



SUMMER – 2023 EXAMINATION

Model Answer – Only for the Use of RAC Assessors

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 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, 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 examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.
- 8) As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced at 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 SIX of the following:	30M



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1	a	<p>Write a note on “FIP Basal Statement” on the future of hospital Pharmacy.</p> <p>Marking Scheme: 2 M Introduction and enlisting , 3M for explanation</p> <p>FIP Basal Statements:</p> <p>Introduction:</p> <ul style="list-style-type: none">● FIP (International Pharmaceutical Federation) is global federation of national associations of pharmacists and pharmaceutical scientists In 2008, hospital pharmacists all over the world met in Basel, Switzerland to discuss the future of hospital pharmacy hosted by FIP● In 2014, they again gathered in Bangkok and launched the updated version of the Basel statement with 65 statements. These statements cover the following six main areas of hospital pharmacy.<ol style="list-style-type: none">1. Procurement2. Influence on prescribing3. Preparation and delivery of medication4. Medication administration5. Monitoring Medication6. Human resources, training & development <p>1.Procurement:</p> <ol style="list-style-type: none">a. Transparent procurement processb. Follow principle of safety, quality and efficacyc. Regularly reviewed supply of medicines according to need.d. Provision of giving information should be accurate timely and appropriate <p>2.Influence on prescribing</p> <ol style="list-style-type: none">a. Arrange training program for young physicians to educate them about prescription writing and prescribe correct medicineb. Hospital pharmacist participate in collaborative prescribingc. For standard treatment guideline, hospital use hospital formulary <p>3.Preparation and delivery of medication</p> <p>He take responsibility in following cases:</p>	5M
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		<ul style="list-style-type: none">– Preparation, storage, dispensing and distribution of all medicines including investigational medicines– Appropriate labeling and control on medicine stored– Determine which medicine is placed in ward stock and also follow standardized handling procedure and storage conditions of ward medicine– Hazardous medicine prepared in environmental conditions to minimize risk of contaminations.– Develop tracking system for tracing medicines dispensed by pharmacy i.e. pin-point any medicines current and past locations in your supply chain <p>4.Administration:</p> <ul style="list-style-type: none">– Seven rights in medicine administration are – Right patient, Right Drug, Right Dose, Right Route, Right Time, Right Documentation and Right Response.– Take patients medication history– Ensure proper packaging of medicines and labels should be identified correctly.– Ensure that healthcare professional who administer medicines are appropriately trained in their use, hazards and necessary precautions <p>5.Monitoring of medicines use:</p> <ul style="list-style-type: none">– Monitoring patient's response to current medication for-<ul style="list-style-type: none">a) safety & efficacy purposeb) Detecting medication errors. Hence modifying dose of administered medicines or substitute drug– Prepare medication errors report, regularly revised to improve quality and safety of medicines use practice.– Prepare ADR report, reviewed it and send it in time to regional or pharmacovigilance center and also manufacturer <p>6.Human Resource training and development:</p> <ul style="list-style-type: none">- At national level :Health Authorities, hospital pharmacist and stakeholder collaboratively develop hospital pharmacy human resource plan for responsible	



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1	b	<p>use of medicines in both rural and remote area</p> <p>-Training program of pharmacy support staff :-</p> <p>It should be nationally formalized (Approval status), harmonized (Balanced) & Credentialed with defined scope of practice.</p> <p>What is inventory control? Enlist different techniques of inventory control. Explain the “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>Definition: Inventory Control is the balance between not ordering too much and avoiding stock out situations of material.</p> <p>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>Economic Order Quantity:</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>OR</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>	5M



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		<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-</p> <p>AC - annual Consumption</p> <p>OC - ordering cost</p> <p>UC - unit cost</p> <p>ICC - inventory carrying cost</p>	
1	c	<p>Discuss in detail about the floor stock dispensing system with its advantages and disadvantages.</p> <p>Marking scheme: 1 M for introduction to floor stock method, 1 M for charged method, 1 M for non-charged method(any 1 method of dispensing), 1 M for advantages and 1 M for disadvantages</p> <p>Floor stock dispensing system is the stock of drugs (charged and non-charged) which is stored at wards or nursing units under the supervision of nursing incharge.</p> <p><u>Charged floor stock method:</u></p> <ul style="list-style-type: none">● Normally these drugs are expensive and therefore directly charged to the	5M



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		<p>patient's account.</p> <ul style="list-style-type: none">These include injections and other single dose preparation. <p>Dispensing of charge floor Stock drugs-</p> <p style="text-align: center;">ENVELOPE SYSTEM:</p> <p>1) Envelope used to dispense drug to ward & which is also used as charge plate.</p> <p>2) Pre-labeled envelopes are filled with specific drugs in specific quantities & placed at the disposal of the nursing station.</p> <p>3) When a nurse administers the drug, the nurse writes the patient name & room number, drug name & their quantities on the envelope & places it in out basket.</p> <p>4) This envelope is later sent to the pharmacy where it is priced & forwarded to the account department for billing.</p> <p><u>Non Charge floor stock method:</u></p> <ul style="list-style-type: none">The cost of this group of drugs is calculated in the per day cost of the hospital room.Two methods are used for dispensing of non charge floor stock drugs namely<ol style="list-style-type: none">Drug basket method:Mobile dispensing unit: <p>DISPENSING OF NON- CHARGE FLOOR STOCK DRUGS</p> <p style="text-align: center;">1. BASKET SYSTEM:</p> <p>1) Night nurse checks drug stock against list of medication in medicine cabinet, utility room, & refrigerator.</p> <p>2) Nurse place tick marks on the number allotted for each drug on the requisition slip for floor stock drug supply.</p> <p>3) The duty nurse placed an empty bottle along with a requisition slip in the basket at night & this basket was sent to the pharmacy department.</p>	



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		<p>4) In the next morning, pharmacist collect & see requisition slip & accordingly dispenses & fill up empty container with suitable label,</p> <p>5) Finally the filled basket is delivered to the floor through messenger service.</p> <p>2. Mobile dispensing unit:</p> <p>a. Stainless steel trolley with specific dimensions is used to carry medicine and containers.</p> <p>b. The Carbon copy of requisition for floor stock supplies is left at the nursing station as record of delivery.</p> <p>c. The pharmacist checks the nursing station for drug stock and refills empty containers according to requisition.</p> <p>d. This increases interaction between pharmacist and the nursing staff</p> <p><u>Advantages: (any 2)</u></p> <p>1. The deteriorated and outdated drugs may be removed quickly through routine checking of the drug cabinet, thus it eliminates drug returns.</p> <p>2. The nursing station drug cabinets are under continuous supervision.</p> <p>3. The pharmacist is available for spot consultation by clinical and nursing staff.</p> <p>4. Ready availability of drugs.</p> <p>5. Reduces pharmacy load.</p> <p><u>Disadvantages:(any 2)</u></p> <p>1. Consumes nursing personnel's time.</p> <p>2. The pharmacist has to inventory drug cabinets and check the quantity of supplies left.</p> <p>3. Chances of medication errors may increase.</p> <p>4. Special facilities required at nursing station for storage of drugs</p>	



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1	d	<p>Enlist daily activities of clinical pharmacists. Describe interprofessional collaboration including definition, procedure and its benefits.</p> <p>Marking scheme: 2 M for enlisting daily activities, 1 M for definition, 1 M for procedure and 1 M for benefits of interprofessional collaboration</p> <p>Daily activities of Clinical Pharmacist:</p> <ul style="list-style-type: none">• Ward round participation• Treatment chart review• Adverse drug reaction monitoring• Drug information and poisons information• Medication history• Patient counselling• Interprofessional collaboration <p>Interprofessional collaboration:</p> <p>Definition: The multiple health workers from different professional backgrounds work together with patients, families caregivers and communities to deliver the highest quality of care</p> <p>Procedure:</p> <p>Hospitals encourage patient-oriented, team based rounds that include the primary doctor, specialized physicians, nurse, Pharmacist and any relevant team members</p> <ol style="list-style-type: none">1. Pharmacist must accompany physician on medical round to assist him by providing drug information2. The physician, pharmacist and nurses should develop an inter-professional relationship with each other to enhance the quality of patient care3. Care team collaboration platform deliver right information to the right people at right time via secure messaging video voice4. Assessment and treatment are done together that focus on patient outcomes which can reduce health care cost and inefficiency.5. It requires leader to put their egos aside for the good of patient6. Interprofessional collaboration levels the playing field and acknowledges that	5M



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		<p>everyone plays a vital role on the care team</p> <p>Benefits: (any 2)</p> <ol style="list-style-type: none"> 1.It improves the patient care, safety and compliance 2.It reduces medical errors 3.Its starts treatment faster 4.It reduces healthcare costs and inefficiencies 5.It improves job satisfaction and staff relationships 6.It reduces preventable ADR, optimizes medication dosages and decreases mortality rates. 																	
1	e	<p>Enlist any five haematological tests with its normal values and significance.</p> <p>Marking scheme: 1 M each for any five haematological tests with its normal values and significance</p> <table border="1"> <thead> <tr> <th>Sr. No.</th><th>Name of the test</th><th>Normal values</th><th>Significance</th></tr> </thead> <tbody> <tr> <td>1</td><td>Haemoglobin (Hb)</td><td>In males - 15.5 ± 2.5 g % In females: 14 ± 2.5 g % In infants: 16.5 ± 2.5 g %</td><td>Hb count decreases in anemia and leukemia and increases in polycythemia and dehydration</td></tr> <tr> <td>2</td><td>RBC count</td><td>In males - 4.5 - 6 millions /mm³ In females: 3.5 - 5.5. millions /mm³ In infants: 4 - 5.5. millions /mm³</td><td>RBC count increases in polycythemia, sweating, vomiting, diarrhoea, severe burns and heart diseases. It decreases in anemia, pregnancy, old age and after haemorrhage.</td></tr> <tr> <td>3</td><td>WBC/leukocyte count</td><td>In adults - 5000 - 11000 cells/mm³ In children - 8000 - 10000 cells/mm³ In infants - 10000 - 20000</td><td>Decrease in WBC count is called leukopenia. It is observed in typhoid, influenza, measles,</td></tr> </tbody> </table>	Sr. No.	Name of the test	Normal values	Significance	1	Haemoglobin (Hb)	In males - 15.5 ± 2.5 g % In females: 14 ± 2.5 g % In infants: 16.5 ± 2.5 g %	Hb count decreases in anemia and leukemia and increases in polycythemia and dehydration	2	RBC count	In males - 4.5 - 6 millions /mm ³ In females: 3.5 - 5.5. millions /mm ³ In infants: 4 - 5.5. millions /mm ³	RBC count increases in polycythemia, sweating, vomiting, diarrhoea, severe burns and heart diseases. It decreases in anemia, pregnancy, old age and after haemorrhage.	3	WBC/leukocyte count	In adults - 5000 - 11000 cells/mm ³ In children - 8000 - 10000 cells/mm ³ In infants - 10000 - 20000	Decrease in WBC count is called leukopenia. It is observed in typhoid, influenza, measles,	5M
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				cells/mm ³	<p>blood disorders like agranulocytosis, aplastic anemia, hepatitis, etc.</p> <p>Increase in WBC count is called leukocytosis. It is observed in pathological conditions like bacterial infections, fever, appendicitis, meningitis, pneumonia, tonsillitis, rheumatic fever, etc and also in physiological conditions like muscular exercise, fear, pregnancy and menstruation. Greater increase in leukocytes is observed in leukemia.</p>	
		4	Differential leukocyte count (DLC)	<p>Neutrophils - 40 - 70% of total WBCs.</p> <p>Eosinophils - 2 - 4 % of total WBCs.</p> <p>Basophils - 0 - 2 % of total WBCs</p> <p>Lymphocytes - 20 - 30% of total WBCs.</p> <p>Monocytes - 5 - 10% of total WBCs</p>	<p>Neutrophils - Increase in neutrophil count (neutrophilia) is observed in bacterial infections, inflammatory lesions, intoxication and urinary tract infections.</p> <p>Eosinophils: Increase in eosinophil count (eosinophilia). It indicates allergic conditions, presence of intestinal parasites i.e. worms and skin diseases. Decrease in eosinophil count (eosinopenia). It occurs in injury, burns and</p>	



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					<p>release of adrenocortical hormones.</p> <p>Basophils: Increase in basophil count (basophilia) and is observed in granulocytic leukemia.</p> <p>Lymphocytes: Increase in lymphocytes (lymphocytosis) and it is observed in children with bacterial and viral infections and very high count is observed in whooping cough and leukemia.</p> <p>Monocytes: Increase in monocytes (monocytosis) and it is observed in bacterial infections like TB and in malaria.</p>	
		5	Erythrocyte sedimentation rate (ESR)	<p>Westergren method - Males: 0 - 5 mm at the end of one hour Females: 0 - 7 mm at the end of one hour</p> <p>Wintrobe method - Males: 0 - 9 mm at the end of one hour Females: 0 - 20 mm at the end of one hour</p>	<p>It increases in T.B, rheumatoid arthritis, pneumonia, anaemia, jaundice and cancer. ESR decreases in polycythemia, sickle cell anemia, protein shock, burns, etc.</p>	
		6	Platelets count	150000 - 300000 / mm ³	Increased count in rheumatoid arthritis, tuberculosis, liver	



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					cirrhosis etc	
		7	Blood clotting time	<p>1) By capillary method</p> <p>Slide method: 2 – 6 min</p> <p>Tube method: 2 – 6 min</p> <p>2) By venous blood method</p> <p>Howell method: 0 – 30 min</p> <p>Lee & White method: 5 – 15 min</p>	<p>Prolonged clotting time indicates hemophilia, haemorrhage, obstructive jaundice, leukemia, presence of circulating anticoagulants, pneumonia, heparin therapy or vitamin K deficiency.</p> <p>Decreased clotting time may result in intravascular clotting of blood called as thrombosis and embolism</p>	
		8	Prothrombin time:	10-14 seconds	PT is prolonged if there is deficiency of factor VII, X, V or II or fibrinogen	
		9	MCV (Mean Corpuscular Volume)	$87 \pm 5 \text{ um}^3/\text{cell}$	Increased count indicates Macrocytic anemia. Decreased count indicates microcytic anemia	
		10	Hematocrit /Packed Cell Volume (PCV)	<p>Male 42 – 52%</p> <p>Female 36 – 48%</p>	<p>Increased MCV indicates Macrocytic Anemia</p> <p>Decreased MCV indicates Microcytic Anemia</p>	
		11	Mean	Normal Range: 27 – 32 pg	Increased MCH	



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		<table> <tr> <td></td><td>Corpuscular Hemoglobin (MCH)</td><td></td><td>indicates Macrocytic Anemia Decreased MCH indicates Hypochromia</td></tr> <tr> <td>12</td><td>Mean Corpuscular Hb Concentration (MCHC)</td><td>Normal Value: 32 – 36%</td><td>Increased MCHC indicates Spherocytosis Decreased MCHC indicates Hypochromia</td></tr> </table>		Corpuscular Hemoglobin (MCH)		indicates Macrocytic Anemia Decreased MCH indicates Hypochromia	12	Mean Corpuscular Hb Concentration (MCHC)	Normal Value: 32 – 36%	Increased MCHC indicates Spherocytosis Decreased MCHC indicates Hypochromia	
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12	Mean Corpuscular Hb Concentration (MCHC)	Normal Value: 32 – 36%	Increased MCHC indicates Spherocytosis Decreased MCHC indicates Hypochromia								
1	f	<p>Define poison. Classify poisons with suitable examples.</p> <p>Marking scheme: 1 M for definition and 4 M for classification with examples</p> <p>Definition: Poison is any substance taken in the body by ingestion, inhalation through lungs, injection or absorption that interferes with normal physiological function.</p> <p>Classification:</p> <p>1) Corrosive substances:</p> <ol style="list-style-type: none"> Strong acids e.g. sulphuric acid, nitric acid, hydrochloric acid Organic acids e. g. Oxalic acid and carbonic acid Strong alkalies e.g. NaOH, KOH <p>2) Irritants:</p> <ol style="list-style-type: none"> Inorganic irritants <ol style="list-style-type: none"> Non-metallic poisons e.g. Phosphorus, chlorine, bromine Metallic poisons e.g. Arsenic, mercury, copper, lead Organic irritants <ol style="list-style-type: none"> Vegetable origin e.g. castor oil seeds, ergot Animal origin e.g. snake venom, scorpion and insect bites Mechanical irritants e.g. powdered glass, diamond dust, chopped hair 	5M								



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		<p>3) Neurotics:</p> <ul style="list-style-type: none">a) Poisons having specific action on cerebrum e.g. opium and its alkaloids, anaesthetics, sedatives and hypnoticsb) Poisons acting specifically on spinal cord e.g. Nux vomica and its alkaloidsc) Poisons acting peripherally e.g. conium and curare <p>4) Cardiac poisons e.g. digitalis, strophanthus</p> <p>5) Pulmonary depressants e.g. Gases such as carbon monoxide and coal gas</p> <p>6) Miscellaneous e.g. Analgesics, antipyretics, antidepressants, antihistamines, hallucinogens etc.</p>	
1	g	<p>What is medication error? Give its types with strategies for prevention of medication error.</p> <p>Marking scheme: 1 M for definition, 2 M for types and 2 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>Types of medication error:</p> <ul style="list-style-type: none">● Prescribing● Omission● Wrong time● Unauthorized drug● Improper dose● Wrong dose prescription/preparation● Administration errors including the incorrect route of administration, giving	5M



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		<p>the drug to wrong patient, wrong rate or extra dose</p> <ul style="list-style-type: none">Monitoring error such as failing to take into account patient liver or renal function failing to document allergy or potential for drug interactionCompliance error such as not following protocol or rules established for dispensing and prescribing medications <p>Strategies for prevention of medication error: (any 4)</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 the calculations5.When writing orders do not use drug abbreviations6.To each prescription always add the patient's weight and age7.Do not use abbreviations for route and frequency of dosage8.When writing a prescription state treatment condition9.Always specify duration of therapy10.Do not hesitate to check dose and frequency if you are not knowing11.Always remember each medication has potential for adverse reaction12.Be aware of high risk medications13.Before ordering any medication check for liver and renal function.14.Double check the frequency and dosing of all high alert medications	
2		Answer any <u>TEN</u> of the following:	30 M
2	a	<p>Define "Good Pharmacy Practices". Give requirements of good pharmacy practices(GPP).</p> <p>Marking scheme: 1M for definition and 2 M for requirements (any 4)</p> <p>Definition: Good Pharmacy Practice (GPP) defines pharmacists as providing quality pharmacy service to every patient. It is the practice of pharmacy that responds to the</p>	3M



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		<p>needs of the people, who use the pharmacists' services to provide optimal, evidence based care.</p> <p>Following are the important requirements of good pharmacy practice: (any 4)</p> <ol style="list-style-type: none">1. A pharmacist first priority must be the welfare of the patient2. A pharmacy service must supply medication and health care products of assure quality and must monitor the effects of their use.3. A pharmacy services must contribute in the promotion of rational and economical prescription and appropriate use of medicines.4. Each element of pharmacy services must be relevant to the patient, is clearly defined and is effectively communicated to all those involved.5. It requires to convert all activities in a smooth manner with zero defect level.6. Pharmacist gives appropriate information & advice about use of medicine.7. Pharmacists promote prescribing & dispensing methods that should be rational & economical.8. Pharmacists work together with other health care professionals for improving patient safety.	
2	b	<p>Describe the role of pharmacists in preventing antimicrobial resistance.</p> <p>Marking scheme: 3 M for Any 6 roles</p> <p>Pharmacists have a key role in avoiding misuse of antibiotics to prevent antimicrobial resistance. Following are the roles of pharmacist in AMR:</p> <ol style="list-style-type: none">1. Infection prevention and control is an essential strategy to reduce infection and the subsequent increased use of antimicrobials.	3M



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		<p>2. Immunization is an important part of any infection control strategy. It helps reduce the misuse of antimicrobials.</p> <p>3. Advise the hospitals about the selection, safe and appropriate use of antibiotics, disinfectants and sterilant.</p> <p>4. Pharmacists maintain records of antibiotics distributed to the medical staff & also participate in monitoring of patient lab. report of microbial sensitivity & advice to physicians on selection of antibiotics.</p> <p>5. Select correct route of antibiotic administration.</p> <p>6. Pharmacists help in dose adjustment of antibiotics in renal disorder for better result.</p> <p>7. Carry out periodic prescription audits by an expert and give suggestions to optimize the use of antibiotics</p> <p>8. Arrange the review program for accessing and improving the quality of antimicrobial therapy.</p> <p>9. Quantitative data on antimicrobial drug use should be routinely generated and used.</p> <p>10. Offer effective medication therapy management.</p>	
2	c	<p>Give the various functions of pharmacy and therapeutic committee. Marking scheme: 3 M for any 6 functions</p> <p>Following are Functions of PTC:</p> <p>1. To advise the medical staff and hospital administration in matters relating to the rational use of drugs.</p> <p>2. To establish and develop suitable educational programmes to improve the hospital's professional staff on the matters related to the use of drugs.</p> <p>3. To develop and compile formulary of drugs:-Drug involved in formulary is subjected to constant revision. Entries of new drugs in formulary have proven their therapeutic value, safety & cost. It also minimizes the duplication of the same type of drugs or products.</p>	3M



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		<p>4. To study problems related to the distribution and administration of drugs used in hospitals.</p> <p>5. Participate in QC activity</p> <p>6. To review adverse drug interactions occurring in hospitals.</p> <p>7. To initiate and promote the studies on drug use and review the results of such studies.</p> <p>8. To recommend drugs which need to be stocked in the hospital patient care areas.</p> <p>9. To advise the pharmacy in the implementation of effective drug distribution and control procedures.</p> <p>10. To recommend the policies regarding drug safety in the hospital.</p> <p>To develop and maintain the emergency box at nursing stations.</p>	
2	d	<p>Explain in detail the FIFO and FEFO method with its advantages and disadvantages.</p> <p>Marking scheme: 1 ½ marks each for explanation, advantages and Disadvantages of FIFO and FEFO Method.</p> <p>FIFO Method:</p> <p>First in First out is one of the methods of stock management. It is based on the assumption that materials which are purchased first are issued/used/distributed/dispensed first.</p> <p>Advantages:(any 1)</p> <ol style="list-style-type: none">1. It is easy to implement/Apply.2. The condition of dead stock never arises.3. It assumes flow of costs corresponds with normal physical flow of goods.4. It produces higher income during the inflation period.	3M



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		<p>Disadvantages:(any 1)</p> <ol style="list-style-type: none">1. If the longer the product stays in the warehouse, the higher the possibilities for decomposition of the product, that affect on economy.2. It does not accurately reflect the actual cost of production or operations.3.It increases the tax liability in periods of rising prices.4.It shows a lower net income and a higher cost of goods sold in periods of falling prices. <p>FEFO Method: First Expired First Out is one of the methods of stock management. In this method the shelf-life of the product is considered. The product having short shelf-life is issued/distributed/dispensed first.</p> <p>Advantages:(any 1)</p> <ol style="list-style-type: none">1.It ensures that the product with the shortest expiry date is issued/sold first.2.It reduces business overheads from wastage.3.It ensures that products reaching end-users have sufficient remaining shelf-life.4.It avoids excess or dead inventory at warehouse level.5.It give assurance to consumer about guarantee product quality and their by consumer satisfaction.6.The condition of dead stock never arises. <p>Disadvantages:(any 1)</p> <ol style="list-style-type: none">1.It requires an accurate product tracking system.2.It requires good management of warehouse space for stocking and it should be well maintained.3.Higher taxes on products.	



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2	e	<p>Explain in short various disposal methods used for pharmaceutical wastes.(Any three method)</p> <p>Marking scheme: 3 M for any 3 methods</p> <p>Following are methods of disposal of pharmaceutical waste:</p> <p>1.Return to donor or manufacturer: Returning unusable drugs for safe disposal by the manufacturer. For unwanted, unrequested donations, especially those that arrive past or unreasonably near their expiry date, it may be possible to return them to the donor for disposal.</p> <p>2.Landfill: Place the waste directly into a land disposal site without prior treatment or preparation. It is the oldest and the most widely practiced method of disposing of solid waste.</p> <p>3.Encapsulation (Waste immobilization): Encapsulation involves immobilizing the pharmaceuticals in a solid block within a plastic or steel drum. They are filled to 75% capacity with solid and semi-solid waste of pharmaceuticals, and the remaining 25% space is filled by pouring in a medium such as cement or cement/lime mixture, plastic foam or bituminous sand. Lastly sealed drums are placed at the base of landfill and covered with fresh municipal solid waste.</p> <p>4.Sewer: Liquid pharmaceuticals, e.g. syrups and intravenous fluids, can be diluted with water. Then, flushed into the sewers in small quantities over a period of time without serious public health or environmental affect.</p> <p>5.Inertization: Inertization involves removing the packaging materials, paper, cardboard and plastic, from the pharmaceuticals. Pills are removed from their blister packs. The pharmaceuticals are then ground and a mix of water, cement and lime added to form a homogenous paste. The paste is then transported in the liquid state by concrete mixer truck to a landfill and decanted into the normal urban waste.</p> <p>6.Medium temperature Incineration: The expired solid form pharmaceuticals using a two– chamber incinerator that operates at the minimum temperature of 850°C, with a combustion retention time of at least two seconds in the second</p>	3M



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		<p>chamber. Before incineration the pharmaceutical waste is diluted with large quantities of municipal waste.</p> <p>7.High Temperature Incineration: Expired pharmaceuticals, chemical waste, used oil wastes are burnt at very high temperatures more than 850°C in cement kiln.</p> <p>8.Chemical Decomposition: If an appropriate incinerator is not available, the option of chemical decomposition can be used in accordance with the manufacturer's recommendations, followed by landfill.</p>	
2	f	<p>Comment on “Automated Drug Dispensing System”.</p> <p>Marking scheme: 3 M for Explanation including advantages and disadvantages</p> <p>Automated Drug Dispensing System:Explanation:</p> <p>It is a medication management system that allows hospitals to store and dispense drugs near the point of use. These systems have drug storage devices or cabinets that electronically dispense medication in controlled fashion and track medication use.</p> <p>Today automation in drug dispensing includes:</p> <ul style="list-style-type: none">• Computer -assisted physician order entry• Robotic handling, packaging and sorting of drugs in the pharmacy• Stand-alone nursing-unit based cabinets• The automated generation of customizable reports and forms <p>Each system and each cabinet is configured slightly different but all operates on the same basic principle.</p> <p>The cabinet look and function much like an automated teller machine (ATM)</p> <p>The user inputs his confidential ID, selects a patient profile from a list of options and chooses the appropriate medication to be administered</p>	3M



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		<p>The dispensing cabinet then unlocks a specified drawer containing the medication allowing the user access for a limited time.</p> <p>The different protocols can be there for access to the machine, time period for access and how to handle medication errors.</p> <p>Advantages:(any 2)</p> <ol style="list-style-type: none">1. Commonly need pharmaceuticals are at the point of care, that will reduce the workload of nurses.2. Controlled substances remain in a secure lock box until needed.3. Cost of expired drugs is greatly reduced.4. Reduction in number of missing medicines5. Here more efficient medication billing.6. Greater medication security & potential reduction in medication errors. <p>Disadvantages:(any 2)</p> <ol style="list-style-type: none">1.Remote dispensing creates physical barriers between patient and pharmacist limiting pharmacists ability to detect patient's Non-verbal cues during counseling.2.In case of patients taking controlled substances the lack of physical contact with the patient, the risk of dangerous interactions cannot be avoided.3.In case of failure of telecommunication services, the system is ineffective.4.Variety of drugs offered through remote dispensing is limited in comparison to traditional pharmacies.	



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Q. No.	Sub No.	Answers	Marking Scheme
2	g	<p>Write a note on total parenteral nutrition including its definition, content and indications for use.</p> <p>Marking scheme: 1 M each for definition, enlist contents and indications</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> <p>CONTENTS OF TPN</p> <p>TPN is mixture of separate components which contain</p> <p>Carbohydrates such as, Lipids (fat), Amino acids, Electrolytes, Trace elements, Vitamins and Fluids. TPN composition adjusted as per requirement of individual patient.</p> <p><u>Carbohydrates:</u> Carbohydrates is the main source of energy. Dextrose and monohydrates of glucose used as primary source of carbohydrate in TPN</p> <p><u>Lipids (Fat):</u> Linoleic acid is used as primary source of essential fatty acid in TPN.</p> <p><u>Electrolytes:</u></p> <p>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></p> <p>Vitamins 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</p>	3M



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Q. No.	Sub No.	Answers	Marking Scheme
		<p>Indications: (any 2)</p> <p>In following conditions TPN is needed:</p> <p>Inflammatory Bowel disease, Gastrointestinal ulcers, Small or large intestinal obstructions, Intestinal Ischemia, Intestinal perforation, Cancer patients on Chemotherapy, Prolonged Diarrhea, Severe pancreatitis, Paralytic ileus, Cohn's disease.</p>	
2	h	<p>Define radiopharmaceuticals. Give various methods of disposal of radiopharmaceuticals.</p> <p>Marking scheme: 1M for definition, 2 M for Disposal methods</p> <p>Definition : Radiopharmaceuticals are pharmaceutical preparations containing radioactive components.</p> <p>Disposal Methods: The radioactive waste is disposed as per following:</p> <p>1. Dilute and Disperse:</p> <p>Low activity solid radioactive waste such as vial, syringes, needles, cotton swab should be stored in puncture resistant waste bin. It must be disposed of in accordance with hospital activity.</p> <p>Similarly, liquid radioactive waste with less activity can be disposed into the sanitary sewage system with adequate flushing with water flow.</p> <p>2. Delay and Decay:</p> <p>Radio-active waste with half-lives of less than a month and medium level activity waste are stored. The storage room is properly ventilated with an exhaust system. The storage space is coated with lead shielding of appropriate thickness to prevent radiation leakage. The radioactive waste is stored for a minimum period of about 10 half- lives. The decay of material takes place during this time. Only 0.1% of the initial radio-activity remains. The waste is then checked for the remainder of the activity. If the activity is low- level it is disposed of as low activity solid or liquid waste. Most of the low and medium level radioactive hospital waste is disposed of by this method.</p>	3M



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		<p>3. Concentrate and Contain:</p> <p>The radio-active waste with very high activity levels and for those with long half-lives is disposed of with this technique. The waste material is collected in suitably labeled containers. These containers are kept in one place under monitoring. At once, all containers are buried at the places approved by the specified authority. This method is rarely used for hospitals.</p> <p>4. Incineration:</p> <p>Long half-life radionuclide waste should be incinerated or deeply burned in soil in a separately marked site/ Area approved by competent authority. Incineration reduces the bulk of radioactive waste and converts to small quantity of ash or further disposal.</p> <p style="text-align: center;"><u>OR</u></p> <p>Disposal of Radiopharmaceuticals:</p> <ol style="list-style-type: none">1.It is useful to separate radioactive waste according to their half-life i.e. short and long half-life radionuclide. There should be separate shielded waste bin should be lined with plastic liner that can be easily removed when full.2.Before storing, label/ tag the radioactive waste. The waste bin should be tightly closed marked as radioactive and place it at radioactive waste store.3.The date and time of disposal of radioactive waste, its identity and area of disposal should be recorded.4.Low activity solid radioactive waste such as vial, syringes, needles, cotton swab should be stored in puncture resistant waste bin. It must be disposed of in accordance with hospital activity.5.Similarly, liquid radioactive waste with less activity can be disposed into the sanitary sewage system with adequate flushing with water flow.6.The radioactive waste is then monitored for its decay. It decay to residual activity (i.e. only 0.1% of the initial activity remains), then it should be disposed off according to hospital waste disposal policies.	



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Q. No.	Sub No.	Answers	Marking Scheme
		7. Long half life radionuclide waste should be incinerated or deeply burned in soil in a separately marked site/ Area approved by competent authority. Incineration reduces the bulk of radioactive waste and converts it to a small quantity of ash or further disposal.	
2	i	<p>What is an “Electronic Health Record”? Give its benefits. Marking scheme: 1M for EHR and 2M for benefits (any 4)</p> <p>Definition: An electronic health record (EHR) is a digitally recorded systematized collection of patient and population health information. These records can be exchanged throughout many health-care settings. Records are exchanged via networked, enterprise-wide information systems or other information networks and exchanges.</p> <p>Advantages/ Benefits of Electronic Health Record (any 4)</p> <ol style="list-style-type: none">1. EHR provides a summary of the various healthcare events in the life of a person.2. It collects all accurate and complete information from patient records which help to provide evidence – based treatment.3. Patient information can be accessed from any place.4. Data can be easily captured or transferred from one device to another.5. Errors can be reduced with Electronic Health Record(EHR) systems as all the information is capable of reading easily which further reduces the risk of miscommunication between system users.6. EHR systems can be connected directly to medical devices which trigger alerts upon a significant change in a patient's health.7. The EHR systems maintain patients' information in a more secure manner compared to paper based systems.	3M



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		<p>8. EHR increases accuracy and faster diagnosis that determines the most suitable medications for diseases, and monitoring the patient's health in the future.</p> <p>9. It helps to avoid repeating unnecessary investigations.</p> <p>10. EHRs useful for tracking and monitoring diseases.</p> <p>11. EHR helps in selecting the most efficient paths of treatments.</p> <p>12. It provides effective, safe and efficient healthcare services, and decreases cost of health care.</p> <p>13. It reduces cost through decreased paperwork, improved safety, reduced duplication of the testing & improved health.</p> <p>14. Enhancing privacy & security of patient data.</p> <p>15. Helping providers more effectively diagnose patients, reduce medical error and provide safer care.</p>	
2	j	<p>What is Pharmaceutical Care? Describe its elements. Marking scheme: 1M for Definition and 2 M for elements</p> <p>Definition:</p> <p>Pharmaceutical care is the responsible provision of drug therapy for the Purpose of achieving definite outcomes that improves a patient's quality of life.</p> <p>PRINCIPLE ELEMENTS OF PHARMACEUTICAL CARE:(any 4)</p> <p>1.Responsibility of patient care: The pharmacist should accept the responsibility of care of the patient.</p> <p>2.Provision of care: The pharmacist should behave with the patient in such a way that the patient should feel the caring attitude of the pharmacist.</p> <p>3.Caring nature of pharmacist: It is the central piece of the</p>	3M



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		<p>pharmaceutical care.</p> <p>4.Positive Outcomes: The pharmacist should take care of medicines, an medication monitoring to produce positive outcomes to the patients.</p> <p>5.To improve the quality of life of patients.</p> <p>6.Data collection: Collect relevant data of patient for further medical care.</p> <p>7.Additional services: The pharmacist also measures the blood pressure, blood glucose level, weight, height etc.</p> <p>8.Evaluation of information: The pharmacist must evaluate collected information for further medication management.</p> <p>9. Maintain a professional relationship with patients, so that patients can access pharmaceutical care at all times.</p> <p>10. Monitoring and modifying plan to get positive outcomes:</p> <p style="text-align: center;"><u>OR</u></p> <p>Principle elements to provide quality pharmaceutical care:(any 4)</p> <p>1. Pharmacists should have knowledge & skill in pharmaceutical care & accept the responsibility of patient care.</p> <p>2. Pharmacists should be in direct contact with patients so patients feel the care attitude of pharmacists. A caring nature of nurse & physician is given the most important pharmaceutical care.</p> <p>3. Commitment to quality assessment & improvement procedures, many factors are responsible for deciding the quality of life such as socio economic status, educational background, social & business contact & health of all these health status of a person is a major factor for deciding a person's quality of life.</p>	



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		<p>4. Outcome oriented pharmacy practice that requires the pharmacist to work in contact with patients & other health care providers that promote health, to prevent disease, to monitor drug therapy & make it effective & safe.</p> <p>5. System for data collection, documentation & transfer of information</p>	
2	k	<p>What are LASA Drugs? Give importance to the listing of LASA Drugs.</p> <p>Marking scheme: 1 ½ M for explanation and 1 ½ M for importance of LASA Drugs: These medications are visually similar in physical appearance or packaging and names of medications that have spelling similarities and/or similar phonetics. It means medicines have a similar look or similar names but different drugs or strength.</p> <p>LASA look or sound are similar to each other, either by their generic name or brand name. for example, Prozac sounds a lot like Prilosec when said out loud.</p> <p>Few Examples: Ephedrine- Epinephrine. Lantus -Lente. Taxol – Taxotere. LASA drugs lead to potential medication errors.</p> <p><u>Following are importance strategies for listing LASA drugs</u></p> <p>As LASA drugs have potential to create confusion so these drugs are listed carefully to prevent medication errors and potential harm to the patients.</p> <p>1. changes in the appearance of labeling and packaging of LASA medicines, paying special attention to their differences ,for example the use of uppercase-lowercase letters, boldface or coloured letters to highlight the differences between names; coloured labeling and contrasting background</p> <p>2. inclusion of stickers with security symbols or pictograms on the packaging</p> <p>3. bar-code-assisted medication administration</p> <p>4. changing order and separate storage of products with similar name, with special attention in case of medicines with narrow therapeutic margin.</p>	3M



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3		Attempt the following	20 M
3	a	Give the long form of NABH Ans : National Accreditation Board for Hospitals and Healthcare Providers.	1M
3	b	For hospitals with bed strength 300, the number of pharmacist requirements is _____. Ans: ii) 10	1M
3	c	_____number of copies of purchase order are prepared . Ans : 7	1M
3	d	Define High Risk drugs. Definition : High risk medications are drugs that have a heightened risk of causing significant patient harm when they are used in error. OR High risk drugs are the drugs that have a high risk of causing harm to patient when misused	1M
3	e	Which method is not suitable for Cytotoxic drug disposal. Ans : iii) Medium temperature incineration	1M
3	f	Define an Ambulatory patient.-Ans : Patients who are able to walk and receive primary healthcare and walk away from hospitals are called Ambulatory patients.	1M
3	g	Define Bulk compounding.	1M



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		<p>Bulk Compounding is defined by the FDA as the combination, mixing or alteration of drug ingredients to create medications tailored to individual patient needs.</p> <p>OR</p> <p>Bulk Compounding is “the preparation and supply of a single unit of a product intended for immediate use by a specific consumer which cannot be fulfilled by a commercially available product.”</p> <p>OR</p> <p>When one or more prescribers in an area use the same compounded prescription repeatedly, pharmacists will sometimes make batches of the product to use when prescriptions are received. that is called as bulk compounding</p>	
3	h	<p>What does GRP stand for?</p> <p>Ans : Good Radiation Practices /Good Radio pharmacy Practice</p>	1M
3	i	<p>Define Clinical Pharmacy.</p> <p>Clinical pharmacy is a branch of pharmaceutical science which deals with various aspects of patient care, not only with dispensing of drugs, but advising the patient on rational selection and safe use of drugs.</p> <p>OR Baker(1976) has defined Clinical pharmacy as pharmacist involvement in monitoring patient therapy and giving advice which directly influences the decisions about drug therapy and the way in which it is administered.</p> <p>OR Clinical pharmacy is a newborn discipline that carries a traditional hospital pharmacist from a product oriented approach to a healthier patient oriented approach to ensure maximum well-being while on drug therapy.</p>	1M



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3	j	Give english translation for following Latin terms- (½ mark each) i) Pulvis - Powder ii) Auristillae - Ear drops	1M
3	k	Dictionaries and encyclopedias are _____ sources of Drug Information . Ans : Tertiary	1M
3	l	_____are the pastes with a base of Kaolin and Glycerine for external application in warm conditions. Ans : Poultices	1M
3	m	Lower level of serum TSH indicates_____. Ans : Hyperthyroidism	1M
3	n	Spirometry test is performed to assess the disease associated with which organ ? Ans : Lungs	1M
3	o	Normal blood sugar level is_____mg%. Ans: 80-120mg%	1M
3	p	Bilirubin increase in - Ans : iv) All of the above	1M
3	q	Antidote for organophosphorus compound poisoning is - Ans :ii)Atropine	1M



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Q. No.	Sub No.	Answers	Marking Scheme
3	r	<p>Define anti- natal care.</p> <p>Antenatal care is the routine health care of pregnant women without symptoms (screening), in order to diagnose diseases or complicating obstetric conditions without symptoms. <u>OR</u></p> <p>It is care for protecting the health of pregnant women. <u>OR</u></p> <p>It is care provided to the expecting mother from time of conception until the beginning of labour</p>	1M
3	s	<p>Define Pharmacovigilance.</p> <p>Pharmacovigilance is “defined as the pharmacological science relating to the detection, assessment, understanding and prevention of adverse effects, particularly long term and short term adverse effects of medicines.”</p> <p><u>OR</u></p> <p>Pharmacovigilance is the pharmacological field which deals with the detection, assessment, understanding and prevention of unintended effects, adverse drug reactions or any other possible medication errors, caused by pharmaceutical product.</p>	1M
3	t	<p>Post marketing surveillance of medicine is the function of -</p> <p>Ans : iii) National Pharmacovigilance centres</p>	1M