

MANIPAL UNIVERSITY

THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017

SUBJECT: MEDICINAL CHEMISTRY - I (PCH 304T) (REVISED REGULATIONS 2014)

Thursday, May 04, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 70

☞ Answer ALL the questions.

☞ Long essays questions:

- 1A. Classify H¹-antihistamines with examples giving one structure from each class.
1B. Write the general structural requirements of H¹ antihistamines. (5+5 = 10 marks)

- 2A. What is the importance of studying solubility and partition coefficient of drugs in medicinal chemistry? Explain
2B. How do you synthesise salbutamol and Clonidine? (4+6 = 10 marks)

- 3A. Discuss the SAR and development of HMG-CoA-reductase Inhibitors.
3B. Write the synthesis of Verapamil. (7+3 = 10 marks)

4. Short answer questions:

- 4A. Classify Adrenergic blockers giving examples for each class. (5 marks)
4B. What are irreversible alpha blockers? Giving an example, write the chemical mechanism of action. (1+4 = 5 marks)
4C. Outline the synthesis of Indomethacin and Diclofenac. (5 marks)
4D. i) Discuss the SAR of carbonic anhydrase inhibitors.
ii) Give the structure and uses of any one alpha-glucosidase inhibitor. (4+1 = 5 mark)
4E. Write the synthesis of Acetazolamide and Glibenclamide. (5 marks)
4F. Discuss the structural features and SAR of Morphine. (5 marks)

5. Give reasons for the following:

- 5A. Electron releasing substituents are preferred on the pyridine ring of proton pump inhibitors.
5B. Administration of aryl carbamates slow down the hydrolysis of acetylcholine by acetyl cholinesterase.
5C. Organophosphorous poisoning is more difficult to treat.
5D. The Nitrogen containing ring in ACE inhibitors must contain a carboxylic acid.
5E. Heparin is not given orally.

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: MEDICINAL CHEMISTRY – I (PCH 304)
(CREDIT BASED SYSTEM - REGULARS)**

Thursday, May 04, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ **Answer ALL the questions.**

✍ **Long Essays:**

- 1A. Classify anticholinergics with examples giving one structure from each class.
1B. What are the common SAR features of Cholinergic blockers. (4+4 = 8 marks)
- 2A. Write any four chemical features of ACE inhibitors with example.
2B. How do you synthesise Warfarin and Phentolamine? Give chemical reactions. (4+4 = 8 marks)
- 3A. What are diuretics? Classify diuretics with examples giving one structure from each class.
3B. Discuss the SAR of loop diuretics. (4+4 = 8 marks)

4. **Short Essay:**

- 4A. Write the synthesis of diphenhydramine and mepyramine (pyrilamine)
4B. Discuss the common structural features of NSAIDs
4C. Discuss the SAR of 1, 4 Dihydropyridines as antianginal agents and give the synthesis of nifedipine.
4D. Classify Antihypertensive agents. Give the chemical synthesis of verapamil. (4 marks × 4 = 16 marks)

5. **Short Answers:**

- 5A. EDTA is used in treating lead as well as digoxin poisoning.
5B. 4-hydroxy benzoic acid has high partition coefficient than salicylic acid.
5C. Write the SAR of sulphonyl urea as oral hypoglycemics
5D. Outline the synthesis of mefenamic acid.
5E. Both epinephrine and norepinephrine show same effect on many tissues. (2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY

THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017

SUBJECT: MEDICINAL CHEMISTRY – I (PCH 304)
(CREDIT BASED SYSTEM - REPEATERS)

Thursday, May 04, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ Answer ALL the questions.

✍ Long Essays:

1A. What are the general pathways of drug metabolism? Explain the reductive and hydrolytic biotransformation reactions giving suitable examples.

1B. Explain the importance of Redox Potential.

(6+2 = 8 marks)

2A. Classify local anesthetics with examples. Explain the mechanism of action and SAR. Outline the synthesis of benzocaine.

2B. Classify first generation H₁ receptor antagonists giving two examples.

(6+2 = 8 marks)

3A. Classify adrenergic drugs giving examples for each class. How do you synthesize phenylephrine?

3B. How do you synthesize pyridostigmine? Explain the mechanism of action of pyridostigmine.

(4+4 = 8 marks)

4. Short Essays:

4A. Classify non-barbiturate sedative-hypnotics giving the structure of one drug from each class. Write the synthesis and IUPAC name of Diazepam.

(4 marks)

4B. Enlist the ideal characteristics of a general anesthetic. Explain the mechanism of action of general anesthetics.

(4 marks)

4C. i) Outline the synthesis of Triprolidine.

ii) What are the primary indications for the use of NSAIDs?

(2+2 = 4 marks)

4D. Discuss the important structural modifications of morphine and their effect on analgesic activity.

(4 marks)

5. **Short Answers:**

5A. Write the structure and use of:

- i) Methohexital Sodium
- ii) Chlorphenesin
- iii) Dantrolene Sodium
- iv) Talbutal

5B. Give the chemical classification of antiepileptic drugs.

5C. Classify cholinergic drugs giving examples.

5D. Give the mechanism of action of antiepileptic drugs.

5E. What are antidepressants? Give the structure of imipramine.

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHARMACEUTICAL BIOTECHNOLOGY (PBT 302T)
(REVISED REGULATIONS 2014)**

Saturday, May 06, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 70

✍ **Answer ALL the questions.**

✍ **Long essays questions:**

1. Discuss the production of Recombinant human insulin.
2. Describe the features and cells involved in Humoral and Cell mediated immunity.
3. With the help of a neat labelled diagram explain the design features of an Industrial Fermenter.

(10 marks × 3 = 30 marks)

4. **Short answer questions:**

- 4A. Write a note on Bacterial transformation.
- 4B. Describe primary, secondary and immortal cultures with suitable examples.
- 4C. Explain the source and features of embryonic stem cells.
- 4D. Write an essay on the production and standardization of BCG vaccine.
- 4E. What are sera preparations? Explain the production and standardization of Tetanus antitoxins.
- 4F. Explain the concept of DNA vaccines.

(5 marks × 6 = 30 marks)

5. **Give reasons for the following:**

- 5A. Microbial enzymes are preferred over animal and plant enzymes.
- 5B. In the production of recombinant Hepatitis B vaccine, yeast is preferred host over *E. coli*.
- 5C. Nonsense mutation is different from Missense mutation.
- 5D. Anaerobic conditions are needed for Alcohol production.
- 5E. Germinal gene therapy is not suitable providing personalized gene therapy.

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHARMACEUTICAL BIOTECHNOLOGY (PBT 302)
(CREDIT BASED SYSTEM)**

Saturday, May 06, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ **Answer ALL the questions.**

✍ **Draw neat labelled diagrams wherever necessary.**

✍ **Long essays questions:**

1. Describe the production and recovery of Lactic acid by homo fermentation.
2. Citing suitable examples, discuss the different types of cloning vectors used in recombinant DNA technology.
3. Describe the production and standardization of Diphtheria vaccine.

(8 marks × 3 = 24 marks)

4. **Short Essay Questions:**

- 4A. With suitable examples, explain anchorage dependent cells.
- 4B. Explain the production of Tetanus toxoid preparation.
- 4C. Write the precautions to be taken during the collection, processing and usage of 'Concentrated Human RBC'.
- 4D. Write a note on factors affecting extraction.

(4 marks × 4 = 16 marks)

5. **Short Answer Questions.**

- 5A. What is Darcy's law of filtration?
- 5B. Mention the steps involved in recovery of Penicillin G.
- 5C. What are restriction enzymes? Give an example.
- 5D. Mention the principle involved in microbial assay by tube dilution method.
- 5E. Mention the type of steel used in construction of Industrial Fermenters and its advantages.

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHARMACOLOGY -I (PHA 305T)
(REVISED REGULATIONS 2014)**

Tuesday, May 09, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 70

✍ **Answer ALL the questions.**

✍ **Long essays questions:**

1. Classify anti thyroid drugs. Describe the steps involved in the synthesis, storage and release of thyroid hormones with a neat, labelled diagram.

(3+7 = 10 marks)

2. Outline the cholinergic transmission with a neat representation. Write drugs affecting this process.

(6+4 = 10 marks)

3. Explain the various factors modifying drug action.

(10 marks)

4. **Short answer questions:**

4A. Explain the mechanism of action of thiazide diuretics.

4B. With the help of a diagram explain the mechanism of action of digoxin.

4C. Explain the mechanism of action of heparin.

4D. Explain the mechanism of action of thiazolidindiones. List its adverse effects.

4E. Describe the mechanism of action of sodium nitroprusside.

4F. Explain the transducer mechanism of action of Adrenaline.

(5 marks × 6 = 30 marks)

5. **Give reasons for the followings:**

5A. Antihistaminics are not useful in the treatment of asthma.

5B. Sublingual GTN is preferred over its oral administration in angina.

5C. Spironolactone should be cautiously used in patients on angiotensin converting enzyme inhibitors.

5D. Therapeutic drug monitoring is required for drug that has narrow therapeutic index.

5E. The therapeutic efficacy of streptokinase reduces when used repeatedly.

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHARMACOLOGY– I
(RGUHS SYLLABUS)**

Tuesday, May 09, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 80

✍ **Draw neat, labeled diagrams wherever necessary.**

✍ **Long Essays: (Answer any TWO questions)**

1. Describe merits and demerits of parenteral route of administration.
2. Describe the pharmacological actions of acetylcholine.
3. Discuss the CNS actions of morphine.

(10 marks × 2 = 20 marks)

4. **Short Essays: (Answer any EIGHT questions)**

- 4A. Explain the signal transduction mechanism of ligand gated ion channel receptors.
- 4B. Write short on tubular excretion of drugs.
- 4C. Describe any five factors that can modify drug actions.
- 4D. Write the mechanism, therapeutic uses and adverse action of alpha adrenergic blockers?
- 4E. Discuss the mechanism of action of skeletal muscle relaxants.
- 4F. Write short note on stages of anesthesia.
- 4G. Write the anticoagulant mechanism of aspirin and clopidogrel
- 4H. Discuss the mechanism of action of ACE inhibitors and Angiotensin receptor blockers.
- 4I. Write short note on calcium channel blockers.
- 4J. Classify antihypertensive drugs. Add a note on venodilators.

(5 marks × 8 = 40 marks)

5. **Short answers: (Answer ALL)**

- 5A. Why ACE inhibitors produce cough.
- 5B. Why urine acidifiers are used in management of morphine or amphetamine poisoning?
- 5C. Why high dose of atropine is required to produce mydriatic effect in rabbits?
- 5D. List drugs which are used in the treatment of dementia.
- 5E. Mention the extrapyramidal side effects of antipsychotic drugs.
- 5F. Why morphine is contraindicated in patients with head injury?
- 5G. Why phystostigmine is preferred drug to reverse the toxicity of atropine?
- 5H. Mention the advantages and disadvantages of combining adrenaline with local anesthetics.
- 5I. Mention the limitation of sublingual route of administration of drugs.
- 5J. Why diuretics are not to be given in cases of gout?

(2 marks × 10 = 20 marks)



MANIPAL UNIVERSITY

THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017

**SUBJECT: PHARMACOLOGY – I (PHA 305)
(CREDIT BASED SYSTEM)**

Tuesday, May 09, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ **Answer ALL questions.**

✍ **Long essay questions:**

1. Explain the various patient and drug-related factors that modify drug action. (8 marks)
2. Classify hypolipidaemic agents with examples. Describe the mechanism of action of statins. Mention their uses and side effects. (3+3+2 = 8 marks)
3. Describe the actions of atropine on CVS, eye, smooth muscles and glands. How is atropine poisoning treated? (6+2 = 8 marks)

4. **Short Essay Questions:**

- 4A. Describe the mechanism of action of quinidine.
- 4B. Explain the mechanism of action of:
 - i) Pioglitazone
 - ii) Finasteride
- 4C. Explain the bio-synthesis of prostaglandins and drugs affecting it.
- 4D. Elaborate the mechanism of action of furosemide. (4 marks × 4 = 16 marks)

5. **Give reasons for the following:**

- 5A. Trimetazidine is used as an add-on therapy in angina and post MI patients.
- 5B. Codeine should not be given to patients with wet cough.
- 5C. Rapid i.v. injection of epinephrine produces a biphasic response.
- 5D. Iodides can be used in the management of thyroid storm.
- 5E. Parathormone promotes absorption of calcium from intestine. (2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHARMACOGNOSY- II (PCO 306)
(CREDIT BASED SYSTEM)**

Thursday, May 11, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ **Answer ALL questions.**

✍ **Draw neat labelled diagrams and structure wherever necessary.**

✍ **Long Essay:**

1A. Describe the pharmacognostic report on podophyllum.

1B. Give the source, active constituents, uses, cultivation and collection of Lemon grass.

1C. Define glycosides, classify them with examples. Give the stass otto procedure for the extraction of the same.

(8 marks × 3 = 24 marks)

2. **Short essay:**

2A. Describe the principle and procedure involved in column chromatography.

2B. Explain the biogenesis of shikimic acid pathway in the production of secondary metabolites.

2C. Explain the percolation process with neat diagram. Add a note on factors affecting the same.

2D. Describe the morphology of senna and give its active constituents.

(4 marks × 4 = 16 marks)

3. **Short answer:**

3A. Write the Biogenesis of Hyoscine from Hyoscyamine

3B. Umbeliferous fruits

3C. Enflurage method

3D. Substituents and adulterants of digitalis

3E. Powder characters of cascara

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHARMACOGNOSY - 3 (PCO 306T)
(REVISED REGULATIONS 2014)**

Thursday, May 11, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 70

✍ **Answer ALL the questions.**

✍ **Long essays questions:**

1. Give the definition, chemical classification and general identity tests for Alkaloids.
(1+6+3 = 10 marks)
2. What are Anthracene glycosides? Give their chemistry, method of extraction and chemical tests.
(1+4+2+3 = 10 marks)
- 3A. Give the source, constituents and uses of Digitalis, Milk thistle and Wild Cherry.
- 3B. With a neat labelled diagram, explain the microscopy of Senna leaflet.
(6+4 = 10 marks)

4. **Short answer questions.**

- 4A. Describe the biogenesis of Quinine, commencing from Strictosidine.
- 4B. Isolation, identification and estimation of Rutin.
- 4C. Determination of various types of Ash values and its significance.
- 4D. Classification of Herbal medicines as per WHO.
- 4E. Describe the nutritional requirements of a Plant Tissue Culture medium.
- 4F. Explain different methods of enzyme Immobilization with suitable examples.
(5 marks × 6 = 30 marks)

5. **Give reasons for the following:**

- 5A. Green tea is rich in polyphenols.
- 5B. Carrageenan is used in anti-inflammatory studies.
- 5C. Prebiotics are preferred over probiotics to improve intestinal flora.
- 5D. Factors responsible for ageing of the skin.
- 5E. Bitter glycosides are used as gastric stimulants.
(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHARMACY PRACTICE (PPR 301T)
(REVISED REGULATIONS 2014)**

Saturday, May 13, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 70

✍ **Answer ALL the questions.**

✍ **Long essays questions:**

1. Explain the goals and procedures for medication order review and adverse drug reaction management.
2. Define pharmaceutical care and explain the steps involved in pharmaceutical care process.
3. Define hospital and draw an organization chart of hospital and explain the functions of each.
(10 marks × 3 = 30 marks)

4. **Short Answer Questions:**

- 4A. Explain the application of computers in community pharmacy.
- 4B. Define patient counselling and explain barriers for patient counselling.
- 4C. Explain the concepts of rational drug use.
- 4D. Explain Economic order quantity (EOQ) method of inventory control.
- 4E. Explain complete floor stock drug distribution system with its advantages and disadvantages.
- 4F. Explain the procedure to get ward stock of narcotics from hospital pharmacy.
(5 marks × 6 = 30 marks)

5. **Give Reasons for the following:**

- 5A. Six to eight inventory turnover considered satisfactory.
- 5B. Readability and comprehensibility is important when preparing Patient information Leaflets.
- 5C. Hospital formulary system Deprives the physician of his right to prescribe and obtain the brands of his choice.
- 5D. Pharmacist are right person to take responsibility of CSSR.
- 5E. Pharmacy technicians should not dispense the drugs to the patients.
(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: HOSPITAL AND COMMUNITY PHARMACY (PPR 301)
(CREDIT BASED SYSTEM)
(NEW SYLLABUS)**

Saturday, May 13, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ **Answer ALL the questions.**

✍ **Long essay questions:**

1. Define Pharmacy Therapeutic Committee (PTC). Explain the objectives and functions of PTC. (8 marks)
2. What is Central Sterile Supply Room (CSSR)? Explain its location and layout. (8 marks)
3. What is medication nonadherence? Explain the factors affecting medication nonadherence. (8 marks)

4. **Short essay questions:**

- 4A. Describe the various pharmaceutical services rendered by the hospital pharmacy.
- 4B. Explain the method of dispensing noncharge floor stock drugs.
- 4C. Write briefly on continuing professional development programme.
- 4D. What is the role of purchasing agent and pharmacists in drug procurement? (4 marks × 4 = 16 marks)

5. **Short Answer questions:**

- 5A. Who is responsible for controlling narcotics in the hospital?
- 5B. Enumerate the contents of Total Parenteral Nutrition.
- 5C. How to control perishable (expiry dated) drugs in the hospital pharmacy.
- 5D. Mention the types of prescriptions received in the outpatient pharmacy.
- 5E. Mention the four important functions of chief Pharmacist. (2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHYSICAL PHARMACEUTICS AND PHARMACOKINETICS (PCE 303T)
(REVISED REGULATIONS 2014)**

Tuesday, May 16, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 70

✍ **Answer ALL the questions.**

✍ **Long essays questions:**

1. Define thixotropy and explain the two methods for quantitative measurement of thixotropy.
2. Explain any five factors affecting gastric emptying rate of drugs. Discuss the kinetics of protein binding of drugs using any two plots.
3. Explain the effect of temperature on rate of reaction. State and explain Fick's laws of diffusion.

(10 marks × 3 = 30 marks)

4. **Short Answer Questions:**

- 4A. Write the salient features of Lyophobic colloids.
- 4B. Define angle of repose. Describe the experimental method to determine the angle of repose of granules.
- 4C. Explain the application of excretion rate method to determine the pharmacokinetics of drug in urine administered by IV bolus assuming that it follows one compartment open model.
- 4D. Compare and contrast mammillary and catenary compartment models.
- 4E. Discuss the use of polymorphs and surfactants to enhance bioavailability of drugs.
- 4F. Discuss the monomolecular inclusion complexes with relevant examples and applications.

(5 marks × 6 = 30 marks)

5. **Give Reasons for the Following:**

- 5A. Micelles are not surface active. Why?
- 5B. The surface tension of water is 72.8 dynes/cm, while that of Toluene is 27.45 dynes/cm. why?
- 5C. Why male volunteers are preferred over female volunteers for a bioequivalence study?
- 5D. Why salicylic acid doesn't follow pH partition hypothesis for its absorption?
- 5E. Why suspensions follow mostly zero order?

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY**THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017****SUBJECT: PHYSICAL PHARMACEUTICS AND BIOPHARMACEUTICS (PCE 303)
(CREDIT BASED SYSTEM)**

Tuesday, May 16, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ **Answer ALL the questions.**

✍ **Long Essays:**

1. Explain the effect of polymorphism of drugs on their absorption. Discuss salivary excretion of drugs.
2. Define true density and explain the methods to determine the same.
3. Explain any one method to determine the order of reaction. Discuss the distribution method for the analysis of complexes.

(8 marks × 3 = 24 marks)

4. **Short notes:**

- 4A. Explain any one optical property of colloids.
- 4B. Discuss any two approaches to enhance the bioavailability of drugs.
- 4C. Explain the plastic flow of fluids.
- 4D. Describe rotating basket method of dissolution testing.

(4 marks × 4 = 16 marks)

5. **Short answers:**

- 5A. Write any two oxidative phase I reactions involving Carbon-Nitrogen systems.
- 5B. Write any two pharmaceutical applications of surfactants.
- 5C. Write any two differences between flocculated and deflocculated suspensions.
- 5D. Define pharmaceutical and chemical equivalence.
- 5E. Write any two differences between creaming and breaking of emulsions.

(2 marks × 5 = 10 marks)



MANIPAL UNIVERSITY

THIRD YEAR B. PHARM. DEGREE EXAMINATION – MAY 2017

SUBJECT: PHARMACEUTICAL JURISPRUDENCE (PMA 307) (CREDIT BASED SYSTEM)

Thursday, May 18, 2017

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

✍ **Answer ALL the questions.**

✍ **Long essay questions:**

- 1A. Write the composition and functions of Pharmacy Council of India.
- 1B. Explain various stages of Clinical Trials.

- 2A. Describe briefly the operations which are totally prohibited and which are controlled by the central and state governments under the Narcotic Drugs and Psychotropic Substances Act.
- 2B. Write short notes on Pharmaceutical Enquiry Committee.

- 3A. Give a brief account of Schedule M and N.
- 3B. What are the qualifications required to appoint Government Analyst? What are his duties?
(8 marks × 3 = 24 marks)

4. **Short note questions:**

- 4A. What ethics should a pharmacist follow in relation to his Job and Trade.
- 4B. What types of advertisements are exempted under the Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954.
- 4C. i) Discuss the salient features of Sales Promotion Employees Act 1976.
ii) Discuss duties of Food Inspector as mentioned under Prevention of Food Adulteration Act.
- 4D. Explain patent filing procedure in India.
(4 marks × 4 = 16 marks)

5. **Short answer questions:**

- 5A. Mention functions of AICTE Act.
- 5B. Discuss registration committee as mentioned in Insecticides Act.
- 5C. How are experimental animals required to be handled before and after experimentation and how are the records to be maintained for this purpose.
- 5D. Write short notes on USFDA.
- 5E. Under what conditions or circumstances pregnancies can be terminated medically?
(2 marks × 5 = 10 marks)

