

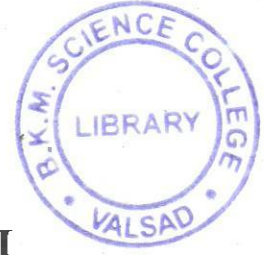


**RAN-1299**

**M.Sc. (Sem. - III) Examination**

**March / April - 2019**

**Chemistry of Natural Products : Paper - I**



**Time: 3 Hours ]**

**[ Total Marks: 70**

**સૂચના : / Instructions**

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર આવશ્ય લખવી.  
Fill up strictly the details of signs on your answer book

Name of the Examination:

M.Sc. (Sem. - III)

Name of the Subject :

Chemistry of Natural Products : Paper - I

Subject Code No.: 1 2 9 9

Seat No.:

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Student's Signature

(2) Figures to the right indicate full marks of the questions.

**Q-1: Answer any three of the following:**

**18**

- Prove the presence of  $\text{>N} - \text{CH}_3$  group and ether linkage in morphine.
- Give evidence for the size of ring C in colchicine. How will you show the presence of acetmido group in colchicine.
- How is it established that haemin contains vinyl group and propionic acid residue?
- Give synthesis of opsopyrrole, cryptopyrrole, phyllopyrrole and haemopyrrole.

**Q-2: Answer any three of the following:**

18

- a) Explain the transformation of  $R-CH_2COOH \longrightarrow R-COOH$ . Name it and show how it is important to establish the nature of side chain in cholesterol.
- b) What are sex hormones? Prove the structure of progesterone giving analytical and synthetic evidences.
- c) Give evidences to prove that ergosterol contains one ethylenic double bond and two double bonds in ring B.
- d) What are corticoids? Give names and structures of any four corticoids. Give partial synthesis of cortisone.

**Q-3: Answer any three of the following:**

18

- a) Discuss ozonolysis of Eudesmol. Give synthesis of Eudesmol.
- b) How farnesol is converted to farnesenic acid and geranyl acetone. Give synthesis of geranyl acetone.
- c) Give evidence for presence of S-atom and side chain in Biotin.
- d) Give evidences for the size of ring and its linkage to Purine nucleosides.

**Q-4: Answer any three of the following:**

16

- a) Discuss catalytic reduction reaction of bilirubin and derive conclusion.
- b) Give oxidation reactions of retene. Give synthesis of retene.
- c) Discuss spectral properties of porphyrins. Give synthesis of symmetrical dipyrromethene.
- d) Show presence of naphthalene ring in retinol and write its synthesis.



R A N - 1 3 0 0

# RAN-1300

M. Sc. (Part-II) Sem - III Examination

March / April - 2019

Organic Chemistry: Paper-II (Instrumental Techniques & Analysis)

Time: 3 Hours ]

[ Total Marks: 70

सूचना : / Instructions

(1)

नीचे दशविले निशानीवाणी विगतो उत्तरवही पर अवश्य लपवा।

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Name of the Examination:

M. Sc. (Part-II) Sem - III

Name of the Subject :

Organic Chemistry: Paper-II (Instrumental Techniques & Analysis)

Subject Code No.: 1 3 0 0



Seat No.:

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Student's Signature

- (2) All questions are compulsory.  
(3) Figures to the right indicate full marks of the questions.

Q.1 Answer any three of the following.

18

- a i. Discuss the shielding and deshielding in ethylene.  
ii. Enlists the different solvents used in  $^{13}\text{C}$ -NMR. Calculate the chemical shift in  $\delta$  ppm of each carbons for 2,3- Dimethyl pentane.
- b i. A compound A with M.F.  $\text{C}_4\text{H}_8\text{O}_3$ , gives PMR Spectrum that exhibits a triplet at  $\delta$  1.27, a quartet at  $\delta$  3.66, a singlet at  $\delta$  4.13 and another singlet at  $\delta$  10.95. The IR of compound displays at broad absorption in the range  $2500\text{-}3200\text{ cm}^{-1}$ , a strong band near  $1715\text{ cm}^{-1}$  and a band near  $1215\text{ cm}^{-1}$ . Deduce the structure of the compound.  
ii. The IR spectrum of the compound B shows absorption at  $3100\text{-}2900$ ,  $1740$ ,  $1525$ ,  $1450$ ,  $1350$ ,  $1280$ ,  $1060$ ,  $750$  and  $700\text{ cm}^{-1}$ . The PMR shows singlet at  $\delta$  7.22 (5H),  $\delta$  4.8 (2H) and  $\delta$  1.96(3H). Hydrolysis of B give an alcohol with molecular weight 108. Deduce the structure of the compound B.

- c i. Name the different methods for ion source. Discuss chemical ionization method.
- ii. Define radical cation,  $M + 1$  peak and Base peak
- d i. Indicate the major fragments with base peak that could be formed in mass spectra of; 2-pentanone, m-cresol and ethyl benzene.
- ii. Define coupling constant. Give the  $^1\text{H-NMR}$  signals that can be obtained in ethylphenyl amine; vinylbenzene & 1-phenyl ethanol with justification.

**Q.2 Answer any three of the following.**

**18**

- a. Give an account of bonded phase supports. How they are advantageous than the normal solid supports?
- b. Describe the thermobalance. Explain the effect of furnace atmosphere on thermal gravimetric analysis results giving one example.
- c. Explain importance of derivatization in HPLC giving two examples.
- d. Give characteristics of an ideal detector? Describe in brief the UV detector.

**Q.3 Answer any three of the following.**

**18**

- a. Discuss the schematic diagram of the instrument used in Chemiluminescence method for  $\text{NO}_x$  determination.
- b. Give the characteristics of drug industry wastewater and flowchart for the treatment given to effluent of drug industries.
- c. Discuss the interference in BOD determination. Explain how an estimation of BOD of water samples is determined?
- d. Describe the detrimental effects of oxides of Sulphur? Give one method for the determination of  $\text{SO}_x$ .

- a. An organic compound shows the following spectral characterization;  
UV:  $\lambda_{\text{max}}$  256 nm ( $\epsilon = 12000$ ) & 322 nm ( $\epsilon = 200$ )  
IR: 3352, 2833, 2760, 1687, 1616, 1580  $\text{cm}^{-1}$ .  
 $^1\text{H}$  NMR: ( $\text{CDCl}_3$ , TMS)  $\delta$ ppm (10.83, s, 1H), (9.59, s, 1H), (7.31, m, 2 H) and (6.79, m, 2H).  
Peak at 10.83 disappears on shaking with  $\text{D}_2\text{O}$ .  
 $\text{M/Z} = 29(8), 39(40), 65(30), 121(90) \text{ \& } 122(100)$
- b. i. Indicate the major fragments that could be formed in mass spectra of the following compounds;  
i. Methylphenylketone  
ii. Ethylbenzene  
ii. Why deuterated solvents are used in  $^1\text{H}$ -NMR? Enlists the different solvents used in PMR spectroscopy.
- c. Give the classification of LC on the basis of interaction of solute to the stationary phase and on the type of column. Give a comparative statement of the GC and HPLC.
- d. Give a comparative statement of pneumatic and reciprocating pumps.
- e. Name the various type of environmental pollution. Which compound of mercury caused Minamata disaster? What are the effects of mercury poisoning?



# RAN-1303

M.Sc. Sem III Examination

March / April - 2019

Dyes and Intermediates - I



[ Total Marks: 70

## સૂચના : / Instructions

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Name of the Examination:

M.Sc. Sem III

Name of the Subject :

Dyes and Intermediates - I

Subject Code No.: 1 3 0 3

Seat No.:

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Student's Signature

**Q.1 Answer any three of the following.**

18

- What are diazotates? Explain different methods of diazotization?
- Define benzenediazonium chloride with chemical reaction. Give the mechanism of diazotization with physical properties.
- Explain Fast salt, Fast base and Rapid fast colour with important example. Give synthesis and uses of azoic dye obtained by chlorination of m-xylene.
- Indicate replacement reaction in benzenediazonium chloride. Give synthesis and uses of Acid Black 1.

**Q.2 Answer any three of the following.**

18

- In FBA at which nm wavelength emission maximum brightening effect is obtained? Classify Fluorescent whitening agents giving suitable examples of each class.
- Define white dyes. Write a short note on basis operations involved in dyeing process.

- c) Explain the following terms with suitable examples.  
Leuco Salt, Fluorescence effect, Fluorescence Agents and Fluorescence Principle.
- d) What is the basic difference between Blankophor G and Blankophor R? Discuss the preparation of dye bath, application of dye bath and finishings with suitable examples.

**Q.3 Answer any three of the following.**

18

- a) What are azine dyes? write short note on oxazine ring systems with important example.
- b) Give the name and structure of coupling component in pigment orange VI. Give synthesis and uses of safranin B and sirius supra yellow RT.
- c) State the difference between dyes and pigment. Give synthesis and uses of Rosinduline GG and Brilliant Alizarine Blue 3 R.
- d) Give the structural formula of Basic yellow II. Write a short note on chemistry of cyanine dyes.

**Q.4 Answer any three of the following.**

16

- a) 'Diazotized anthranilic acid is coupled with J acid in basic medium'. -Formulate the reaction. Why excess of hydrochloric acid is used in diazotization? Write important coupling rules.
- b) Define Rapidogens. Give synthesis and uses of Direct dye obtained from Gamma acid as starting material.
- c) Describe colour fastness and Burnt gas fumes fastness with example. Give synthesis and uses of Tinopol - BV.
- d) What are Thiazole dyes? Give broad classification of organic pigment with important example.





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# RAN-1342

## M.Sc. (Chemistry) Semester - IV Examination

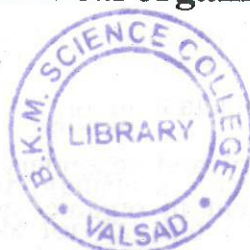
March / April - 2019

### Paper-I (Theoretical organic chemistry)

Time: 3 Hours ]

[ Total Marks: 70

सूचना : / Instructions



(1)

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Fill up strictly the details of signs on your answer book

Name of the Examination:  
M.Sc. (Chemistry) Semester-IV

Name of the Subject :  
Paper-I (Theoretical organic chemistry)

Subject Code No.: 1 3 4 2

Seat No.:

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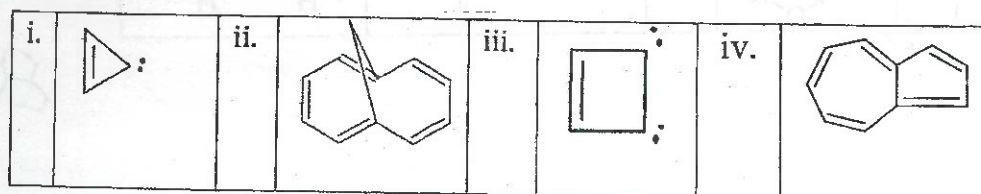
B.D. Patel  
Student's Signature

(2) Figures to the right indicate full marks of the questions.

1. Answer any four of the following. 18

- (a) Discuss the aromatic character of benzenoid compounds giving suitable examples, emphasizing on IR and UV spectroscopic data.
- (b) Compare the aromatic character of [18] and [16] annulenes.
- (c) Classify the following molecules as aromatic, antiaromatic or nonaromatic.

Give the reasons for the classification.



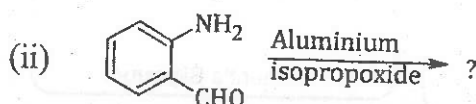
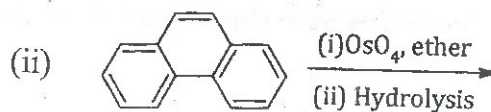
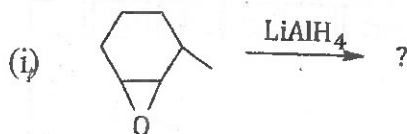


- (d) How the antiaromatic compounds can be differentiated from organic compounds. Give one instrumental method useful for the assessment of aromaticity in a compound.
- (e) Discuss the aromatic character of tropylium cation and cyclopropenium ion.

2. Answer any three of the following.

18

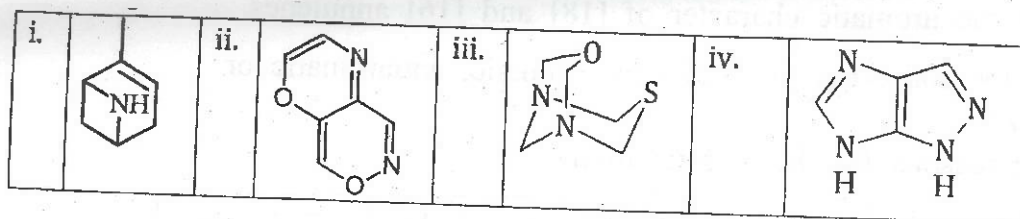
- (a) Name the different peroxydic reagents. Discuss Bayer - Villiger oxidation with example.
- (b) Enlist various types of reductants. Explain the mechanism and application of aluminium isopropoxide as reductant in organic synthesis.
- (c) Discuss the mechanism of primary and secondary alcohols with Mn(VII). Give the importance of this reagent in organic synthesis as an oxidant.
- (d) Suggest the product(s) and explain any two of the following.



3. Answer any three of the following.

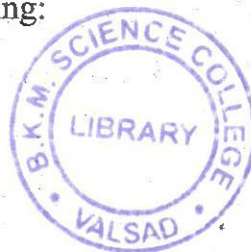
18

- (a) "Boiling points of pyrazoles are much higher than anticipated, whereas their N-Alkyl derivative have much lower boiling points" Explain.
- (b) Using systematic nomenclature rules give the names of any three of the following structures:



(c) Draw the structural for any three of the following:

- (i) pyrimido [5,4-b] quinoline
- (ii) 4,4-dimethyl-4H-1,2,5-thiadiazine
- (iii) imidazo[2,1-b][1,3]oxazole
- (iv) 9-methyl-3,9-diazabicyclo[3.3.1] nonane



(d) Discuss the importance of benzoxazole heterocycle in textile industries. Give the preparation and important reactions of benzoxazoles.

(e) Give the synthesis, important characteristics and reactions of pyrazine.

4. Answer any four of the following.

16

- (a) Explain how HMO method predicts a special stabilization of benzene. Draw the molecular orbitals for  $4\pi$  and  $6\pi$  electron allylic systems.
- (b) Enlist various isomers of bicyclic six membered aromatic compounds with one nitrogen atoms in each of the rings. Give synthesis and important reactions of any one symmetrical isomer among these compounds.
- (c) Describe general methods of synthesis of diazines. Give important reactions of 1,3- diazine.
- (d) Discuss the geometry and various methods for the trapping of [4] annulene.
- (e) Discuss the application of periodic acid or  $K_2Cr_2O_7$  as oxidising agent in organic synthesis.



RAN-1343

M.Sc. (Chemistry) (Sem. IV) Examination

March / April - 2019

Organic Chemistry : Paper - II  
(Industrial Chemicals & Process)



સૂચના : / Instructions

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Name of the Examination:

M.Sc. (Chemistry) (Sem. IV)

Name of the Subject :

Organic Chemistry : Paper - II

Subject Code No.: 1 3 4 3

Seat No.:

0 0 0 1 6 2

B. D. Patel

Student's Signature

**Instruction:**

- (1) All questions are compulsory.
- (2) Figures to the right indicate full marks of the questions.

1. Answer any three of the following.

18

- Define unit process and unit operation. Give mechanism of aromatic nitration. Give a brief account of various industrially important chemicals obtained from benzene and toluene by nitration.
- How amination is carried out for the manufacturing of chemicals on large scale? Give an account of industrially important chemicals obtained by ammonolysis process.
- Enlist different halogenating agents. Give a brief account of chlorination and bromination in the manufacturing of industrially important chemicals.
- What is hydroxylation? Giving examples give a brief account of industrially important hydroxyl chemicals obtained by different routes?



2.

**Answer any three of the following.**

- (a) Discuss the industrial manufacturing and uses of polyacrylates and polyesters.
- (b) What are petrochemicals? Discuss how industrially important chemicals are obtained by C4 cut.
- (c) Discuss the development of petrochemicals industry in Gujarat.
- (d) What are polymers? Give their classification. Give names of techniques of polymerization and discuss any one giving suitable example.

18

3.

Give the industrial production and uses of any three of the following with diagram .

- (a) Ethanol amines
- (b) Acetone
- (c) Power alcohol
- (d) Penicillin

18

4.

**Answer any four of the following.**

- (a) What is crude petroleum? Discuss how industrially important chemicals are obtained from ethylene.
- (b) What is sulphonation? Write its mechanism. Give a brief account of sulphonation of naphthalene derivatives.
- (c) Write a note on co-polymer.
- (d) Give industrial production and uses of MIBK.
- (e) Give a brief account of homopolymers.

16





# RAN-1344

## M.Sc. (Sem. - IV) Examination

### March / April - 2019

### Organic Chemistry: Paper-III

### (Rearrangements and Synthetic Approach)

Time: 3 Hours ]

[ Total Marks: 70

સૂચના : / Instructions



(1)

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Name of the Examination:

M.Sc. (Sem. - IV)

Name of the Subject :

Organic Chemistry: Paper-III

Subject Code No.: 1 3 4 4

Seat No.:

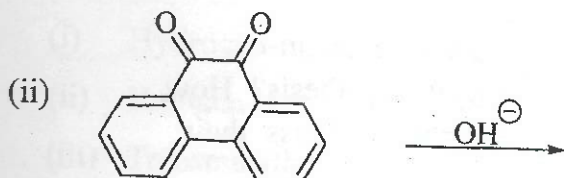
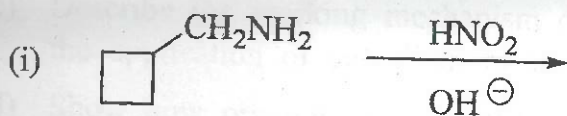
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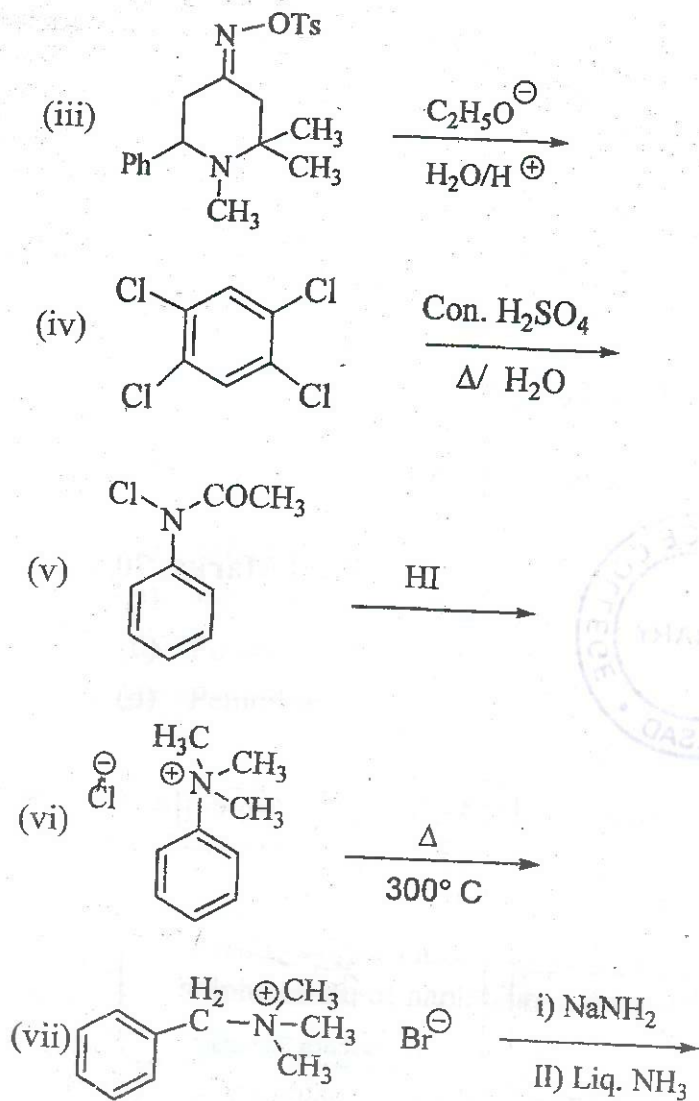
Student's Signature

(2) Figures to the right indicate full marks of the questions.

1. Give name of the rearrangement, end products and offer suitable mechanism with supporting explanation briefly of any five of the following:



18

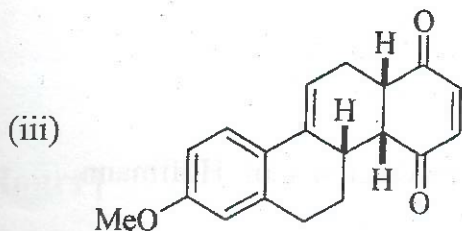
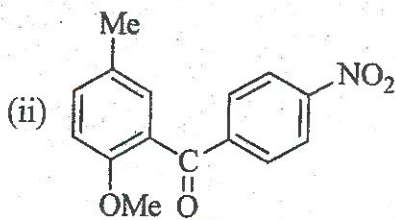
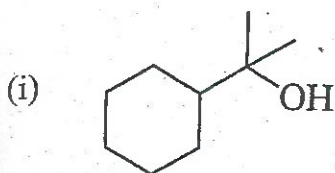


2. Answer any THREE of the following:

18

- (a) What is meant by disconnection? Explain the following terms with suitable examples.
- TM
  - FGI
  - Reagent
  - Retrosynthetic analysis
- (b) What are the needs of protective group in organic synthesis? How carbonyl group is protected using different reagents. Discuss their merits and demerits.

(c) Give the disconnection and plan the synthesis for the following molecules:



(d) Explain the following transformation using appropriate reagents:

(i) 3-Aminopropanal  $\rightarrow$  3-Amino propanoic acid

(ii) Ethyl acetoacetate  $\rightarrow$  4-Hydroxy butane-2-one

(iii) Ethylmagnesium bromide + 2-Ethynylpropane-1,3-diol  $\rightarrow$  2-(Hydroxymethyl) hex-3-yne-1,5-diol

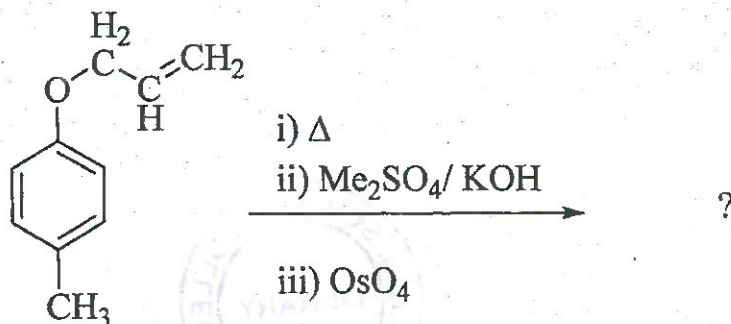
3. Answer any THREE of the following:

18

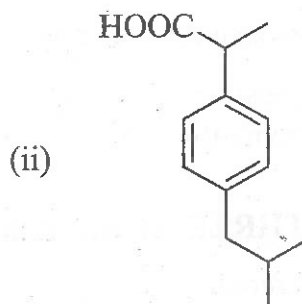
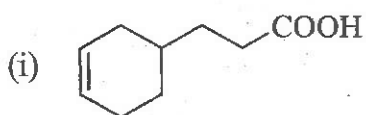
- Discuss the stereochemistry of hydroboration. Describe synthetic importance of carbonylation reaction on organoborane compound with suitable examples.
- Give methods for the preparation of dialkyl cuprate. Explain the reactions of lithium dialkylcuprate with vinylhalide and alkyl acetate giving equations.
- Describe the working mechanism of organopalladium compounds. Discuss the application of palladium metal in organic synthesis.
- Show how organolithium compounds are prepared by the following methods:
  - Hydrogen-metal exchange
  - Halogen-metal exchange
  - Transmetallation

4. Answer any THREE of the following:

- a) Give end product, name the rearrangement and offer suitable mechanism of the following rearrangement.



- b) Give mechanism and three synthetic applications of Hoffmann rearrangement.
- c) Give preparation and synthetic applications of organozinc compounds.
- d) Give the disconnection and plan the synthesis for the following molecules:







# RAN-1346

## M.Sc. (Sem. IV) Examination

### March / April - 2019

### Organic Chemistry: Paper - IV

### (Dyes & Intermediate - II)

Time: 3 Hours ]

[ Total Marks: 70

सूचना : / Instructions



नीचे दृशविले निशानीवाणी विगतो उत्तरवही पर अवश्य लपणी.  
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Name of the Examination:

M.Sc. (Sem. IV)

Name of the Subject :

Organic Chemistry: Paper - IV

Subject Code No.: 1 3 4 6

Seat No.:

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Student's Signature

(1) Figures on the right indicate full marks of the question.

1. Answer any TWO of the following. 18
- Discuss the chemistry of Anthraquinone mordant dyes with suitable example.
  - What are Anthraquinone dyes? Write note on Anthraquinone acid dyes with examples.
  - Give synthesis of
    - Indanthrene Orange FFRK
    - Anthracene Blue SWX
    - Indanthrene Scarlet B
    - Indanthrene Brilliant Orange GR
2. Answer any TWO of following. 18
- Classify TPM dyes. Discuss the chemistry and synthesis of any two dyes from each class.
  - Describe the method of application of reactive dyes on different fabrics. How reactive dyes are superior to non-reactive dyes? Describe them.

- c) Give synthesis of
- i. Remazol Brilliant Blue R
  - ii. Crystal Violet
  - iii. Acid Red 1
  - iv. Procion Brilliant Red H-3B

3. **Answer any TWO of the following.**

18

- a) Give an account of Cationic dyes.
- b) Classify Indigoid and Thioindigoid dyes. Give synthesis and application of important dyes of these groups.
- c) Give synthesis of
  - i. Disperse Blue 14
  - ii. Chrysoidine Y
  - iii. Acridine Yellow G
  - iv. Bismarck Brown

4. **Answer any TWO of the following.**

16

- a) Give a brief account of Disperse dyes.
- b) Describe Acid dyes.
- c) Write note on Anthraquinone solubilized vat dyes.

