



Subject Name: HOSPITAL AND CLINICAL PHARMACY

Subject Code: 20225

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by the candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, the examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of the examiner of relevant answers based on the candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on an equivalent concept.
- 8) As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced in the first year of AICTE diploma Programme from academic year 2021-2022. Hence if the students write answers in Marathi or bilingual language (English +Marathi), the Examiner shall consider the same and assess the answer based on matching of concepts with model answer.

Q. No.	Sub No.	Answers	Marking Scheme
1		Answer any <u>SIX</u> of the following:	30M
1	a	<p>Define ward round participation. Write the goal and procedure of ward round participation by a clinical pharmacist.</p> <p>Marking Scheme: 1M definition, 2M goals, 2M for procedure of ward round.</p> <p><u>Definition :</u></p> <p>A Ward round is a visit made by a medical practitioner, alone or with a team of healthcare professionals and medical students to hospital in-patients at their bedside to review and follow-up the progress in their health.</p> <p><u>The goals of clinical pharmacists participation in ward rounds are to:</u></p> <p>1.To gain a patients' clinical status and progress, currently planned investigations, and therapeutic goals.</p>	5M

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		<p>2.To get relevant information on drugs consumed, their effectiveness, and adverse effects.</p> <p>3.Optimize therapeutic management by influencing drug therapy selection, drug administration, monitoring, and follow-up, investigate unusual drug orders or doses.</p> <p>4.Additional Information about the patient comorbidities, medication compliance, or alternative medicine use that might be relevant to their management.</p> <p>5.Detect, manage, and prevent adverse drug reactions and drug interactions.</p> <p>6.The doctors are visiting all the patients in an order beginning from the intensive care unit</p> <p>7. Documented case report reminds the case history of the patients to update and change the strategies of treatment.</p> <p>8.The ward team objective is to ensure safe, effective, economic, and patient-friendly treatment.</p> <p>9.Participants in the inpatient discharge planning.</p> <p>10.Many learning opportunities are provided to pharmacists.</p> <p>11.It strengthens the inter-professional ships among various HCP leading to better healthcare research.</p> <p><u>Procedure :</u></p> <p>1.Pharmacists should complete pre -round preparation before participating in ward rounds-like developing a patient log sheet(profile), choosing the best method of communication(verbal/written) with the team members etc.</p> <p>2.If a hospital has its own formulary, the pharmacist should ensure that all prescriptions are in accordance with hospital formulary.</p>	



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		<p>3. During the visit, pharmacists should identify any drug interaction, adverse drug events or medication errors, if any and suggest an alternative solution for it.</p> <p>4. Pharmacists have the opportunity to intervene while performing various activities like medical history interview; medication chart review, therapeutic drug monitoring and drug information during ward round participation.</p> <p>5. Observe and participate in consultant-led patient management discussions. A pharmacist must arrange at least one lecture/month for supportive staff regarding drug related problems.</p> <p>6. Take follow ups by phone calls.</p> <p>7. Specific monitoring Aids- In specialised areas such as ICU, oncology, pulmonary, renal etc. monitoring criteria and protocols may be written that help in determining the degree of monitoring required.</p>	



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1	b	<p>Define Inventory control. Enlist their methods and describe in detail “Economic Order Quantity” Method.</p> <p>Marking scheme: 1 M for Inventory control definition, 2 M for enlisting any eight inventory techniques,2 M for EOQ explanation</p> <p><u>Definition:</u> Inventory Control is the balance between not ordering too much and avoiding stock out situations of material. Different techniques of Inventory control:</p> <ul style="list-style-type: none">● Economic Order Quantity (EOQ)● Reorder quantity level● Inventory turnover● ABC analysis● VED analysis● ABC-VED matrix analysis● FEFO, FIFO analysis● Lead time● Buffer stock <p><u>Economic Order Quantity:</u></p> <p>Economic Order Quantity is the purchasing of item in bulk amount at which ordering cost and inventory carrying cost will be minimum.</p> <p><u>OR</u></p> <p>The quantity of material to be ordered in economic lot size which minimizes both the cost (carrying & ordering) is known as economic order quantity.</p> <p>EOQ is a profitable quantity for those materials which are used regularly & in bulk quantities are purchased in economic lot size</p> <p>This technique is used to decide how much quantity of material is to be ordered. Hence it is determined by following formula-</p> $EOQ = \sqrt{\frac{2 \times AC \times OC}{UC \times ICC}}$ <p>Where, AC - annual Consumption ,OC - ordering cost UC - unit cost ,ICC - inventory carrying cost</p>	5M
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Q. No.	Sub No.	Answers	Marking Scheme
1	c	<p>Explain distribution and storage of NDPS in hospitals.</p> <p>Marking scheme: 3 marks for distribution and 2 marks for storage</p> <p><u>Distribution of NDPS:</u></p> <p>1. A separate register should be maintained to record dispensing and a controlled procedure is used to issue or receive NDPS drugs.</p> <p>2. Following persons are involved in dispensing, Medical superintendent is overall responsible for the proper safeguarding and handling of narcotics and psychotropic substances. Chief pharmacist responsible for the purchase, storage, accountability and appropriate dispensing of the narcotics and psychotropic substances within the hospital. Head nurse : Responsible for the record of proper storage.</p> <p>3. Prescription order of the narcotics & psychotropic substances should be made by using ink or indelible pencil, typing and duly sign by the respective doctor.</p> <p>4. Prescriptions for Narcotic & psychotropic substances must include the following information: Patient's full name, Address, Date, Name and strength of the drug, Quantity of drug, Signature of prescriber, Dose and route of administration.</p> <p>5. If the required drug is not in stock in the ward, the complete controlled drug prescription must be written on a hospital prescription blank form by a registered medical practitioner and then it is Signed and sent to the hospital pharmacy. Abbreviation like p.r.n (Pro Re Nata) or S.O.S (Si Opus Sit) must be discouraged for such drugs</p> <p>6. The completed form along with the empty containers and nurses inventory sheet is sent to the pharmacy for dispensing. The prescription signed by a Registered Medical Practitioner will also permit the patient to purchase drugs from outside pharmacies.</p> <p>7. The delivery of narcotic drugs from the pharmacy to the wards and nursing stations must be carried out through some reliable persons.</p> <p>8. Charges for Narcotic and Psychotropic Substances depend upon the policy of the hospital. It could be like the charges may be made for individual dose received or flat charges for all narcotics and hypnotics</p>	5M

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		<p>9. After the dispensing of narcotics by the pharmacy, Nurse in charge must prepare special form in duplicate entries to cover incidence of every dose of narcotics & psychotropic substances given/administered to patient or drug is lost or wasted on ward. Such accountability of control substances needs to be furnished to the pharmacy department while requesting for new supply of drugs. Original is filled in the pharmacy and duplicate copy is kept for record to the nursing office.</p> <p>10. While administering a dose, if a patient refuses or the doctor cancels any dose, it is the responsibility of the nurse to destroy the drug into the sink and record "Refused by patient" or "order cancelled by doctor". Nurses should always preserve a proper record in case of destruction/ wastage /contamination.</p> <p>11. Pharmacists need to preserve the records of the receipt and return of narcotics && psychotropic substances for disposal. Documentation of the return of narcotics & psychotropic substances for demolition by the pharmacist from the respective ward of hospital is considered as good practice of record.</p> <p><u>Storage:</u></p> <ul style="list-style-type: none">● A separate register should have been maintained to register them and record the addition and/or deletions of NDPS in Red Ink along with their signature.● Record barrow narcotics in separate- Borrowing Narcotics Administration Register.● Registered nurses will be responsible for records of proper storage.● NDPS must be stored in a separate cupboard with double lock and key. The key of the locks should be kept with two different people. Other than narcotic drugs no other items are permitted to be stored in the cupboard.● NDPS must be procured and stored in such a manner so as to prevent misuse by unauthorized persons.● The storage area for NDPS must be opened and accessed by a specific pharmacist in charge and specific nursing in charge of the respective department.	

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		<ul style="list-style-type: none">Send completed narcotics Administration Records to the pharmacy daily. Enter shift count (Count narcotics at the change of shift each shift) in Red on the Narcotics and controlled drug record.	
1	d	<p>Define Drug information centre and Poison information centre. Write the various sources of drug information with explain.</p> <p>(Marking scheme - 1 mark each for definition, 3 marks for various sources of information)</p> <p>Drug information centre: (1 mark)</p> <p>It is defined as "A branch in the hospital designed for receiving, collecting, analyzing & providing unbiased, accurate & up-to-date information about drugs & their use".</p> <p>Poison information centre : (1 mark)</p> <p>It is a specialized unit providing information on prevention, early diagnosis and treatment of poisoning and hazard management.</p> <p>Sources of drug information:</p> <p>On the basis of the origin, composition & function, the sources of information can be classified into three types,</p> <ol style="list-style-type: none">1.Primary sources2.Secondary sources3.Tertiary sources. <p><u>Primary resources: (1 mark with any 2 examples)</u></p> <p>It includes the original research papers published in scientific journals; proceedings of seminars and conferences; newsletters; and patents. It can also include the care reports, case series, editorials and letters to the editors.</p> <p>Some good journal representing science and practice of pharmacy are given below:</p> <ol style="list-style-type: none">1, The American Journal of Health System Pharmacy	5M



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		<p>2. Drug Discovery Today</p> <p>3. American Journal of Hospital Pharmacy</p> <p>4. Advanced Drug Delivery Reviews</p> <p>5. Journal of Clinical Pharmacy and Therapeutics</p> <p>6. Journal of Ethnopharmacology</p> <p>7. Pharmacology and therapeutics</p> <p>8. Journal of Medicinal Chemistry</p> <p>9. Journal of Pharmacy Practice</p> <p><u>Secondary Resources :(1 mark with any 2 examples)</u></p> <p>It comprises the second-hand information including summary of information appearing in the primary sources. Here original information selected, summarized, modified, condensed from primary source.</p> <p>These usually include various print and electronic abstracting and indexing services like international pharmaceutical abstracts (IPA), EMBASE, SEDBASE, Science Direct, Micromedex, Biosis, CA search, BRS, Natural Medicine Comprehensive Database (NMCD), India Drug Index, AHFS drug information, etc.</p> <p><u>Tertiary Resources: (1 mark with any 2 examples)</u></p> <p>The tertiary resources provide overview of the topic in a concise and readable form, like encyclopedia, medical dictionaries, directories, desk references, drug compendia and textbooks. These are the summary of the primary resources.</p> <p>Some of the frequently used tertiary resources of drug information are given below:</p> <p>1. The United States Pharmacopoeia</p> <p>2. The British Pharmacopoeia</p> <p>3. British National Formulary (BNF)</p> <p>4. Martindale Extra Pharmacopoeia</p>	

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		5. Remington's Science and Practice of Pharmacy 6. The Merk Index 7. Indian Pharmacopoeia 8. Goodman and Gillman's Pharmacological Basis of Therapeutics 9. Physician's Desk Reference	
1	e	Enlist different Test of Liver Functioning and explain any two of them. (3M for enlisting and 2 marks for explanation of any 2 tests) <u>Liver Functioning tests are:</u> 1.Tests based on excretory functions- <ul style="list-style-type: none">● Measurement of Serum bilirubin● Measurement of Urine bilirubin● Measurement of Urine bile salts● Measurement of Bromosulphophthalein (BSP) dye test 2. Tests based on serum enzymes derived from liver determination of : <ul style="list-style-type: none">● Serum aspartate transaminase (AST)● Serum alanine transaminase (ALT)● Serum alkaline phosphatase (ALP) 3. Tests based on metabolic capacity- <ul style="list-style-type: none">● Tests related to carbohydrate metabolism - galactose tolerance test● Test related to lipid metabolism - determination of serum cholesterol and ratio of free to esterified cholesterol● Test related to protein metabolism - serum protein estimation and serum ammonia estimation 4. Tests based on synthetic functions- <ul style="list-style-type: none">● Determination of plasma proteins, albumins and globulins● Determination of prothrombin time	5M



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		<p>5. Tests based on detoxification- Hippuric acid test, Blood ammonia and bilirubin</p> <ul style="list-style-type: none">● Determination of Hippuric acid test● Determination of Blood ammonia and bilirubin <p>BILIRUBIN</p> <p>Bilirubin is a bile pigment, & is the excretory end product of heme degradation. It is conjugated in the liver to form bilirubin diglucuronide, & excreted in bile.</p> <p>1. Serum bilirubin</p> <ul style="list-style-type: none">● The normal concentration of serum bilirubin is in the range of 0.2- 1.0 mg/dl. Of this, the conjugated bilirubin is about 0.2-0.4 mg/dl, while the unconjugated bilirubin is 0.2 - 0.6 mg/dl.● Jaundice symptoms include yellow coloration of conjunctiva, mucous membrane & skin due to increased level of bilirubin. Jaundice is visible when serum bilirubin level exceeds 2.5 mg/dl. <p>Van den bergh reaction</p> <ul style="list-style-type: none">● This is a specific reaction to identify the increase in serum bilirubin(above reference level). Normal serum gives a negative van den Bergh reaction.● This reaction is very useful to understand the nature of jaundice.● The response of van dan Bergh reaction can differentiate the jaundice as follows-● Indirect positive —Hemolytic jaundice● Direct positive —Obstructive jaundice● Biphasic—Hepatic jaundice <p>2. Bilirubin in Urine</p> <p>The conjugated bilirubin, being water soluble, is excreted in urine.</p> <p>The bilirubin in urine can be detected by Fouchet's test or Gmelin's test.</p> <p>bilirubin in urine tests measures the levels of bilirubin in your urine.</p> <p>Normally, urine doesn't have any bilirubin. If there is bilirubin in your urine, it may be an early sign of a liver condition.</p> <p>A positive (+) result of bilirubin in urine (bilirubinuria) is indicative of a liver problem or a bile obstruction.</p> <p>Bilirubin in urine can be detected by Fouchet's test or Gmelin test</p>	



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		<p>A)Fouchet's test :</p> <p>Principle : Bilirubin is precipitated by Barium Chloride . This bilirubin is oxidized to green biliverdin by Fouchet's reagent.</p> <p>TEST :</p> <p>i)Acidity 10ml of urine with a few drops of dilute acetic acid and add 5ml of 10% solution .</p> <p>ii)If there is not much ppt add 2 drops of saturated solution of magnesium sulphate , mix and allow to stand for a few minutes.</p> <p>iii)Filter and unfold the filter paper.</p> <p>iv) Add one drop of Fouchet's reagent to ppt.</p> <p>v)The development of green coloration indicates the presence of bile pigments.</p> <p>B) Modified Gmelin's test:</p> <p>To 10 ml of urine, add 2-3 drops of dil.HCL .filter it through paper, allow it to dry and put a drop of conc HNO₃ at the apex of paper.Different coloration can be seen in the order of green , blue, violet , red and yellowish red, showing the presence of bile pigments.</p> <p>3. <u>Measurement of Urine bile salts</u></p> <p>The amount of urobilinogen present in urine depends on the amount of bilirubin entering the intestine. It is estimated semi-quantitatively by Ehrlich's aldehyde reagent.</p> <p>Clinical interpretation:</p> <ul style="list-style-type: none">● In increase in urobilinogen in urine, is found in hemolytic jaundice due to excess production of bilirubin● In hepatitis urobilinogen in urine may be normal or decreased● In post hepatic obstructive jaundice, due to the complete or almost complete biliary obstruction, no urobilinogen is found in urine because bilirubin is unable to enter the intestine <p>4.Measurement of Bromsulphophthalein (BSP) dye test</p> <p>In addition to excreting bilirubin, the liver is capable of eliminating various dyes or</p>	

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		<p>drugs by the same excretory pathway as bilirubin.</p> <p>Bromosulphothalein excretion test:</p> <p>A 5% solution of BSP is injected intravenously (the dose is 5 mg/kg body wt) and a sample of blood is tested 45 minutes later for percentage of injected dye remaining in the blood.</p> <p>Clinical interpretation:</p> <p>In normals, the retention of BSP at 45 minutes is less than 5 %. Impairment of liver cell function causes an increase in BSP retention.</p> <p>TESTS BASED ON SERUM ENZYMES FROM LIVER</p> <p>→ Liver cells contain several enzymes which may be released into the circulation in liver damage.</p> <p>→ Measurement of selected enzymes in serum is often used to assess the liver function.</p> <p>1. Transaminases or aminotransferases</p> <ul style="list-style-type: none">• The activities of 2 enzymes-serum glutamate pyruvate transaminase(SGPT; recently known as alanine transaminase-ALT) & serum glutamate oxaloacetate transaminase(SGOT; recently known as aspartate transaminase-AST)--are widely used to assess liver function.• The activity of these enzymes is low in normal serum(SGPT-5-40 IU/litre; SGOT-5-45 IU/litre).• Serum SGPT & SGOT are increased in liver damage.However, SGPT is more sensitive & reliable for the assessment of LFT. <p>Clinical Significance of SGPT & SGOT TESTS</p> <ul style="list-style-type: none">• In liver diseases, the concentration of these enzymes increase in the serum.• Both enzymes increase in obstructive jaundice.• Very high concentrations of these enzymes indicate toxic hepatitis.	

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		<p>2. ALKALINE PHOSPHATASE (ALP)</p> <p>Alkaline phosphatase(ALP) is mainly derived from bone & liver.</p> <p>A rise in serum ALP(normal 3-13 KAunits/dl KING ARMSTRONG), usually associated with elevated serum bilirubin is an indicator of biliary obstruction(obstructive jaundice).</p> <p>ALP is also elevated in liver cirrhosis & hepatic tumors.</p> <p>Measurement of other serum enzymes like γ-glutamyl transpeptidase(GGT), 5'-Nucleotidase, isocitrate dehydrogenase & isoenzymes of lactate dehydrogenase are also useful in LFT.</p> <p>3.Gamma – Glutamyl transpeptidase: (GGT)</p> <p>Measurement of (GGT)activity provides a sensitive index to assess liver abnormality</p> <p>Serum GGT is highly elevated (Normal 10 – 15U/L) in biliary obstruction and alcoholism</p> <p>LFT BASED ON SERUM PROTEINS (Albumin)</p> <ul style="list-style-type: none">• Albumin is only synthesized by the liver.• It is a good marker to assess chronic liver damage.• Low serum albumin is commonly observed in patients with severe liver damage.• It must however, be noted that the serum albumin concentration is also decreased due to malnutrition. <p>LFT BASED ON SERUM PROTEINS(Globulin)</p> <ul style="list-style-type: none">• Increased synthesis of Globulins indicates impairment of liver.• Cirrhosis of the liver is indicated by the reversal of albumin/globulin(A/G) ratio. <p>GALACTOSE TOLERANCE TEST</p> <ul style="list-style-type: none">• Galactose is a monosaccharide, almost exclusively metabolized by the liver.• The liver function can be assessed by measuring the utilization of galactose.• This is referred to as the Galactose Tolerance Test.• In normal individuals, the half-life of galactose is about 10-15 minutes.• This is markedly elevated in infective hepatitis & cirrhosis.	

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		<p>PROTHROMBIN TIME</p> <ul style="list-style-type: none">• The liver synthesizes all the blood clotting factors.• A decrease in the concentration of plasma clotting factors is found in the impairment of liver function.• This can be checked by measuring prothrombin time which is prolonged in patients with liver damage compared to normal.• The half-lives of clotting factors are relatively short(5-72 hrs.), therefore, changes in prothrombin time occur quickly.• Hence this test is useful to assess acute as well as chronic liver damage. <p>HIPPURIC ACID SYNTHESIS</p> <ul style="list-style-type: none">• The liver is the major site for the metabolism of xenobiotics(detoxification).• Measurement of hippuric acid synthesis is an ideal test for assessing the detoxification function of the liver.	
1	f	<p>Define medication errors. Write various strategies to minimise medication error.</p> <p>Marking scheme: 1 M for definition, 4 M for strategies to minimize medication errors.</p> <p>Definition:</p> <p>Medication error is defined as any error in the prescribing, dispensing or administration of drugs which are the single most preventable cause of patient harm.</p> <p>OR</p> <p>Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer.</p> <p>Strategies for prevention of medication error: (any 8)</p> <ol style="list-style-type: none">1.If not sure about the dose or drug consult to the pharmacist2.If the illegible writing, confirm the drug or dose by calling healthcare provider and then dispense medicines3.Recheck the calculation to confirm that patient will get right therapeutic dose4.Ask another clinician to recheck your calculations of dose.5.When writing orders do not use drug abbreviations	5M

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		<p>6.To each prescription always add the patient's weight and age</p> <p>7.Do not use abbreviations for route and frequency of dosage</p> <p>8.When writing a prescription state treatment condition</p> <p>9.Always specify duration of therapy</p> <p>10.Do not hesitate to check dose and frequency if you are not knowing</p> <p>11.Always remember each medication has potential for adverse reaction</p> <p>12.Be aware of high risk medications</p> <p>13.Before ordering any medication,analyse blood samples for liver and renal function.</p> <p>14.Double check the frequency and dosing of all high alert medications</p>	
1	g	<p>Define National Accreditation Board for Hospital and write its benefits and Role of pharmacist in it.</p> <p>(Marking scheme: 1 mark - definition, 2 marks for any 2 benefits, 2 marks for any 4 role of pharmacist)</p> <p>NABH- It is a constituent Board of Quality Council of India, that is set up to improve the standards of health care organisations with the purpose of improving health care quality and patient safety in public and private hospitals.</p> <p>Benefits of Accreditation: (any 2 benefits)</p> <p>1.For patients: (any 2 points - 1mark)</p> <p>a) Patients can feel safe due to implementation of accreditation standards ensures Patient safety, commitment to quality care resulting in good clinical outcomes.</p> <p>(b) Improves patient satisfaction and increases community confidence as services are provided by credentialed medical staff.</p> <p>(c) Provides good marketing advantage in competitive healthcare.</p> <p>(d) Accreditation by ISQua gives international recognition which will boost medical tourism.</p> <p>(e) Provides an objective system of empowerment by insurance and other third parties.</p> <p>(f) The rights of patients are respected and protected.</p> <p>2.For a Hospital/Organisation:(any 2 points - 1mark)</p> <p>(a)Guide the hospital to provide quality healthcare, patient safety as per global standards so continuous improvement in health care organisation.</p>	5M

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		<p>(b)The testimony that the hospital wishes to increase the patient's experience positively.</p> <p>(c) It provides International recognition for any hospital which helps to promote medical tourism.</p> <p>(d) It provides a marketing advantage in a competitive health care.</p> <p>3. Benefits for staffs: (any 2 points - 1mark)</p> <p>(a) The staff are satisfied as it provides for continuous learning, good working environment and leadership.</p> <p>(b) It improves efficiencies and competencies of staff.</p> <p>(c) It improves overall professional development, knowledge and competencies.</p> <p><u>Role of pharmacist in NABH: (any 4)</u></p> <p>The primary duty of a hospital pharmacist is to support safe, rational and economic use of medicines for the benefit of the patient and in interest of hospital. The pharmacist performs his role in management of medication while going for the NABH accreditation. The various roles of a hospital pharmacist include:</p> <p>1. Provide guidelines for the organization for pharmacy services, management and drug use.</p> <p>2. Set up a multidisciplinary committee called the Pharmacy Therapeutic Committee which provides best information on medication management and the same shall be updated and implemented.</p> <p>3. Provide guidelines for the storage of the medication. This defines a list of high-risk medication, emergency medication and LASA (Look Alike and Sound Alike) drugs etc. Also suggests guidance for storing these drugs physically apart from each other.</p> <p>4. Establish guidelines and policy to find error or illegible prescription for rational and safe prescription of medication.</p> <p>5. To set the standards for medication writing in a uniform manner. Medication orders are legible, dated, timed and signed.</p> <p>6. Identify potential high risk medications and to outline steps to prevent errors that may result from confusion of these medications.</p>	

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		<p>7. Establish policies / guidelines for dispensing only against valid prescription or medication orders. Dispensing shall be preceded by checking the expiry date, strength, generic component of the drug.</p> <p>8. Ensure patient safety after the administration of medication creating a system for monitoring, reporting and analysing the medication errors and adverse drug reactions.</p> <p>9. Prepare very vital standards on safe use of narcotic, psychotropic, chemotherapeutic agents and radioactive agents.</p> <p>10. Ensure the availability of medication as per the hospital formulary and maintain as per the inventory. Pharmacists know the procedure of purchasing and also audit documentation of periodic stock including physical verification.</p> <p>11. Fire safety arrangement in the pharmacy and store room. Pharmacist know about chemical spill management</p> <p>12. Quality indicator for pharmacy-</p> <ul style="list-style-type: none">a) Incidence of dispensing errorsb) % of wastage of drugc) % of medicine expiring in a periodd) % of stock out of drugse) % of stock out of emergency drugsf) % of medicines procured through local purchase <p>Pharmacists collect data of all above quality indicators from the pharmacy department every month and analyse it.</p>	
2		Answer any <u>TEN</u> of the following:	30 M
2	a	Define Hospital Pharmacy and write its scope Marking scheme: 1 M for definition, 2 M for any 4 points in scope. Definition: Hospital pharmacy is defined as a department of hospital wherein procurement, storage, compounding, dispensing and distribution of medicines and professional supplies is done to inpatients and outpatients under the control of legally qualified pharmacists.	3M

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		<p>Scope of hospital pharmacy:</p> <ol style="list-style-type: none">1. To professionalize the functioning of pharmaceutical services in hospital2. To perform functions of material management3. To make the hospital self-sufficient in respect of critical drugs4. To ensure availability of right medication at the right time, right dose and at minimum possible cost5. To serve as source of drug information6. To serve as counselling department7. To organise and participate in research projects, educational programs8. To cooperate and coordinate with other departments9. To participate inpatient care system more actively than performing only the counting, pouring and dispensing job10. To educate patients, nurses, interns and pharmacy trainers on various aspects of drug.	
2	b	<p>Define Drug related problems and classify it.</p> <p>Marking scheme: 1 M for definition, 2 M for classification</p> <p>Definition:</p> <p>Drug related problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcome.</p> <p>Classification:</p> <p>1.New drug therapy- patient has a medical condition that require new drug therapy e.g.-Need for additional drug</p> <p>2.Unnecessary drug therapy- A patient is taking a drug therapy which is not suitable for his/her condition.</p> <p>3.Use of wrong drug- A patient has a medical condition for which the wrong drug is prescribed.</p> <p>4.Too low dose- A patient has a medical condition for which too low a dose of the correct drug is taken.</p>	3M

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		<p>5. Too high dose- A patient has a medical condition for which too high a dose of the correct drug is taken.</p> <p>6. ADR- A patient has a medical condition that occurs due to ADR.</p> <p>7. Drug interaction- A patient has a medical condition because of drug-drug interaction, drug-food interaction or drug-disease interaction.</p> <p>8. Non-compliance- A patient has a medical condition for which the patient ignores the doctor's instructions to take the medication and follow the self-prescription.</p> <p>9. Lack of monitoring of effect and toxicity of drugs: e.g Clinical examination e.g. blood pressure weight with heart failure, blood tests e.g. regular counting of HbC with clozapine treatment.</p>	
2	c	<p>Explain the dispensing of Radiopharmaceuticals.</p> <p>Marking scheme: 3 M for any 6 points</p> <p>Dispensing of Radiopharmaceuticals</p> <ul style="list-style-type: none">■ Dispensing should be safe, straightforward and reliable■ Radiopharmaceuticals can be prepared in the form of ready to use kits or cold kits which provide individual or multiple doses and can be reconstituted by the addition of the radionuclide at the time of intended use■ Chemical reagents are prepared in a sterile environment using pyrogenic free raw materials and dispensed into single or multiple unit dose containers.■ The cold kit preparation should be subjected to terminal sterilization preferably by autoclaving or by membrane filtration■ Radiopharmaceuticals are never dispensed directly to patients, they are provided to trained healthcare professional at the hospital or clinics and then administered to the patients■ Recommended dosage level is calculated on the basis of patient history, age, weight, surface area and other factors■ Dispensing of prescription is done as per applicable pharmacy law and	3M

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		<p>appropriate records are maintained</p> <ul style="list-style-type: none">■ Policies and procedures are developed for the rational use of radiopharmaceuticals■ Good radiation practices (GRP) should be strictly followed to reduce the unwanted and avoidable radiation exposure.	
2	d	<p>Write about any 3 equipment used for maintaining cold storage conditions.</p> <p>Marking scheme: 1 M each</p> <p>Refrigerator:</p> <ul style="list-style-type: none">● The medicines are kept safely in narrow temperature range and their efficiency is maintained● It comprises of thermally protected compartments● Temperature range is between 2°C to 8°C● Medicines stored in the refrigerator include vaccines, insulin, chemotherapy drugs, topical preparations, eye drops, insulin, glucagon etc. <p>ILR (Ice lined refrigerator):</p> <ul style="list-style-type: none">● This device has a lining of ice packs hence the name is ice lined refrigerator● Internal lining contains ice, ice packs or cold water filled compartments● If electricity fails, the ice lining keeps the inside temperature at a safe level● 2°C to 8°C temperature can be maintained with just 8 hours of power supply in 24 hours● Additionally, top opening lid prevents loss of cold air during door opening hence temperature can be maintained for a longer span in deep freezer● They are mostly used in the vaccine cold chain <p>Walk in cold room:</p> <ul style="list-style-type: none">● Walk in cold rooms ensure the temperature is constant and within range in all over the room● It is designed for exact observing of temperature conditions required for cold storage● It works between 0°C to 25°C	3M

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Q. No.	Sub No.	Answers	Marking Scheme
		<ul style="list-style-type: none">It maintains precise temperature for long term cold storage.	
2	e	<p>Define PTC and write the functions and scope of the committee.</p> <p>Marking scheme: 1 M for definition 2 M for Function and scope (any 4 points)</p> <p>Definition:</p> <p>PTC is a committee which formulates policies regarding evaluation, selection and therapeutic use of drugs.</p> <p><u>Functions and scope of PTC</u></p> <ol style="list-style-type: none">To advise medical staff and hospital administration in matters relating to use of drugs, prevention of waste and confusion.Establish and develop suitable educational schemes to improve hospital's professional staff on matters related to use of drugs.Develop and compile a formulary of drugs.To constantly review formulary and update if necessary.To study problems related to drug administration, distribution, drug stocking and drug use.To review ADR or interactions occurring in the hospital.To recommend about drugs to be stocked in patient care areas.To advise pharmacy in implementation of effective drug distribution and control procedures.To develop written policies and procedures for selection, procurement, storage, distribution and use of drugs.To develop policies regarding drug safety.	3M
2	f	<p>Define Hospital formulary and write about contents of hospital formulary</p> <p>Marking scheme: 1 M for definition 2 M for content</p> <p>Definition: Hospital Formulary is a continually revised compilation of pharmaceuticals (plus ancillary information) which reflects the current clinical judgement of medical staff.</p> <p><u>Content of hospital formulary:</u></p> <p>PTC will take the decision regarding content of hospital formulary, but it generally</p>	3M

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Q. No.	Sub No.	Answers	Marking Scheme
		<p>contains 3 parts -</p> <p><u>1. Information of hospital policies and procedures</u> regarding drugs. This will include following items:</p> <ul style="list-style-type: none">a) Formulary policies and proceduresb) Brief description of PTCc) Hospital regulations governing prescribing, dispensing and administration of drugs.d) Pharmacy operating procedurese) Information on using formulary <p><u>2. Drugs product listing</u> - This includes information on drug products which have been approved by PTC</p> <ul style="list-style-type: none">a) List of approved drugsb) Information about each approved drug <p>This section is the heart of formulary and consists of one or more index to facilitate use of formulary. e.g. 1) Generic brand name, cross-reference list</p> <p style="text-align: center;">2) Pharmacologic-therapeutic index</p> <p><u>3. Special information</u> - This section includes:</p> <ul style="list-style-type: none">a) Prescription writing - This section is to guide young physicians who are appointed as trainee staff. This gives information about parts of prescription, systems of measurement, abbreviations used, essentials of narcotic prescription, etc.b) Other data -<ul style="list-style-type: none">i) Normal laboratory valuesii) Calculation of doses for childreniii) Weights and measuresiv) Toxicology sectionv) mEq calculationsvi) Diagnostic and pathological reagents in common use. <p>And other such data that PTC considers useful is included in formulary.</p>	

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Q. No.	Sub No.	Answers	Marking Scheme
2	g	<p>Enlist different software used in pharmacy and explain pharmacy management software</p> <p>Marking scheme: 2 M to Enlist,1 M for pharmacy management software.</p> <p>Different software used in pharmacy</p> <ul style="list-style-type: none">● <u>Electronic health record (EHR) software:</u> E.g. eClinical Works, Allscripts, Nextgenclinic● <u>Medical billing software:</u> e.g.Epic care● <u>Hospital management software:</u> E.g. Availity● <u>Medical equipment management software:</u> E.g. Sortly● <u>Medical research software:</u> E.g. Pubmed.gov● <u>E-prescribing software:</u> E.g. MediTab, ScriptSure● <u>Telemedicine software:</u>● <u>Therapeutic drug monitoring:</u> E.g. WinNOpNLIN, USC Pack● <u>Personal Health Record software (medical diaries):</u> E.g. Tulipa app <p>● Pharmacy management software (PMS): This software helps to achieve two business goals-</p> <p>1.It helps <u>automate the pharmacy workflow more efficiently-</u> This includes such tasks as reviewing physician orders and preparing medications, controlling the inventory and making drug orders, handling billing and insurance, providing counselling, identifying incompatibilities, and more—all while following legal protocols and compliance.</p> <p>2.It provides <u>better customer experience and improves patients outcomes by attracting them.</u>-By computer communication, prescriptions can be easily handled by software, freeing more time for pharmacists to interact with patients. Here pharmacists can communicate with patients online on a patient portal. Also setting up a connection to a hospital's EHR, a pharmacist can access a patient's medication history to make better recommendations.</p>	3M
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Q. No.	Sub No.	Answers	Marking Scheme
2	h	<p>Write in brief about Drug Food Interaction with example Marking scheme: Explain any 3 examples, 1 mark each)</p> <p>Food affects the absorption of the drug. It may be attributed to</p> <ol style="list-style-type: none">1) Dilution of the drug2) Adsorption or complexation of drug3) The alteration of gastric emptying <p>1.The interaction of drug and Tyramine containing drug ex. Cheese.</p> <p>MAO is an enzyme abundantly present in liver and other tissues. It causes metabolism of Serotonin (5- hydroxytyramine), Tyramine and noradrenaline. When the action of MAO is inhibited , the concentration of serotonin, tyramine and noradrenaline increases in CNS. This causes sudden hypertension and severe headache.</p> <p>Hence tyramine containing food like cheese, banana, some beers,yeast products and caffeine-containing drinks are restricted in patients on MAO inhibitor therapy .</p> <ol style="list-style-type: none">2.milk reduces absorption of tetracycline by forming an insoluble complex.3.Fatty food delays gastric emptying time and alters rate of absorption.4.Absorption of some drugs reduces in presence of food e.g. Ampicillin, Rifampicin, Isoniazid. Iron absorption is reduced if food has been taken within the previous two hours. If Iron is taken on an empty stomach it can cause nausea. Therefore, Iron tablets are often given with food.5.Absorption of drugs like- riboflavin, spironolactone, lithium, citrate, Carbamazepine increases in the presence of food.6.Nitrofurantoin is given with food to avoid GIT irritation this also increases drug absorption.	3M

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Q. No.	Sub No.	Answers	Marking Scheme
2	i	<p>Define unit dose drug distribution with its advantages and disadvantages.</p> <p>Marking scheme: 1 M for definition, 1 M each for advantages and disadvantages (any 2 points in each)</p> <p>Definition: Unit dose medications can be defined as those medications which are ordered, packaged, handled, administered and charged in multiples of single dose units containing a predetermined amount of drug or supply sufficient for one regular dose, application or use.</p> <p>Advantages: (any 2)</p> <ol style="list-style-type: none">1. Less/no pilferage and wastage.2. Avoids duplication of orders and extra paperwork.3. Medication errors are reduced.4. Services round the clock become possible.5. Better financial control6. Patients are charged only for the doses they receive.7. Less space required as compared to bulky floor stock.8. More efficient utilisation of personnel.9. It allows nurses more time for direct patient care. <p>Disadvantages: (any 2)</p> <ol style="list-style-type: none">1. Need separate manpower for pre-packaging2. Separate containers, closures, machinery and space is required.3. Unit dispensing should be handled by skilled person and supervised by pharmacist only4. All the formulations cannot be made available in UDDS	3M
2	j	<p>Define Total Parenteral Nutrition with its contents.</p> <p>Marking scheme: 1 M for definition 2 M for contents</p> <p>Definition: Total Parenteral Nutrition (TPN) is the method of infusing nutrition to the patients through Intravenous (IV) route. The nutrition is in the form of fluids.</p>	3M

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Q. No.	Sub No.	Answers	Marking Scheme
		<p>CONTENTS OF TPN</p> <p>TPN is mixture of separate components which contain</p> <p>Carbohydrates, Lipids (fat), Amino acids, Electrolytes, Trace elements, Vitamins and Fluids. TPN composition adjusted as per requirement of individual patients.</p> <ul style="list-style-type: none">● <u>Carbohydrates</u>: Carbohydrates are the main source of energy. Dextrose and monohydrates of glucose used as primary source of carbohydrate in TPN● <u>Lipids (Fat)</u>: Linoleic acid is used as the primary source of essential fatty acid in TPN.● <u>Electrolytes</u>: Sodium (Na) - 100 to 200 mEq, Potassium (K)- 80 to 120 mEq, Magnesium (mg) - 8 to 16 mEq, Calcium (Ca) - 5 to 10 mEq, Chloride (C)- 100 to 200 mEq. <u>Vitamins</u>: ● <u>Vitamins</u> are required for the metabolism of carbohydrates, proteins, fats. water soluble (B1, B2,B3, B5, B6, B7, B9, B12 & C) & fat-soluble vitamins (A, D, E & K) used in TPN formulation	
2	k	<p>Write various storage conditions with temperature as per IP</p> <p>Marking scheme: 3 M for any 3 storage conditions</p> <p>As per IP 1996</p> <ul style="list-style-type: none">● Cold: Any temperature not exceeding 8°C and usually between 2°C to 8°C.● Cool: Any temperature between 8°C to 25°C● Room temperature: The temperature prevailing in a working area. This temperature falls between 15°C to 30°C● Warm: Any temperature between 30°C to 40°C● Excessive heat: Any temperature above 40°C● Light resistant container● Well closed container	3M

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Q. No.	Sub No.	Answers	Marking Scheme
		<p style="text-align: center;"><u>OR</u></p> <p>As per IP 2022 the storage conditions are defined as following terms:</p> <ul style="list-style-type: none">● Store in dry, well-ventilated place at a temperature not exceeding 30°C● Store in a refrigerator (2°C to 8°C). Do not freeze.● Store in a freezer (-2°C to -18°C)● Store in a deep freezer (below -18°C)● Store protected from light● Store protected from light and moisture	
3		Attempt any <u>FOUR</u> of the following	12 M
3	a	<p>Define clinical pharmacy.It is a newborn discipline that carries traditional hospital pharmacists from product oriented approach to patient oriented approach so as to ensure patients maximum well being while on drug therapy. <u>OR</u></p> <p>Clinical pharmacy is defined as the area of pharmacy which is concerned with the various aspects of patient care and deals with the dispensing of medicines, advising the patient on safe and rational use of drugs to promote health, wellness, and disease prevention. <u>OR</u></p> <p>Clinical pharmacy is a health science discipline in which pharmacists provide patient care that optimizes medication therapy and promotes health, wellness and disease prevention.</p>	1M
3	b	<p>Give the dose for BAL Antidote.</p> <p>Ans. BAL is administered in a dose of 3-5 mg/kg I.M. at an interval of 4 hours for the first 2 days, and an interval of 6-12 hours for additional 10 days.</p>	1M

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Q. No.	Sub No.	Answers	Marking Scheme
3	c	<p>Define the term HMR.</p> <p>Ans. Home Medication Review (HMR) is a patient-focused and collaborative health care service provided in the community setting to enhance the quality use of medicines and patient understanding. OR</p> <p>Home Medication Review (HMR) is a service designed to assist patients living at home to maximize the benefit of their medication regimen & prevent medication related problems.</p>	1M
3	d	<p>Give the composition of Universal Antidote.</p> <p>Ans. Composition of Universal Antidote:</p> <p>Magnesium oxide 1 part</p> <p>Activated charcoal 2 parts</p> <p>Tannic acid 1 part</p>	1M
3	e	<p>Give the meaning of following Latin term:</p> <p>1) Auristille- Eye drops</p> <p>ii) Ante jentaculum - Before breakfast</p>	1M
3	f	<p>Define Radiopharmaceuticals.</p> <p>Ans. Radiopharmaceuticals are pharmaceutical preparations containing radioactive components. OR</p> <p>Radiopharmaceuticals are medicinal formulations containing radioisotopes which are used in major clinical areas for diagnosis and/or treatment</p>	1M

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Q. No.	Sub No.	Answers	Marking Scheme
3	g	Define Anit-natal care. Ans. Antenatal care is the care a pregnant woman receives from the maternity team to ensure that both mother and baby are as healthy as possible.	1M
3	h	Blood Pressure can be measured by _____. Ans. Sphygmomanometer	1M
3	i	Pharmacist required for 100 bed Hospital i) 02 ii) 05 iii) 05 iv) 08 Ans. ii) 5 OR iii) 05	1M
3	j	AST has a wide distribution in i) Tissue ii) Cardiac iii) Renal iv) Blood Ans. ii) Cardiac	1M
3	k	Give the full form of ASHP. Ans. American Society of Health-System Pharmacists OR American Society of Hospital Pharmacists	1M
3	l	T3 and T4 mainly for i) Mental functioning ii) Physical functioning iii) Body Temperature iv) All the above. Ans. iv) All of the above	1M

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Q. No.	Sub No.	Answers	Marking Scheme
3	m	<p>The patients who come to the hospital with general symptoms like fever, cough and cold are known as _____</p> <p>Ans. Ambulatory patient</p>	1M
3	n	<p>Thyrocalcitonin is used to maintain.</p> <p>i) Phosphate level ii) Mg level iii) CAL level iv) None</p> <p>Ans. iii) CAL level</p>	1M
3	o	<p>Give the ingredients in TPN.</p> <p>Ans. Ingredients in TPN are: Carbohydrate, amino acids lipids(fats/triglycerides), electrolytes, trace elements, vitamins and fluids</p>	1M
3	p	<p>What are Reserved antibiotics?</p> <p>Ans. Reserved antibiotics are drugs that are accessible but reserved for treatment of confirmed or suspected infections caused by multi-drug-resistant micro organisms.</p>	1M
3	q	<p>Define pharmacovigilance.</p> <p>Ans. Pharmacovigilance is the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other medicine/vaccine related problem.</p>	1M
3	r	<p>Vitamins store in</p> <p>i) Room temp ii) Freezer iii) Cold temp iv) Cool temp</p> <p>Ans. iv) Cool temp</p>	1M



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Q. No.	Sub No.	Answers	Marking Scheme
3	s	<p>Where is the WHO ADR monitoring centre situated?</p> <p>Ans. Uppsala, Sweden.</p>	1M
3	t	<p>Which disposal method is used for cytotoxic drugs.</p> <p>i) Incineration Method ii) Disposal to Sewers</p> <p>iii) Directly to land fill iv) All the above</p> <p>Ans. i) Incineration method</p>	1M