)

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OMR Sheet Number

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Invigilator's signature with Date

Candidate's Seat No. in Words : _____

Name of the Center : _____

Paper Code & Name of Examination : **9009- Doctor of Philosophy(Chemistry)**Date: **03/10/2024****PET 2024 - EXAMINATION**Time: **One Hours**Total Marks: **100****Important Instructions for the candidate**

- Write your seat number and OMR Sheet number on the question paper in the earmarked space
- This question paper carries Fifty (50) Multiple-choice type questions and each question carries 2 Marks
- At the commencement of examination, the question paper will be given to the student.
- Each question has four alternative responses marked (A) (B) (C) and (D). You have to darken the circle as indicated below on the correct response against each question
Example: where (C) is correct answer

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- Your responses to the answer are to be indicated in the OMR Sheet. If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
- Rough work is to be done at the end of this question paper.
- You have to return OMR answer sheet and question paper to the invigilator at the end of examination compulsorily and must not carry with you outside the examination hall.
- Use only Black / Blue ball point pen
- Use of any type of calculator or log table etc. is prohibited.
- There is no negative marking for incorrect answers

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

- परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात तसेच आपणास दिलेल्या उत्तर पत्रिकेचा क्रमांक त्याखाली लिहावा.
- या प्रश्नपत्रिकेतील सर्व प्रश्न सोडवणे अनिवार्य आहे.
- परीक्षा सुरू झाल्यावर विद्यार्थ्यांला प्रश्नपत्रिका दिली जाईल.
- प्रत्येक प्रश्नासाठी (A) (B) (C) (D) अशी चार विकल्प उत्तरे दिली आहेत, त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा निळा करावा.
उदा: जर (C) हे उत्तर योग्य असेल तर

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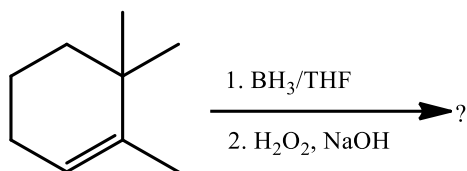
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- या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे ओएमआर उत्तर पत्रिकेतच दर्शवावीत इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
- प्रश्नपत्रिकांच्या शेवटी कोऱ्या जागेवरच कच्चे काम करावे
- परीक्षा संपल्यानंतर विद्यार्थ्यांनी मूळ ओ. एम. आर उत्तरपत्रिका पर्यवेक्षकाकडे परत करणे आवश्यक आहे तथापि प्रश्नपत्रिका व ओ. एम. आर. उत्तरपत्रिका आपल्याबरोबर नेण्यास विद्यार्थ्यांला परवानगी नाही.
- फक्त काळ्या किंवा निळ्या बॉलपेनचाच वापर करावा
- कॅल्क्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही
- चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही

- | Q. No. | Question |
|--------|--|
| 1. | Which of the following is the primary purpose of data interpretation?
(A) To gather new data
(B) To establish relationships and trends in the data
(C) To generate hypotheses
(D) To prove a theory |
| 2. | What is the purpose of data cleaning in research?
(A) To enhance the appearance of graphs and charts
(B) To simplify the dataset
(C) To remove outliers and errors in the data
(D) To increase the sample size |
| 3. | What is the purpose of a literature review in a research paper?
(A) To summarize the research findings
(B) To provide context and background for the research
(C) To present the raw data collected during the study
(D) To outline the methodology used in the research |
| 4. | Plagiarism in research is
(A) Creative use of previous data
(B) Referring for new data and working over it with new objective
(C) Copying unscrupulously and making use of it
(D) Copying and citing |
| 5. | Which of the following is considered a serious violation of research ethics in scientific publication?
(A) Fabricating data
(B) Conducting a peer review
(C) Citing relevant literature
(D) Acknowledging funding sources |
| 6. | indicates a plan of action to be carried out in connection with a proposed research work.
(A) Research abstract
(B) Research design
(C) Research methodology
(D) Research proposal |
| 7. | The term "conflict of interest" in scientific research refers to:
(A) A difference in interpretation of results
(B) A disagreement between co-authors
(C) A dispute with the peer reviewers
(D) A situation where personal or financial interests could influence the research |
| 8. | Which of the following is a key principle of research ethics?
(A) Withholding data to protect intellectual property
(B) Honesty and transparency in reporting
(C) Maximizing personal gain
(D) Focusing solely on positive results |
| 9. | What is the primary purpose of using a literature review in research?
(A) To identify gaps and justify the research question
(B) To provide an extensive bibliography
(C) To summarize all previous research studies
(D) To compare different research methodologies |

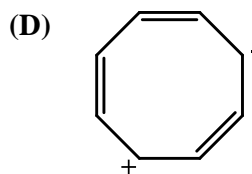
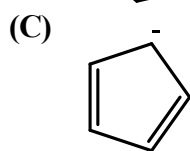
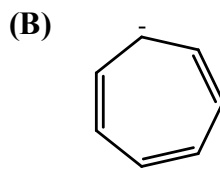
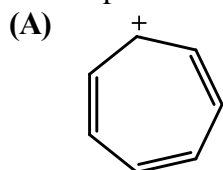
10. Which of the following is the correct sequence of steps in the research process?
 (A) Data collection → Hypothesis formulation → Literature review → Data analysis
 (B) Hypothesis formulation → Literature review → Data collection → Data analysis
 (C) Literature review → Hypothesis formulation → Data collection → Data analysis
 (D) Data collection → Literature review → Hypothesis formulation → Data analysis
11. Which of the following is the best practice for ensuring the clarity and coherence of a research thesis?
 (A) Writing the entire thesis in one go without revisions
 (B) Using complex language and technical jargon throughout the thesis
 (C) Avoiding the use of references and citations to maintain originality
 (D) Organizing the thesis into clear sections with headings and subheadings
12. Which of the following is not a method for validating research results?
 (A) Peer review (B) Replication of studies
 (C) Ignoring contradictory findings (D) Publishing in a reputable journal
13. A term research methodology refers to :
 (A) Methods used in data collection and analysis
 (B) Study of paradigms for data collection, analysis and interpretation
 (C) Specific method to study problem and analysis
 (D) Rules for writing research paper
14. Which of the following is the most appropriate sequence of steps in preparing a research report?
 (A) Writing the introduction, literature review, methodology, results, and conclusion
 (B) Data collection, writing the results, methodology, introduction, and conclusion
 (C) Data collection, data analysis, writing the report, and referencing
 (D) Writing the title, abstract, introduction, literature review, methodology, results, discussion, conclusion, and references
15. What is the main difference between a bibliography and a reference list?
 (A) A bibliography lists only the sources cited in the research, while a reference list includes all sources consulted
 (B) A reference list includes all sources cited in the research, while a bibliography lists all sources consulted
 (C) A bibliography includes only books, while a reference list includes books, articles, and other sources
 (D) A bibliography and reference list are identical in content and purpose
16. Patent protects.....
 (A) Invention (B) Discovery
 (C) Published Research Work (D) Both Discovery and Invention
17. If a frequency distribution has some extreme scores, then appropriate measure of variability will be
 (A) Range (B) Quartile Deviation
 (C) Average Deviation (D) Standard Deviation
18. The issue of research ethics become relevant in which of the following stages of research?
 1. Problem selection
 2. Hypothesis formulation
 3. Hypothesis testing
 4. Data analysis and interpretation
 (A) 1 and 2 (B) 3 and 4
 (C) 2 and 3 (D) 1 and 4

19. What is the primary purpose of an oral presentation in a PhD defence?
 (A) To entertain the audience
 (B) To summarize the entire thesis in a concise format
 (C) To demonstrate the researcher's public speaking skills
 (D) To provide detailed technical data to a general audience
20. Which of the following computer tools is most commonly used for managing and analyzing large datasets in research?
 (A) Microsoft Word (B) Adobe Photoshop
 (C) SPSS (D) PowerPoint
21. The wave function of a quantum system must be.....
 (A) Multiple- valued, discontinuous and finite at infinity
 (B) Single- valued, continuous and finite at infinity
 (C) Single- valued, continuous and infinite at infinity
 (D) Single- valued, continuous at zero at infinity
22. Two operators commute, Then.....
 (A) They are linear (B) They are Hermitian
 (C) They have the same eigen functions (D) They have the same eigen values
23. According to the Dulong- Petit law for a monoatomic crystal, the heat capacity C_v is Cal $K^{-1} Mol^{-1}$
 (A) 7 (B) 6
 (C) 5 (D) 4
24. The units of the molecular partition function are
 (A) cm^{-1} (B) S^{-1}
 (C) $J K^{-1}mol^{-1}$ (D) Dimensionless
25. In a galvanic cell, which statement is true?
 (A) Oxidation occurs at the cathode (B) Reduction occurs at the anode
 (C) The anode is positive (D) Electrons flow from the anode to the cathode
26. In an electrochemical cell, if the overall cell potential is positive, the reaction is
 (A) Non-spontaneous (B) Spontaneous
 (C) At equilibrium (D) Zero
27. The selection rule for a rotational transition in a diatomic molecule is:
 (A) $\Delta J = \pm 1$ (B) $\Delta J = 0, \pm 1$
 (C) $\Delta v = \pm 1$ (D) $\Delta v = 0, \pm 1$
28. For a chemical change $A \rightarrow B$, it is found that the rate of reaction doubles when the concentration is increased four times. The order of reaction is.....
 (A) Zero (B) One
 (C) Two (D) Half
29. If (3 2 6) are the Miller indices of a plane, the intercepts made by the plane on the three crystallographic axes are
 (A) (a,b,c) (B) (2a,3b,c)
 (C) (a,2b,3c) (D) (2a,b,3c)
30. Predict the product of following reaction

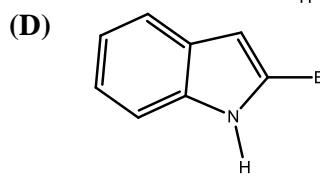
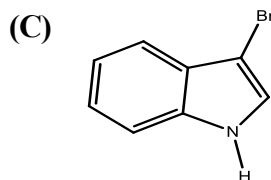
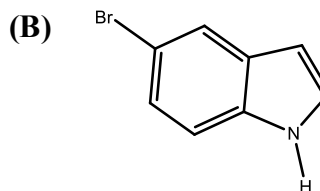
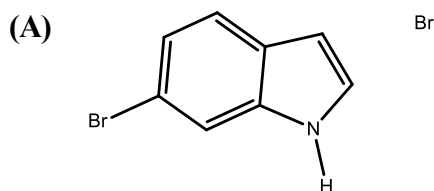
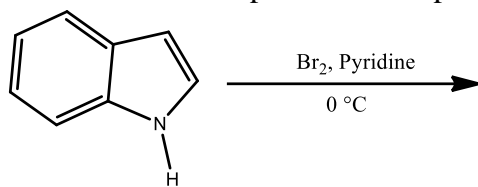


- (A) (1R,2S)-2,3,3-trimethylcyclohexanol + enantiomer
 (B) (R)-1,2,2-trimethylcyclohexanol + enantiomer
 (C) (1S,2S)-2,3,3-trimethylcyclohexanol + enantiomer
 (D) (1R,2S)-2,3,3-trimethylcyclohexanediol + enantiomer

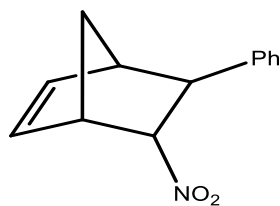
31. The compound that is NOT aromatic is



32. Which of the most possible main product of the following reaction?



33. Which reaction is used to make the following compound?



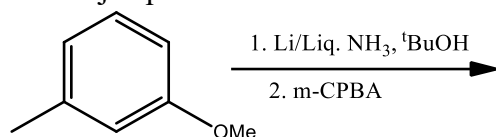
- (A) Claisen
 (C) Diels-Alder

- (B) Ene
 (D) Knoevenagel

34. Which of the following conditions are used to convert $\text{R-CO-R}'$ to $\text{R-CH}_2\text{-R}'$?

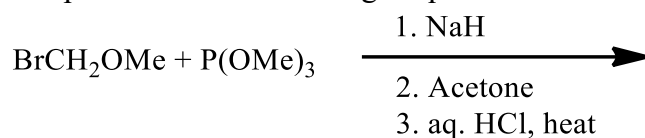
- (A) $\text{NH}_2\text{NH}_2/\text{KOH}/\text{heat}$ (B) $\text{Zn-Hg}/ \text{conc. HCl}/\text{heat}$
 (C) $\text{HS-CH}_2\text{-CH}_2\text{-CH}_2\text{-SH}, \text{H}^+$ followed by H_2/Ni (D) A, B and C

35. The major product formed in the following reaction sequence is...



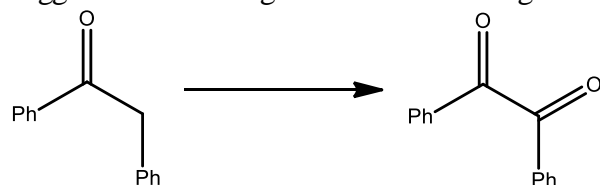
- (A)
- (B)
- (C)
- (D)

36. The product for the following sequence of the reaction is...



- (A)
- (B)
- (C)
- (D)

37. Suggest suitable reagent for the following transformation



- (A) DDQ (B) DCC
 (C) SeO_2 (D) OsO_4

38. Which of the following molecule has D_{3h} point group ?

- (A) CO_2 (B) PCl_5
 (C) POCl_3 (D) C_6H_6

39. Which of the following molecule is paramagnetic in nature?

- (A) B_2 (B) N_2
 (C) O_2 (D) H_2

40. Purple colour of potassium permanganate solution is due to -----

- (A) d-d transition
 (B) Charge transfer from oxygen to potassium
 (C) Charge transfer from oxygen to Manganese
 (D) Charge transfer from Manganese to Oxygen
41. Which of the following molecule undergoes d^2sp^3 hybridization?
 (A) $Ni(CO)_4$ (B) $[NiCl_4]^{2-}$
 (C) $Fe(CO)_5$ (D) $Mn_2(CO)_{10}$
42. Which of the following chemical process is used to convert alcohol into acetic acid ?
 (A) Monsanto process? (B) Waker process
 (C) Oxo process (D) Ziegler Natta process
43. Structure and hybridization of XeF_2 molecule is --
 (A) Linear and sp (B) Bend and sp^3d
 (C) Linear and sp^3d (D) Linear and sp^3d^2
44. When alpha particle is banded on ^{27}Al the resultant product is---
 (A) ^{31}P (B) ^{35}Cl
 (C) ^{39}K (D) ^{28}Si
45. Which of the following technique is used to measure surface area of nanomaterial?
 (A) Scanning electron microscope (B) Temperature programmed desorption
 (C) X ray diffraction (D) Brunauer Emmett Teller
46. Which electrode is commonly used as a reference electrode in electrochemical titrations?
 (A) Platinum electrode (B) Glass electrode
 (C) Saturated calomel electrode (SCE) (D) Copper electrode
47. The main principle behind Thin-Layer Chromatography (TLC) is:
 (A) Separation based on volatility
 (B) Separation based on molecular weight
 (C) Separation based on differences in adsorption
 (D) Separation based on density
48. Isomer shift in Mössbauer Spectroscopy provides information about:
 (A) Magnetic properties of the nucleus (B) Chemical bonding and electron density
 (C) Nuclear spin (D) Crystal structure
49. Which of the following nuclei is NMR active?
 (A) ^{16}O (B) ^{14}N
 (C) ^{12}C (D) ^{19}F
50. Which of the following is the correct order of energy levels in molecular spectroscopy from highest to lowest?
 (A) Rotational > Vibrational > Electronic (B) Electronic > Vibrational > Rotational
 (C) Vibrational > Rotational > Electronic (D) Electronic > Rotational > Vibrational
