

- NB: (1) All questions are compulsory.
 (2) Figures to the right indicate full marks.
- 1 (a) State the Schedule M II requirements for nail lacquer manufacturing. 2
 (b) Write a brief note on anti-acne products. 3
 (c) Enlist nail specialty products. 2
 (d) Give an account of the mechanism of action of hair waving products. 2
 (e) Elaborate on an after shave product with a suitable example 3
 (f) Explain the formulation and evaluation of mouthwashes. 3

 - 2 (a) State the sensitization reactions to cosmetics. Briefly explain various sensitivity testing methods. 4
 (b) Discuss the formulation aspects of Cleansing products. 3
 OR
 Explain quality control tests for skin creams. 3
 (c) Elaborate on the raw materials used in shampoos. 4

 - 3 (a) Classify Wet shaving formulations. Discuss the formulation aspects and ingredients used in their formulation. 4
 (b) Which are the various eye make- up products? Suggest a formula for one product. 3
 (c) Write a detailed description of **any one** 4
 (i) Preservatives and antioxidants used in cosmetics
 (ii) Colors used in cosmetic products

 - 4 (a) Write a note on Face Powders. 3
 OR
 Describe the formulation of Foundation cream. 4
 (b) State the classes of hair colorants and explain any one class. 4
 (c) Discuss quality control tests and BIS standards for Toothpastes. 4

 - 5 (a) Write a short note on Depilatories. 3
 (b) Give an account of large scale manufacturing of Lipsticks. 4
 OR
 Describe raw materials used in lipstick formulations. 4
 (c) State the sources of microbial contamination in cosmetics manufacturing and suggest remedies to prevent it. 4

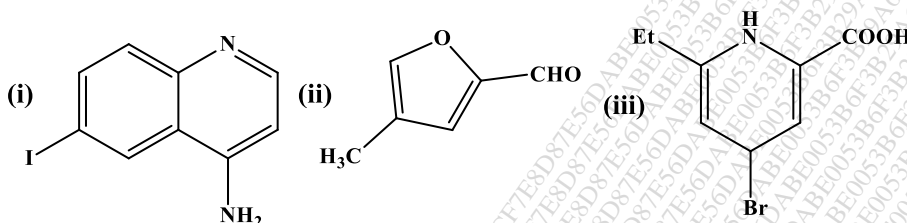
 - 6 (a) What are the factors to be considered while formulating baby cosmetics? Enlist various baby cosmetics. 3
 OR
 Give an account of antiperspirants. 4
 (b) Mention ideal properties of nail lacquers and explain suitable raw materials with examples which impart it. 4
 (c) Elaborate on types of sunscreen agents and discuss evaluation of sunscreen products 4

Time: 3hrs

N.B.: 1. All Questions are compulsory.
2. Figures to right indicate full marks.

Total Marks: 70

Q1. A. Give IUPAC nomenclature of the following compounds: (03)



B. Justify the statement - Pyridine is more basic than pyrrole. (02)

C. Answer the following: (05)

(i) Give structural requirements for (4+2) cycloaddition reactants.

(ii) Write strategy for disconnection of pyrrole.

(iii) Give synthetic equivalent for the synthon $\text{HO}-\text{CH}_2^{\oplus}$

(iv) Give structure of product formed when HBr reacts with Cholesterol

(v) E-factor with example.

D. Give structures of the following: (i) Testosterone. (ii) 17 β -estradiol.

(iii) 5 α -cholestan-3 β -ol (in chair form). (03)

E. Write one reaction in green chemistry catalysed by hydrotalcite. (02)

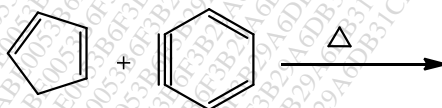
Q2. A. Write complete mechanism for (any two) (04)

(i) Skraup synthesis (ii) Bischler Napieralski synthesis (iii) Fischer indole synthesis

B. Discuss catalytic oxidation reactions with H₂O₂ under phase transfer conditions. (03)

C. (i) Explain with molecular orbital pictures why thermal [1,3] sigmatropic reaction is symmetry forbidden. (03)

(ii) Complete the following reaction: (01)



Q3. A. Attempt the following conversions (any four): (04)

(i) Thiophene to 2-chloromethylthiophene

(ii) 4-methylpyrimidine to 4-methylpyrimidine-N-oxide.

(iii) Phenylacetyl bromide to 2,4-diphenylimidazole.

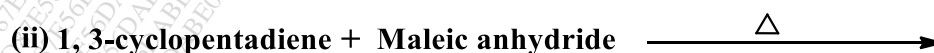
(iv) Furan to 2-bromofuran

(v) 2-phenylethylamine to 2-methylisoquinoline.

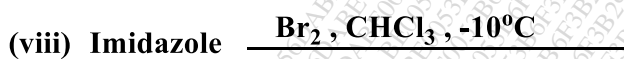
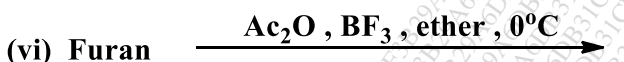
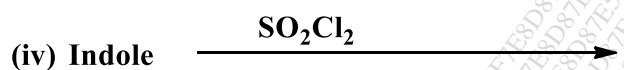
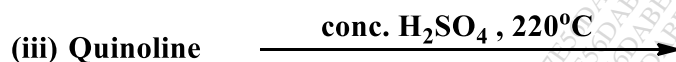
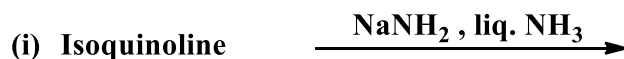
B. Using synthon approach devise scheme for synthesis of benzocaine. (04)

C. Compare conventional and catalytic process for manufacturing of caprolactam. (03)

Q4. A. Complete the following reactions and predict stereochemistry of the products formed: (03)



Q4. B. Write structures of products formed for the following reactions (**any eight**): (08)



Q5. A. Write complete mechanism for **any two**: (i) Paal-Knorr synthesis for furan. (ii) Hinsberg synthesis (iii) Hantzsch synthesis of Pyridine (04)

B. Give reasonable explanation for the following: (05)

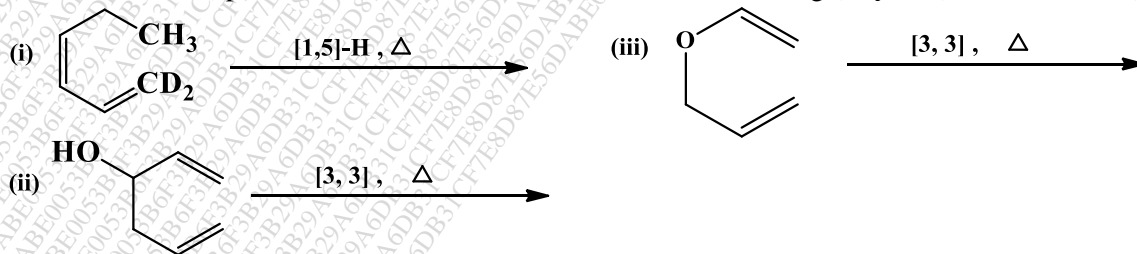
- Electrophilic substitution in indole takes place at 3- position.
- Furan, pyrrole and thiophene are heteroaromatics.
- Oxidation of 5α -cholestane- 11β -ol is highest.
- Hoffmann degradation of 3β -trimethylammonium- 5β -cholestane does not form any product.
- Nucleophilic substitution in pyridine is preferred at 2-position.

C. Attempt the following conversions: (02)

- 5α -cholestan- 3β -ol to 5α -cholestane.
- Cholest-5-en- 3β -ol to cholestan- $3\beta, 5\alpha, 6\beta$ -triol.

Q6. A. Draw resonating structures of: (i) Indole (ii) Furan (iii) Imidazole (iv) Pyridine (04)

B. Give structures of products formed with mechanism for the following (**any two**): (04)



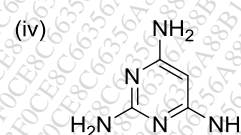
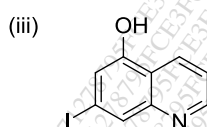
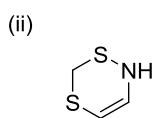
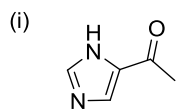
D. Discuss retrosynthetic analysis and synthetic pathway for p-methoxyacetophenone. (03)

Time: 3hrs

Marks: 80

N.B.: 1. All Questions are compulsory
2. Figures to right indicate full marks

Q.1. A. (i) Give IUPAC nomenclature of the following: (Any three) (03)



(ii) Write the structures for the following: (Any two) (02)

a) 4-Acetylimidazole b) 2-propenyl pyridine c) 2*H*-1,3-Thiazine-3-carbaldehyde

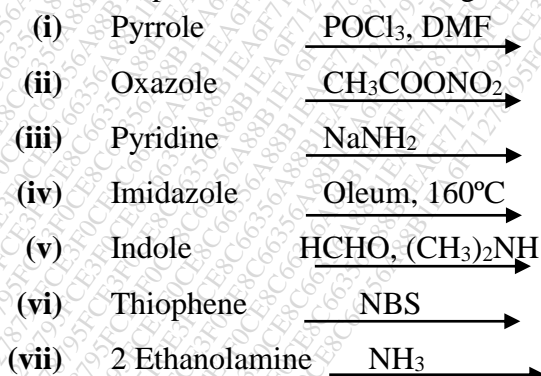
B. Answer the following in brief (10)

- Calculate the isoelectric point for Lysine given that $pK_{a1} = 2.18$, $pK_{a2} = 8.95$, and $pK_{a3} = 10.53$. Write the structure of the zwitterion
- Measurements on two fractions, A and B of a linear polymer, yield molecular weights of 50,000 and 200 000, respectively. A mixture is prepared from one part by weight of A and two parts by weight of B. Determine the number-average molecular weight of the mixture.
- Illustrate the coupling step in DNA synthesis.
- Give the products of quinoline on reaction with $KMnO_4$
- Electrophilic substitution in pyrrole takes place in 2-(or 5) position. Justify.

C. Answer the following:

- Write resonating structures of (a) indole (b) oxazole (02)
- Discuss the reductive desulfurization of thiazole (02)
- Draw the structure and denote the stereochemistry for 5 β -cholestane (01)

Q.2. A. Give the products of the following reactions (Any six) (06)



B. Complete the following reactions: (03)

- (i) 5α -cholestan- $3\alpha,6\beta$ -diol $\xrightarrow{\text{ClCOOC}_2\text{H}_5}$
- (ii) Bis-2 chloroethylether $\xrightarrow{\text{RNH}_2}$
- (iii) 5α -Cholestan-3-one $\xrightarrow{\text{Br}_2}$

C. Deduce the first amino acid fragment obtained during the sequencing of a peptide Ala-Cys-Glu-Ser-Leu-Phe-Tyr-Val using (03)

- (i) carboxypeptidase method
(ii) Edman degradation method.

Q.3. A. Write the following reactions with mechanisms (Any three) (06)

- (i) Radiszewskii Reaction
(ii) Hantzsch Pyrrole synthesis
(iii) Bischler Napieralski synthesis
(iv) Fischer indole synthesis

B. Write all the steps involved in the synthesis of the dipeptide Ala-Gly. (03)

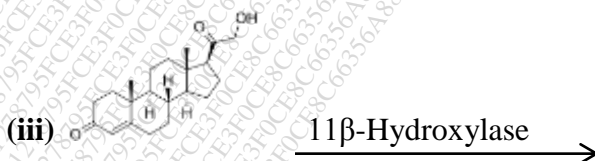
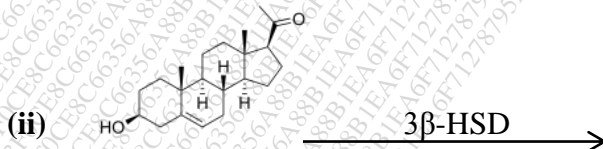
C. Discuss stereochemistry of polymerization. (03)

Q.4. A. Give suitable explanations for the following: (Any three): (06)

- (i) Rate of esterification of 5α -cholestan- 3β -ol is faster than that of 5β -cholestan- 3β -ol.
(ii) Treatment of 5α -Cholest-2-ene with a) KMnO_4 and b) H_2O_2 gives diols with different stereochemistry.
(iii) Nucleophilic substitution in pyridine takes place in 2 or 4 position in pyridine.
(iv) Thiophene is more aromatic than furan.

B. Complete the following reactions: (03)

- (i) 2 moles of ethanolamine $\xrightarrow[\text{Under pressure}]{\text{NH}_3, 150-220^\circ\text{C}}$



C. Briefly discuss the Merrifield solid phase synthesis of DNA (03)

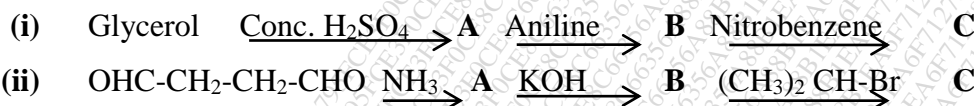
Q.5. A. Compare the basicity of imidazole, pyrrole and pyridine with justification **(03)**

B. Attempt the following conversions (**Any five**) **(05)**

- (i) Pyrrole to Pyrrole-2-carboxaldehyde
- (ii) Furan to Furoic acid
- (iii) Indole to 3-Dimethylaminomethylindole
- (iv) Pyridine to 4-Nitropyridine
- (v) Barbituric acid to pyrimidine
- (vi) Benzaldehyde to isoquinoline

C. Classify polymers on the basis of their physical properties giving one example from each class. Discuss any one in detail **(04)**

Q.6. A. Identify and write the structures of **A**, **B** and **C** in the following reaction sequence **(06)**



B. Arrange the following in order of increasing susceptibility to oxidation: 5 α -Cholestan-1 α -ol, 5 α -Cholestan-4 β -ol and 5 α -Cholestan-2 β -ol. Justify **(03)**

C. Explain the following terms with suitable examples (**Any three**) **(03)**

- (i) Thermoplastic polymer
- (ii) T_g
- (iii) Free radical polymerisation
- (iv) Ziegler Natta catalyst

Time: 3 Hours

Total Marks: 70

- N.B. (1) Question No.1 is compulsory.
 (2) Attempt any five questions from remaining six questions.
 (3) Attempt in all six questions.

1. Answer the following questions: 15 M
- a) Define Star Products 1
 - b) Explain Marketing Mix 2
 - c) Give examples of Patentable and Non-patentable goods 2
 - d) Draw proforma of profit and loss account 1
 - e) Explain importance of C and F agent 1
 - f) Explain Generics and Branded products with examples 2
 - g) Draw and explain PLC 3
 - h) Enlist elements of Brand Plan 1
 - i) Explain the term Delegation 2
2. (a) Explain the importance of Packaging in Pharmaceutical industry. 4
 - (b) Explain Demographic segmentation with examples 4
 - (c) Write a short note on Porters Five force model 3
3. (a) Explain USFDA regulation and its approval 4
 - (b) Explain Uniqueness of Medical Product Marketing 4
 - (c) Write a short note on SWOT Analysis 3
4. (a) Explain importance of positioning of products from Pharmaceutical industry 4
 - (b) Explain importance of Brand Plan 4
 - (c) Write a short note on Conflict management. 3
5. (a) Explain dos and don'ts of resume making 4
 - (b) Explain different working style of acute, chronic and OTC Segment 4
 - (c) Write a short note on ESIS Scheme. 3
6. (a) Explain the concept of Six sigma 4
 - (b) Explain Maslow's theory of motivation 4
 - (c) Write a short note on DPCO 3
7. (a) Explain Indian Pharmaceutical industry as career option. 4

7. (b) **Case Study:** Rajiv was a manager in a multinational firm in Mumbai. The immediate team of executives reporting to him consisted of 12 members and was based in Delhi. One day, three members of his team – Nikhil, Smita and Joy – approached him for leave during a very busy season for the company. Their cases for leave were as follows:

Case I – Nikhil's parents were based in Pune. His father had met with an accident and was in a serious condition. There was no one to take care of his father, and his mother could not handle the situation alone. Nikhil wanted to rush to Pune immediately.

Case II – Smita’s younger sister, based in Delhi, had cleared the Delhi University entrance exam and needed help to manage the admission processes.

Case III – Joy had some happy news from home. His wife had given birth to a baby boy, their first child. She was in Kolkata with her parents and he had to immediately leave to be with his wife.

Rajiv was confused. He could not grant leave to all these three team members as this would cause severe manpower shortage. He had to take quick decision.

Questions.

- 1. Whom should Rajiv grant leave to? Why? 2**
 - 2. How would you convince the employees whose leave request you are rejecting? 2**
- (c) Write a short note on Stress management. 3**

Q.P. Code : 34980

[Time: Three Hours]

[Marks:70]

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. Figures to the right indicate full marks.
 3. Draw neat labelled diagrams wherever necessary.

- Q.1 a What are post granulation ingredients used in tablets? Give their role with examples. 3
 b Elaborate on multiple compressed tablets. 3
 c Describe disintegration test for enteric coated tablets. 3
 d Discuss steps in manufacturing of hard gelatin capsule shell. 3
 e Write a note on three-phase aerosol systems. 3
- Q.2 a Write causes and remedies for mottling and hardness variation in tablets. 4
 b Give an account of materials used in packaging of tablets. 4
 c Discuss formulation of foam-type aerosols. 3
- Q.3 a Discuss the raw materials used in various steps of sugar coating process. 4
 b Differentiate between various types of gelatin. 3
 c Write a note on Metered Dose Inhalers. 4
- Q.4 a Describe the cycle of events during compression using a single punch tablet press. 4
 b Define "Bloom strength". Write a note on liquid fill formulation for soft gelatin capsules. 4
 c Explain large scale manufacturing of aerosols by pressure filling method. 3
- Q.5 a Write the importance of flow property studies in manufacturing of tablets. 3
 b Discuss modifications of conventional coating pans. 4
 c Classify various hard gelatin capsule filling equipments and explain Dosator type. 4
- Q.6 a Give an account of dry granulation method in tablet manufacture. 4
 b Discuss raw materials used in immediate release film coating. 4
 c Describe QC of soft gelatin capsules. 3

(3 Hours)

Total marks: 80

N.B. (1) All questions are **compulsory**
(2) Figures to the right indicate full marks.

Q.1 a) Answer the following:

5

1. Stable and heritable genetic change that occurs spontaneously and randomly among microorganism is called as
 - a. Mutation
 - b. Natural resistance
 - c. Acquired resistance.
 - d. Cross resistance.
2. Glucocorticoids are used in the following conditions except.....
 - a. Psoriasis
 - b. Hypertension
 - c. Asthma
 - d. Arthritis
3. Radioactive iodine is indicated in
 - a. Hypothyroidism
 - b. Hyperthyroidism
 - c. Addison's disease
 - d. None of the above
4. is a luminal anti-amoebic drug.
 - a. diloxanide furoate
 - b. albendazole
 - c. mebendazole
 - d. neomycin
5. Anti-microbials that interfere with folate synthesis or action.
 - a. Sulphonamides
 - b. Macrolides
 - c. Beta lactam antibiotics
 - d. Quinolones.
6. The first line drugs for leprosy are
 - a. isoniazid and rifampin
 - b. dapson, rifampin and clofazimine
 - c. rifampin, pyrazinamide and streptomycin
 - d. none of the above

Q. 1 b) True or False and justify your answer: 10

1. Iron-dextran can be given by deep Intra muscular injection and slow intra venous infusion.
2. Methicillin can be used to treat penicillinase producing staphylococcal infection.
3. Retrovirus is a DNA virus.
4. Nitrofurantoin damages bacterial DNA.
5. Zidovudine is used to treat HIV infection.

Q. 1 c) Match the following: 5

A

1. Nitrosoureas
2. Camptothecins
3. Nitrogen mustards
4. Folate antagonists
5. Anti metabolite

B

- a. Methotrexate
- b. Melphalan
- c. Irinotecan
- d. Lomustine
- e. 5-Fluoro uracil

Q.2 a) Write notes on **any two** of the following: 8

- i) Chemotherapy of Amoebiasis.
- ii) Classification of cephalosporins and pharmacology of fourth generation cephalosporins.
- iii) Targets of anti-malarial drugs and indications, mechanism of action and adverse effects of Artesunate.

Q.2 b) Answer **any one** of the following: 4

- i) Discuss first line therapy in tuberculosis.
- ii) Use of Albendazole in treating helminth infestation.

Q.3 a) Answer **any two** of the following: 8

- i) Short note on Glucocorticoid as immunosuppressant agents.
- ii) DPP IV inhibitors in managing type 2 diabetes.
- iii) Enlist clinical uses of anti-coagulants. Discuss injectable anti-coagulants.

Q.3 b) Attempt **any one** of the following: 4

- i) Write a note on types of oral contraceptives.
- ii) Discuss the pharmacological aspects of Bisphosphonates.

Q.4 a) Answer **any two** of the following: 8

- i) Classify anti-coagulants. Discuss on direct thrombin inhibitors.
- ii) Classify anti-platelet aggregation drugs. Add a note on aspirin.
- iii) Discuss the physiological role of folic acid and its role in treatment of anaemia.

Q.4 b) Write note on **any one**: 4

- i) Tissue plasminogen Activators
- ii) Clinical uses of vitamin K

Q.5 a) Answer **any two** of the following: 8
i) Elaborate on the anti-metabolites used in cancer therapy.
ii) Classify antifungal drugs. Write a brief on amphotericin B.
iii) Discuss the pharmacology of protease inhibitors in anti viral therapy.

Q.5 b) Write note on **any one**: 4
i) Topical anti-fungal drugs
ii) Extended spectrum penicillins

Q.6 a) Write notes on **any two** of the following: 8
i) Classify Immunosuppressant drugs. Discuss on Calcineurin Inhibitors.
ii) Effect of insulin on carbohydrate, fat and protein metabolism.
iii) Discuss oxytocics.

Q.6 b) Write note on **any one**: 4
i) Chloramphenicol
ii) metformin

Please check whether you have got the right question paper.

- N.B: 1. All questions are compulsory.
2. Figures to the right indicates full marks

- Q1 (a) Answer the following:- 12
 i. Name two beta-lactamase inhibitors.
 ii. Discuss the use of sulphonamides in the treatment of burns.
 iii. Give example of calcineurin inhibitors used as immunosuppressants.
 iv. What are tissue plasminogen activators? State their clinical uses.
 v. What are emergency contraceptive pills?
 vi. Enlist types of insulin preparations.
- (b) Fill in the blanks 3
 i. ----- is an alpha glucosidase inhibitor.
 ii. ----- antibiotics produces ototoxicity.
 iii. ----- an iron chelator is used for the treatment of acute and chronic iron toxicity.
- Q2 (a) Answer any two of the following:- 8
 i. Classify penicillins. Elaborate on beta-lactamase resistant penicillins.
 ii. Classify anti-fungal drugs. Explain the mechanism of action, adverse effects and uses of ketoconazole.
 iii. Classify Anti-amoebic drugs. Discuss the adverse effects and indications for the use of metronidazole.
- (b). Answer any one of the following:- 3
 i. Explain rationale for the use of Cotrimoxazole.
 ii. Discuss the mechanism of action and use of streptomycin.
- Q3 (a) Answer any two of the following:- 8
 i. Classify oral hypoglycemic drugs and write a note on DPP IV inhibitors.
 ii. Enlist types of oral contraceptive drugs. Write a note on estrogens.
 iii. Discuss the pharmacotherapy of hypothyroidism.
- (b). Answer any one of the following:- 3
 i. Discuss the effect of insulin on carbohydrate metabolism.
 ii. Explain the role of vitamin D in maintaining bone mineral density.
- Q4 (a) Answer any two of the following: 8
 i. Discuss the pharmacology of clopidogrel.
 ii. Elaborate on clinical use of folic acid and vitamin B12 in megaloblastic anaemia.
- (b). Write a short note on any one:- 3
 i. Factors affecting iron absorption
 ii. Low molecular weight heparins

(P.T.O)

Q.P. Code :05326

- Q5 (a) Answer any two of the following:- 8
- i. Enlist macrolide antibiotics. Discuss the actions, uses & side effects of Erythromycin.
 - ii. Classify anti-viral drugs. Write a note on protease inhibitors.
 - iii. Enlist anti-metabolites used in the treatment of cancer. Write a note on methotrexate.
- (b). Write short note on any one of the following:- 3
- i. Albendazole.
 - ii. Combination treatment of leprosy.
- Q6 (a) Answer any two of the following:- 8
- i. Classify immunosuppressants. Write a note on azathioprine.
 - ii. Give the pharmacological action, adverse effects and therapeutic uses of oxytocin.
 - iii. Discuss the use of bisphosphonates in the treatment of osteoporosis.
- (b). Write short note on any one of the following:- 3
- i. Chloroquine.
 - ii. Therapeutic regimens for the treatment of tuberculosis.
-

Note: 1. Figures to right indicates marks.

2. All Questions are compulsory.

- Q.1 Answer the following
- a Define vector. 1
 - b Explain effect of pH and oxygen parameters in fermentation. 2
 - c Explain microbial limit tests for detection of *S. aureus* in raw materials. 2
 - d Discuss the applications of site directed mutagenesis. 2
 - e Comment on any one method of surface immobilization. 2
 - f Define Inflammation and explain its role in defense mechanism. 2
 - g Enlist the various components of animal cell culture media. 2
 - h Define restriction enzymes and explain two examples with the name of the bacteria and sequence involved in the same. 2
- Q.2 Write short notes on
- a RFLP. 4
 - b C- DNA library. 4
 - c Down stream processing. 3
- Q.3
- a Explain the various molecular mechanisms involved in gene therapy and its limitations. 4
 - b Write any two methods of entrapment immobilization with its applications. 4
 - c Elaborate production of dextran using a flow sheet. 3
- OR**
- Write a note on design of fermentor. 3
- Q.4
- a Discuss the production of Rabies vaccine. 4
 - b Explain the role of animal tissue culture. 4
 - c Write a note on ELISA. 3
- OR**
- Write a note on complement fixation test. 3
- Q.5
- a Explain the technique of diffusion bioassay with its advantages and applications. 4
 - b Describe any one method of DNA sequencing using a suitable diagram. 4
 - c Write a method of production plant tissue culture micropropagation and its applications. 3
- OR**
- Write a note on stem cell culture.
- Q.6
- a Discuss specific defense mechanism. 4
 - b Define autoimmunity and discuss the mechanism involved in autoimmunity with suitable examples. 4
- OR**
- b Distinguish between Type I and Type II Hypersensitivity. 4
 - c Discuss various applications of Hybridoma technology. 3
