

SUBJECT CODE B-02-17	SUBJECT CHEMICAL SCIENCES	PAPER II
HALL TICKET NUMBER	QUESTION BOOKLET NUMBER 207841	
OMR SHEET NUMBER	DURATION 1 Hour 15 Minutes	MAXIMUM MARKS 100
DURATION 1 Hour 15 Minutes	NUMBER OF PAGES 12	NUMBER OF QUESTIONS 50

This is to certify that, the entries made in the above portion are correctly written and verified.

Candidate's Signature

Name and Signature of Invigilator

INSTRUCTIONS FOR THE CANDIDATES

1. Write your Hall Ticket Number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to **open the booklet and compulsorily examine it as below :**
 - (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
 - (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
 - (iii) After this verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item 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 item.
Example : (A) (B) (C) (D)
where (C) is the correct response.
5. Your responses to the items are to be indicated in the OMR Answer Sheet given to you. If you mark at any place other than in the circle in the OMR Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. The candidate must handover the OMR Answer Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. The candidate is allowed to take away the carbon copy of OMR Sheet and used Question Paper Booklet at the end of the examination.
10. Use only Blue/Black Ball point pen.
11. Use of any calculator or log table etc., is prohibited.
12. There is no negative marks for incorrect answers.

అభ్యర్థులకు నూచనలు

1. ఈ పుట పై భాగంలో ఇవ్వబడిన స్థలంలో మీ హాల్ టికెట్ నంబరు రాయండి.
2. ఈ ప్రశ్న పత్రము యాభై బహుళైచ్ఛిక ప్రశ్నలను కలిగి ఉంది.
3. పరీక్ష ప్రారంభమున ఈ ప్రశ్నాపత్రము మీకు ఇవ్వబడుతుంది. మొదటి ఐదు నిమిషములలో ఈ ప్రశ్నాపత్రమును తెరిచి కింద తెలిపిన అంశాలను తప్పనిసరిగా పరిచూసుకోండి.
 - (i) ఈ ప్రశ్న పత్రమును చూడడానికి కవర్ పేజీ అంచున ఉన్న కాగితపు సీలును చించండి. స్టిక్కర్ సీలులేని మరియు ఇదివరకే తెరిచి ఉన్న ప్రశ్నాపత్రమును మీరు అంగీకరించవద్దు.
 - (ii) కవరు పేజీ పై ముద్రించిన సమాచారం ప్రకారం ఈ ప్రశ్నపత్రములోని పేజీల సంఖ్యను మరియు ప్రశ్నల సంఖ్యను పరిచూసుకోండి. పేజీల సంఖ్యకు సంబంధించి గానీ లేదా సూచించిన సంఖ్యలో ప్రశ్నలు లేకపోవుట లేదా విజ్రప్రతి కాకపోవుట లేదా ప్రశ్నలు క్రమపద్ధతిలో లేకపోవుట లేదా ఏవైనా తేడాలుండుట వంటి దోషపూరితమైన ప్రశ్న పత్రాన్ని వెంటనే మొదటి ఐదు నిమిషాల్లో పరీక్షా పర్యవేక్షకునికి తిరిగి ఇచ్చివేసి దానికి బదులుగా సరిగ్గా ఉన్న ప్రశ్నపత్రాన్ని తీసుకోండి. తదనంతరం ప్రశ్నపత్రము మార్చబడదు అదనపు సమయం ఇవ్వబడదు.
 - (iii) పై విధంగా పరిచూసుకొన్న తర్వాత ప్రశ్నాపత్రం సంఖ్యను OMR పత్రము పై అదేవిధంగా OMR పత్రము సంఖ్యను ఈ ప్రశ్నాపత్రము పై నిర్దిష్టస్థలంలో రాయవలెను.
4. ప్రతి ప్రశ్నకు నాలుగు ప్రత్యామ్నాయ ప్రతిస్పందనలు (A), (B), (C) మరియు (D) లుగా ఇవ్వబడ్డాయి. ప్రతి ప్రశ్నకు సరైన ప్రతిస్పందనను ఎన్నుకొని కింద తెలిపిన విధంగా OMR పత్రములో ప్రతి ప్రశ్నా సంఖ్యకు ఇవ్వబడిన నాలుగు వృత్తాల్లో సరైన ప్రతిస్పందనను సూచించే వృత్తాన్ని బాల్ పాయింట్ పెన్ తో కింద తెలిపిన విధంగా ఘరించాలి.
ఉదాహరణ : (A) (B) (C) (D)
(C) సరైన ప్రతిస్పందన అయితే
5. ప్రశ్నలకు ప్రతిస్పందనలను ఈ ప్రశ్నపత్రముతో ఇవ్వబడిన OMR పత్రము పైన ఇవ్వబడిన వృత్తాల్లోనే ఘరించి గుర్తించాలి. అలాకాక సమాధాన పత్రంపై వేరొక చోట గుర్తిస్తే మీ ప్రతిస్పందన మూల్యాంకనం చేయబడదు.
6. ప్రశ్న పత్రము లోపల ఇచ్చిన సూచనలను జాగ్రత్తగా చదవండి.
7. చిత్తుపనిని ప్రశ్నపత్రము చివర ఇచ్చిన ఖాళీస్థలములో చేయాలి.
8. OMR పత్రము పై నిర్దేశ స్థలంలో సూచించవలసిన వివరాలు తప్పించి ఇతర స్థలంలో మీ గుర్తింపును తెలిపే విధంగా మీ పేరు రాయడం గానీ లేదా ఇతర చిహ్నాలను పెట్టడం గానీ చేసినట్లయితే మీ అనర్హతకు మీరే బాధ్యులవుతారు.
9. పరీక్ష పూర్తయిన తర్వాత మీ OMR పత్రాన్ని తప్పనిసరిగా పరీక్ష పర్యవేక్షకుడికి ఇవ్వాలి. వాటిని పరీక్ష గది బయటకు తీసుకువెళ్లకూడదు. పరీక్ష పూర్తయిన తరువాత అభ్యర్థులు ప్రశ్న పత్రాన్ని, OMR పత్రం యొక్క కార్బన్ కాపీని తీసుకువెళ్లవచ్చు.
10. నీలి/నల్ల రంగు బాల్ పాయింట్ పెన్ మాత్రమే ఉపయోగించాలి.
11. లాగరిథమ్ టేబుల్స్, క్యాలిక్యులేటర్లు, ఎలక్ట్రానిక్ పరికరాలు మొదలగునవి పరీక్షగదిలో ఉపయోగించడం నిషేధం.
12. తప్పు సమాధానాలకు మార్కుల తగ్గింపు లేదు.

SEAL



DO NOT WRITE HERE

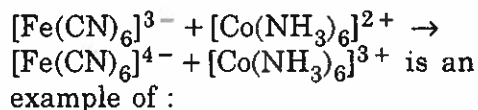
CHEMICAL SCIENCES

Paper - II

- Arrange the following ions in order of their size : Li^+ , Cu^{2+} , Al^{3+} , Fe^{2+}
(A) $\text{Li}^+ < \text{Fe}^{2+} < \text{Al}^{3+} < \text{Cu}^{2+}$
(B) $\text{Al}^{3+} < \text{Li}^+ < \text{Cu}^{2+} < \text{Fe}^{2+}$
(C) $\text{Li}^+ < \text{Al}^{3+} < \text{Fe}^{2+} < \text{Cu}^{2+}$
(D) $\text{Li}^+ < \text{Al}^{3+} < \text{Cu}^{2+} < \text{Fe}^{2+}$
- The chemical substance used as anti-knock agent is :
(A) CH_3MgBr (B) $(\text{C}_5\text{H}_5)_2\text{Fe}$
(C) $(\text{C}_2\text{H}_5)_4\text{Pb}$ (D) $(\text{CH}_3)_4\text{Pb}$
- On coordination to a transition metal atom, the C–O stretching frequency of carbon monoxide :
(A) Shifts to higher frequency
(B) Shifts to lower frequency
(C) Does not shift from its original absorption frequency
(D) Is not related to M–CO bond
- Which statement is not correct with respect to diborane ?
(A) Diborane is pyrophoric when exposed to atmosphere
(B) Diborane gives an adduct $\text{H}_3\text{N}\cdot\text{BH}_3$ with ammonia
(C) All six hydrogen atoms are equivalent
(D) Diborane is used in hydroboration reaction
- Which of the following isotopes is not NMR active ?
(A) ^{57}Fe (B) ^{119}Sn
(C) ^{12}C (D) ^{19}F
- The formula of Roussin's salt is :
(A) $\text{K}_3[\text{Fe}(\text{SCN})_6]$
(B) $\text{K}_2[\text{Fe}_2(\text{NO})_4\text{S}_2]$
(C) $\text{K}_2[\text{Fe}_2(\text{NO})_7\text{S}_3]$
(D) $\text{K}_2[\text{Ru}(\text{NH}_3)_5(\text{N}_2)]$
- Which of the following molecules is similar to CO with respect to binding to haem ?
(A) PF_3 (B) CO_2
(C) NO_2 (D) N_2
- The γ -ray used in ^{57}Fe Mössbauer spectroscopy corresponds to an energy of 14.2 keV. Express a quadrupole splitting of 3 mm s^{-1} in energy units.
(A) 42.6 keV
(B) 3.7 keV
(C) $14.2 \times 10^{-8} \text{ eV}$
(D) $14.2 \times 10^{-11} \text{ eV}$
- Which transition element is involved in the oxygen evolving complex of photosynthesis ?
(A) Iron (B) Nickel
(C) Tungsten (D) Manganese
- How does the binding of oxygen to myoglobin affect the Fe–N bond distances (r) and magnetic moment (m) ?
(A) r increases and m decreases
(B) r and m increase
(C) r and m decrease
(D) r decreases and m increases

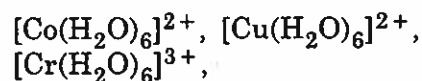


11. The reaction :



- (A) Associative substitution
- (B) Dissociative substitution
- (C) Out sphere electron transfer
- (D) Inner sphere electron transfer

12. Arrange the following ions in decreasing order of their inertness towards substitution :



- (A) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+} > [\text{Co}(\text{H}_2\text{O})_6]^{2+} > [\text{Cu}(\text{H}_2\text{O})_6]^{2+}$,
- (B) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+} > [\text{Cu}(\text{H}_2\text{O})_6]^{2+} > [\text{Co}(\text{H}_2\text{O})_6]^{2+}$,
- (C) $[\text{Co}(\text{H}_2\text{O})_6]^{2+} > [\text{Cr}(\text{H}_2\text{O})_6]^{3+} > [\text{Cu}(\text{H}_2\text{O})_6]^{2+}$,
- (D) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+} < [\text{Co}(\text{H}_2\text{O})_6]^{2+} < [\text{Cu}(\text{H}_2\text{O})_6]^{2+}$,

13. What is the product B in the following reaction ?



- (A) *trans* - $[\text{PtCl}_2(\text{NH}_3)_2]$
- (B) *cis* - $[\text{PtCl}_2(\text{NH}_3)(\text{py})]$
- (C) *trans* - $[\text{PtCl}_2(\text{NH}_3)(\text{py})]$
- (D) *cis* - $[\text{PtCl}_2(\text{NH}_3)_2]$

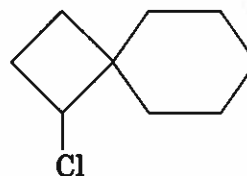
14. In Wilkinson catalysis, the binding of olefin to Rh is an example of :

- (A) Substitution reaction
- (B) Redox reaction
- (C) Oxidative addition reaction
- (D) Reductive elimination

15. In an oxide of silver, 50% of Ag is in +1 oxidation state and the remaining in +3 oxidation state. What is the formula of the oxide ?

- (A) AgO
- (B) Ag₂O
- (C) AgO₂
- (D) Ag₂O₃

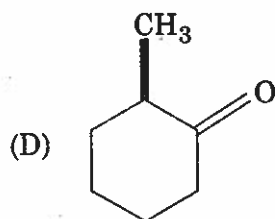
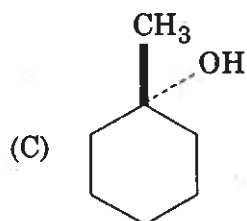
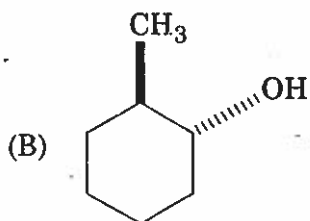
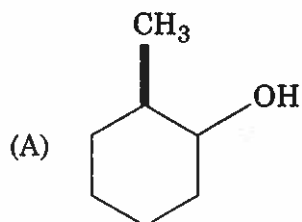
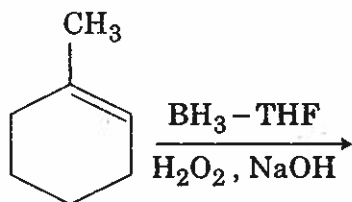
16. The correct name of the following compound is :



- (A) 1 - chloro spiro - [5, 3] - nonane
- (B) 3 - chloro spiro - [5, 3] - nonane
- (C) 6 - chloro spiro - [5, 3] - nonane
- (D) 4 - chloro spiro - [5, 3] - nonane



17. The major product of the following reaction is :



18. Azulene is :

- (A) Aromatic and has no dipole moment
- (B) Anti - aromatic and has no dipole moment
- (C) Non - aromatic and has high dipole moment
- (D) Aromatic and has high dipole moment

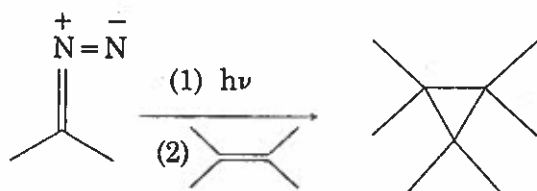
19. Dichloro carbene is an intermediate in which of the following ?

- (A) Reimer - Tiemann reaction
- (B) Hofmann reaction
- (C) Reimer - Tiemann reaction and carbylamine reactions
- (D) Beckmann rearrangement

20. The named organic reaction involving both C-C and C-O bonds formation is :

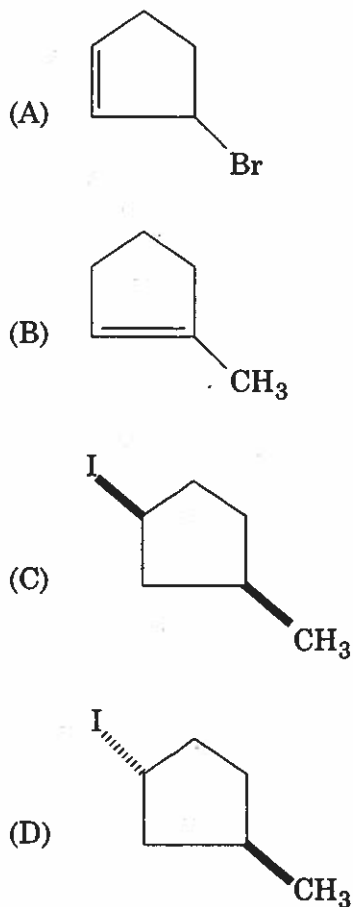
- (A) Darzen's glycidic ester reaction
- (B) Lossen Rearrangement
- (C) Pauson Kohand reaction
- (D) Henry reaction

21. What is the reactive intermediate in the following reaction ?



- (A) Carbanion (B) Carbene
(C) Carbocation (D) Free radical

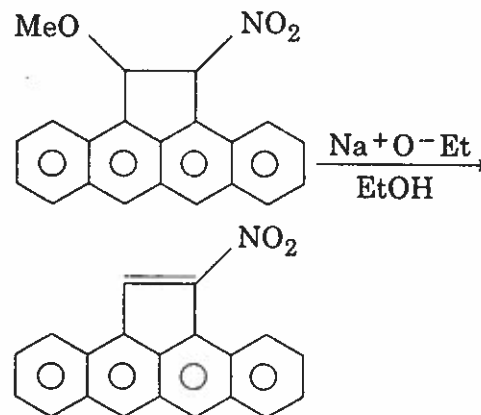
22. The main product obtained when trans 1 - Bromo - 3 - methyl cyclopentane reacts with NaI in DMF is :



23. The heterocyclic ring present in L - tryptophan is :

- (A) Pyrrole
(B) Indole
(C) Tetrahydropyrrole
(D) Pyridine

24. The following reaction proceeds by which mechanism :



- (A) E_1CB Elimination
(B) E_2 - Elimination
(C) E_1 - Elimination
(D) Syn - Elimination
25. An aqueous solution of an optically active pure compound of concentration 100 mg in 1 ml of water and measured in a Quartz tube of 10 cm length was found to be -5° . The specific rotation is :
- (A) -30° (B) -50°
(C) -5° (D) $+6^\circ$

26. The most intense peak in the IR spectrum due to its stretching vibration among the following is :

- (A) C - H (B) O - H
 (C) N - H (D) -S - H

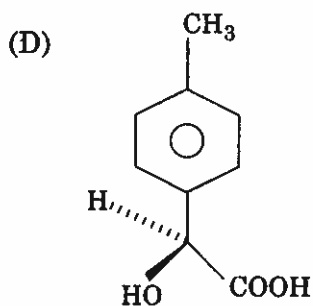
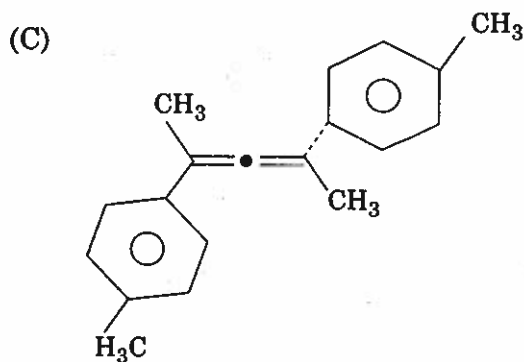
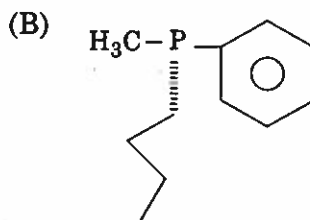
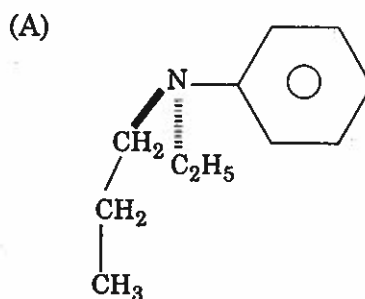
27. 1, 4 - Dichlorobenzene in BBD ^{13}C -NMR spectrum gives :

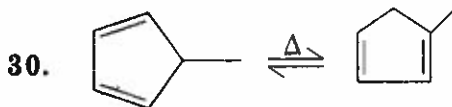
- (A) 4 signals
 (B) 3 signals
 (C) 2 signals
 (D) 4, 3, 2 signals

28. Two consecutive phosphorylations of MVA followed by loss of H_2O gives which of the following product ?

- (A) MVA 5 - Phosphate
 (B) MVA 5 - Pyrophosphate
 (C) Hydroxy methyl glutarate
 (D) Isopentenyl pyrophosphate

29. Which of the compounds is optically inactive ?





This reaction involves

- (A) 1, 3 - Sigmatropic 'H' shift
 (B) 1, 2 - Sigmatropic 'CH₃' shift
 (C) 1, 3 - Sigmatropic 'CH₃' shift
 (D) 1, 5 - Sigmatropic 'H' shift
31. If uncertainty in position and momentum are equal, then uncertainty in velocity is :
- (A) $1/2m\sqrt{h/\pi}$
 (B) $1/m\sqrt{h/\pi}$
 (C) $1/3m\sqrt{h/2\pi}$
 (D) $1/4m\sqrt{h/\pi}$
32. In a zero order reaction for every 10° C rise in temperature, the rate of the reaction is doubled. If the temperature is increased from 10° C to 100° C, the rate of the reaction will become :
- (A) 64 times (B) 512 times
 (C) 256 times (D) 128 times



33. The degeneracy of a quantum particle in cubic box having energy four times that of the lowest energy is :

- (A) 3 (B) 1
 (C) 6 (D) 4

34. Match the Law of Thermodynamics (List- I) with the Definition (List-II) :

List - I

List - II

- | | |
|------------|-------------------------------|
| (a) First | (i) Absolute zero temperature |
| (b) Second | (ii) Internal energy |
| (c) Zeroth | (iii) Temperature |
| (d) Third | (iv) Entropy |

(a) (b) (c) (d)

- (A) (i) (ii) (iii) (iv)
 (B) (iv) (iii) (ii) (i)
 (C) (ii) (iv) (iii) (i)
 (D) (ii) (i) (iv) (iii)

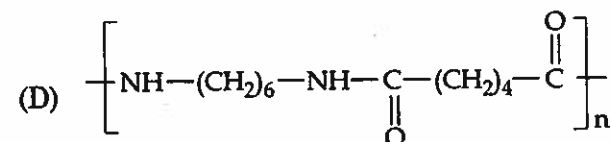
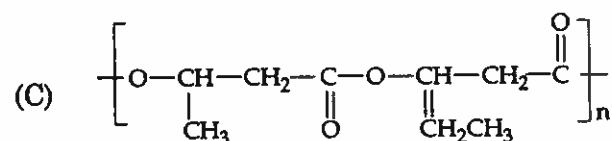
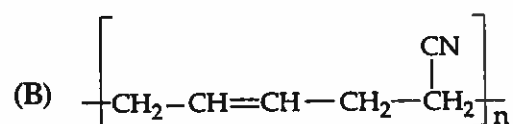
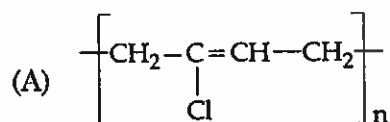
35. For an aqueous solution at 25°C, the Debye-Huckel limiting law is given by :

- (A) $\log \gamma_{\pm} = -0.509 Z_A Z_B \sqrt{\mu}$
 (B) $\log \gamma_{\pm} = 0.509 Z_A Z_B \sqrt{\mu}$
 (C) $\log \gamma_{\pm} = -0.509 Z_A Z_B \mu^2$
 (D) $\log \gamma_{\pm} = -0.509 Z_A Z_B \mu$



36. The criterion for the spontaneity of a process is :
- (A) $\Delta S_{\text{syst}} > 0$
(B) $\Delta S_{\text{surr}} > 0$
(C) $\Delta S_{\text{syst}} + \Delta S_{\text{surr}} > 0$
(D) $\Delta S_{\text{syst}} - \Delta S_{\text{surr}} > 0$
37. Which of the following is not a linear operator ?
- (A) d^2/dx^2 (B) \hat{P}_x
(C) \hat{H} (D) $\sqrt{\quad}$
38. According to Huckle MO treatment the four π -MO energies of butadiene are given by $\alpha \pm 1.62\beta$ and $\alpha \pm 0.62\beta$. The delocalization energy of butadiene is :
- (A) 0.62β (B) 0.48β
(C) 1.62β (D) 1.48β
39. The solubility of Ag_2CrO_4 is 1×10^{-4} M. The solubility product is :
- (A) 4×10^{-12} (B) 1×10^{-12}
(C) 2×10^{-12} (D) 4×10^{-16}
40. The value of d_{111} in a cubic crystal is 325.6 pm. The value of d_{333} is :
- (A) 325.6 pm (B) 976.8 pm
(C) 108.5 pm (D) 625.6 pm
41. The symmetry elements that are present in BF_3 are :
- (A) E, $2C_3$, $3C_2$, $6\sigma_h$, $3\sigma_v$, $2S_3$
(B) $2C_3$, $3C_2$, $2S_2$
(C) E, $3C_2$, $6\sigma_h$, σ_v , $2S_2$
(D) E, C_3 , $6\sigma_h$, σ_v , i
42. In how many ways can two particles be distributed in five states of an energy level if the particles follow Bose-Einstein statistics ?
- (A) 30 (B) 15
(C) 20 (D) 10
43. The analyses of a sample of iron ore gave the following percentage values for the iron content, 7.08, 7.21, 7.12, 7.09, 7.16, 7.14, 7.07, 7.18, 7.11. What will be the mean and standard deviation for the values respectively ?
- (A) 71.3, 0.0020
(B) 7.13, ± 0.045
(C) 7.13, ± 0.002
(D) 71.3, ± 0.0182

44. Which of the following polymer is biodegradable ?



45. If a trial wave function is used to calculate the energy of a quantum mechanical system, the calculated energy is always greater than the true energy. The statement is related to :

- (A) Perturbation theory
- (B) Variation principle
- (C) Born-Oppenheimer approximation
- (D) Heisenberg uncertainty principle

46. Which of the following types of bonds may be involved in supramolecular interactions ?

- (a) Covalent bond
- (b) Hydrogen bond
- (c) p-p interactions between aromatic groups
- (d) Coordinate bond

(A) All four

(B) (b) and (c)

(C) (b), (c) and (d)

(D) (a), (b) and (d)

47. Lithium Carbonate is used in the treatment of :

- (A) Malaria
- (B) Mania
- (C) Peptic ulcer
- (D) Tuberculosis



48. If two moles of A (Mol. Wt. 100) and one mole of B (Mol. Wt. 200) react together to give the desired enantiomer (Mol. Wt. 250) in 80% enantiomeric purity, what is the atom economy of the reaction ?

- (A) 50% (B) 80%
(C) 25% (D) 100%

49. Which of the reagents :

- (a) Citric acid
(b) Calcite
(c) Ethylene glycol
(d) Sucrose

are suitable for preparing silver nanoparticles from silver nitrate ?

- (A) All four
(B) (a), (b) and (c)
(C) (a), (c) and (d)
(D) (b), (c) and (d)

50. Pick the correct statement about biological oxygen demand (BOD).

- (A) A sample of water having high BOD is safe for drinking
(B) A low BOD implies a higher concentration of aerobic bacteria.
(C) Clean water will have low BOD.
(D) Hard water will have high BOD.

- o O o -



Space For Rough Work

SEAL