

ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2023
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALISATION PAPER FOR PHARMACY

Date	: October 7, 2023
Total Marks	: 100
Writing Time	: 150 minutes (2.5 hours)
Reading Time	: 15 Minutes (prior to writing time)

GENERAL INSTRUCTIONS:

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are not permitted to write during this time.
3. This paper consists of **TWO SECTIONS**, namely SECTION A & SECTION B:
 - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions
Part II - 4 Short Answer Questions
All questions under SECTION A are **COMPULSORY**.
 - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the question of your choice.
4. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
5. All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the correct Section, Part and Question Number will **NOT** be evaluated and no marks will be awarded.
6. Begin each Section and Part in a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. **You must hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **8 printed pages**, including this instruction page.

GOOD LUCK

SECTION A

PART I: Multiple Choice Questions [30 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Select an antibiotic which possess activity against an anerobic pathogen from the following.
 - a) Phenoxymethylpenicillin
 - b) Trimethoprim + sulfamethoxazole
 - c) Metronidazole
 - d) Ceftriaxone
2. According to the US-FDA (Food Drug Authority), the pregnancy category of losartan is
 - a) A
 - b) B
 - c) C
 - d) D
3. Which of the following vitamin is considered water insoluble vitamin?
 - a) Vitamin C
 - b) Vitamin B complex
 - c) Vitamin E
 - d) All of the above
4. Which of the following is considered as the universal antidote?
 - a) Atropine
 - b) N-acetylcysteine
 - c) Flumazenil
 - d) Activated charcoal
5. Identify the SSRI (selective serotonin reuptake inhibitor) from the following list
 - a) Venlafaxine
 - b) Fluoxetine
 - c) Lithium
 - d) Imipramine
6. Which of the following anti-parkinson agent is recommended to be used for the treatment of hyperprolactinemia?
 - a) Levodopa
 - b) Selegiline
 - c) Bromocriptine
 - d) Amantadine
7. Clonidine is _____, which causes reduction in HR, BP and renal vascular resistance.
 - a) Alpha 1 agonist
 - b) Alpha 2 agonist
 - c) Alpha 1 antagonist
 - d) Alpha 2 antagonist

8. Which of the following adverse effect of chlorpromazine and phenothiazine is explained by their dopaminergic action?
 - a) Extrapyramidal syndrome
 - b) Dry mouth
 - c) Constipation
 - d) Eruptions

9. Adding adrenaline to lidocaine solution for a subcutaneous administration can prolong the duration of local anesthesia by
 - a) causing precipitation of lidocaine.
 - b) decreasing permeability of the vascular epithelium.
 - c) inducing local vasoconstriction.
 - d) changing the pH of the solution.

10. _____ is an agent used in preventing the withdrawal symptoms and reducing the cravings without inducing euphoria and sleep.
 - a) Chlorpromazine
 - b) Haloperidol
 - c) Diazepam
 - d) Buprenorphine

11. Which group of antibiotics has the nephrotoxic property in normal renal function?
 - a) Aminoglycoside
 - b) Beta-lactams
 - c) Macrolides
 - d) Quinolones

12. A diuretic agent which inhibits carbonic anhydrase enzyme in the proximal tubular epithelial cell:
 - a) Furosemide
 - b) Amiloride
 - c) Acetazolamide
 - d) Hydrochlorothiazide

13. Which antibiotic results in the formation of crystalluria?
 - a) Ceftriaxone
 - b) Sulfamethoxazole
 - c) Metronidazole
 - d) Nitrofurantoin

14. Among the following ARV (anti-retroviral) agents, select an agent which induces renal impairment.
 - a) Tenofovir
 - b) Efavirenz
 - c) Dolutegravir
 - d) Zidovudine

15. Identify an agent which doesn't belong to the category of mucosal protective agents.
- Bismuth subsalicylate
 - Sucralfate
 - Misoprostol
 - Domperidone
16. Indicate the peripheral dopa decarboxylase inhibitor from the following.
- Carbidopa
 - Entacapone
 - Selegeline
 - Clozapine
17. A 19-year-old male presents to ER (emergency room) with a bacterial meningitis. Which of the following cephalosporin is recommended to be initiated in this patient?
- Cefuroxime
 - Cephalexin
 - Ceftriaxone
 - Cefotaxime
18. Indicate an agent recommended to be used in the treatment of ADHD (attention deficit hyperactivity disorder).
- Olanzapine
 - Clozapine
 - Amitriptyline
 - Methylphenidate
19. Which of the following statement is **INCORRECT** concerning the Sod. Valproate?
- Recommended in all forms of seizure
 - Causes thrombocytopenia and hepatotoxicity
 - Recommended as a prophylaxis and treatment in manic episodes in patient with bipolar disorder unresponsive to lithium
 - Considered safe during pregnancy
20. Which antibacterial agent causes "Red man syndrome" if infused rapidly?
- Piperacillin
 - Vancomycin
 - Clindamycin
 - Amikacin
21. Local adverse effect of inhaled corticosteroids is
- Maculopapular rash
 - Cellulitis
 - Oral candidiasis
 - SJS (Steven Johnson syndrome)
22. Which of the following anti-flatulent agent is added in antacid?
- Simethicone
 - Sucralfate
 - Misoprostol
 - Alginic acid

23. The most preferred treatment option in infants with the mild diaper dermatitis is
- Acyclovir ointment
 - Zinc oxide paste
 - Clotrimazole ointment
 - Nystatin paste
24. Alcohol is recommended to be completely avoided while taking metronidazole due to serious adverse effect known as
- Serotonergic syndrome
 - Hypertension crisis
 - Disulfiram like reaction
 - Severe hypernatremia
25. A patient diagnosed with TB and treated with the oral isoniazid developed muscles aches, paresthesia and unsteadiness. Indicate the vitamin recommended to reverse these symptoms.
- Vitamin A
 - Vitamin B1
 - Vitamin B6
 - Vitamin K
26. A patient advised to take amoxicillin, clarithromycin and pantoprazole. What is the most likely condition considering the combination?
- Antibiotic associated colitis
 - IBS (irritable bowel syndrome)
 - NSAIDs induced gastritis
 - H. pylori induced gastritis
27. Identify the **CORRECT** mechanism of action of Ondansetron.
- 5-HT₃ receptor blocker
 - Dopamine receptor blocker
 - H₂ receptor blocker
 - Muscarinic receptor blocker
28. Which of the following is a proper dietary counseling for patients being treated with the warfarin?
- Avoid all foods containing vitamin K
 - Avoid excessive alcohol intake as it decreases the effectiveness of warfarin
 - Maintain consistent dietary vitamin K intake
 - Maintain current dietary intake because vitamins and supplements interact with warfarin
29. Methadone is considered in the treatment programs of narcotic addiction. What is the category of this medicine?
- Psychotropic agent
 - Opioid analgesic
 - NSAIDs
 - Benzodiazepines

30. A 30-year-old man is brought to ER (emergency room) after ingesting a large but unknown quantity of acetaminophen. The use of NAC (N-acetylcysteine) is considered in this patient based on the goal of
- Inhibiting drug absorption
 - Increasing drug elimination
 - Decreasing target receptor binding
 - Inactivating a toxic metabolite

PART II – Short Answer Questions [20 marks]

This part has FOUR Short Questions carrying 5 marks each. Answer ALL the questions.

1. Explain the mechanism involved in food-drug interaction at the metabolism level. Give one example.
2. Explain three types of mechanism with examples how bacteria develop resistance against the antibiotics.
3. Enlist five objectives of NEML (National Essential Medicines List).
4. Describe any three methods used in the quality testing of tablets.

SECTION B: Case Study [50 marks]

Choose either CASE I OR CASE II from this section. Each case carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE I

A 54-year-old woman previously diagnosed with the T2DM (Type-2 Diabetes Mellitus) returns to the diabetic clinic for her scheduled follow up with a chronically elevated blood glucose. At her last visit 3 months ago, her HbA1C was 7.6%, where it had been for several visits. She was recommended to begin treatment with insulin. She was advised to administer insulin soluble 0.4 units/kg/day SC divided q8hr. She was then advised to increase her dose of oral glipizide from 5 mg to 10 mg once a day and advised her to more strictly follow her diet and exercise regimen, which she claims to be doing. Since the last visit, her home fingerstick glucose levels have ranged from 119 mg/dL to 263 mg/dL (6.6 to 14.6 mmol/L) and her weight on her home scale is unchanged at about 98 kg. She describes increased thirst and urination but denies blurry vision, nonhealing ulcers, or lethargy.

At the diabetic clinic, a fingerstick glucose test on arrival today shows glucose level of 221mg/dL (12.27 mmol/L) and hemoglobin A1C 8.1%; urine dipstick is normal.

- **General:** Increased thirst and is drinking more water. Appetite is normal and her weight at home has been unchanged for several months. She denies lethargy, fever, chills, or night sweats.
- **Skin:** No rash, pruritus, or lesions
- **Pulmonary:** No cough, shortness of breath, wheezing
- **Cardiovascular:** No chest pain, pressure, or discomfort; no orthopnea, dyspnea on exertion, or paroxysmal nocturnal dyspnea.
- **Gastrointestinal:** No abdominal pain, nausea, vomiting, diarrhea
- **Genitourinary:** Increased urinary frequency without urgency, dysuria, or blood in urine. No vaginal discharge or itching.
- **Musculoskeletal:** No joint or muscle pain, no sores or lesions on feet.
- **Neurologic:** Has numbness and tingling in both feet that comes and goes throughout the day. No headache, tremor, change in gait.

- **Psychiatric:** No mood swings, depression, or anxiety.
- **Medical history:** Hypertension, type 2 diabetes mellitus, hyperlipidemia, and obesity
- **Surgical history:** Cholecystectomy 5 years prior
- **Medications:** Metformin 1000 mg po q12 hourly, atorvastatin 80 mg po q24 hourly, glipizide 5 mg po q24 hourly, Enalapril 10 mg po q24 hourly, Aspirin 75 mg po q24 hourly, Clopidogrel 75 mg po q24 hourly, all of which she claims to be adhering 100%.
- **Allergies:** Penicillin, which causes maculopapular rash.
- **Family history:** Father died from myocardial infarction at age 89 years, mother age 88 years has type 2 diabetes mellitus, hypertension, and hyperlipidemia.
- **Social history:** Patient works as a social worker, has never smoked cigarettes, denies any illicit drug use, drinks 1 to 2 glasses of wine with dinner every night. She rides a stationary bike about 1 to 2 days per week for 20 minutes, which she has been able to do without difficulty.
- **Vital signs:**
 - Temperature: 37° C
 - Pulse: 82 min
 - BP: 159/88 mmHg
 - Respirations: 12/min
- **Skin:** There is velvety smooth hyperpigmentation in neck folds and under arms; no other lesions or rash.
- **Cardiovascular:** Regular rate and rhythm; no murmurs, gallops, or rubs. Jugular venous distention normal.
- **Gastrointestinal:** Obese abdomen, soft, non-distended, normal bowel sounds, no rebound or guarding
- **Genitourinary:** No signs of yeast infection or other lesions. No tenderness to flank percussion.
- **Musculoskeletal:** No peripheral edema, swelling or tenderness. Joints full range of motion and nontender.
- **Neurologic:** Decreased sensation to light touch in feet bilaterally. Cranial nerves II to VIII grossly intact, normal gait, strength 5/5 throughout.
- **Mental status:** Alert and oriented x3

Answer the following questions based on the above information.

1. The above patient claimed that her adherence is 100%. Do you agree or disagree and why? (2)
2. Explain the mechanism of action of insulin (3).
3. Provide the following patient education/counselling on the use of insulin soluble;
 - a) Storage condition (2)
 - b) Administration time with respect to meal and why (2 + 2)
 - c) Two common side effects of insulin (2)
4. Enlist three microvascular complications related to diabetes mellitus (3)
5. From the patient's medication history, explain the pharmacology (mechanism of action, maximum daily dose and common side effects) of atorvastatin. Also mention the specific timing of atorvastatin and why? (5 + 4).
6. Explain the pharmacologic role of omeprazole in the patient (2).
7. Carefully review the medication list of the patient and identify one serious drug – drug interaction and explain the mechanism involved (2 + 4).
8. In the above patient, explain the pharmacologic role of Aspirin (2).

9. Explain two reliable methods used to assess adherence to chronic medicines other than asking the patients directly (6).
10. As a pharmacist, provide a detailed patient education and counseling (medication timing, common adverse side effects) on the use of following medicines (3 + 3).
 - a) Metformin
 - b) Glipizide
11. As per the patient's medical history, the patient is allergic to penicillin antibiotic. Explain the cross-reactivity of penicillin group of antibiotics (3).

CASE II

Mr. XXX is the Head, Department of Pharmacy, JDWNRH since 2017. As a head of the department, he is focused on the following activities to enhance the efficiency of pharmaceutical care services in the country.

- Developing the national essential medicines list in the country
- Rational use of antibiotics
- Standardization of prescription in the country
- Standardization of error prone abbreviation of medicines
- DIS (Drug information services)
- DUE (Drug use evaluation)
- TDM (Therapeutic drug monitoring)
- Stock management

Answer the following questions;

1. Explain how you can enhance the optimum utilization of NEML (national essential medicine list) among the prescribers and pharmacist (4).
2. Draw your own flowchart/process how to ensure rational use of antibiotics in the hospital and explain how it can prevent the emergence of antibiotic resistance in the country (8)
3. Explain the importance of standardization of prescription in the country (4)
4. Enlist some of the error prone abbreviations encountered across the hospitals (4)
5. Currently, the hospitals in Bhutan failed to establish a standard DIS to assist prescribers and patients. Explain your ideas with a clear and detailed flow-chart on how to establish a complete DIS in the hospital (8).
6. Enlist the category of medicines which are generally recommended to be evaluated on its use. Also explain the impact or positive outcomes of DUE for the country (3 + 3).
7. Explain the therapeutic index, toxicity and sub-therapeutic level of a drug with a graphical representation (6).
8. Enlist six medicines which are recommended to undergo therapeutic drug monitoring and explain why (3 + 2).
9. Draw your own flow-chart (i.e., standard operating procedure) on how to ensure effective and efficient stock management system in the hospital (5)