

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2019
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALISATION PAPER FOR PHARMACY

Date	: October 13, 2019
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 questions 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 are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **10 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. Which of the following antidepressants does not require dose adjustment in renal impairment?
 - a) Duloxetine
 - b) Fluoxetine
 - c) Sertraline
 - d) Venlafaxine
2. What is the purported advantage of Tenofovir alafenamide (TAF) over Tenofovir disoproxil fumarate (TDF)?
 - a) Less risk of nephrotoxicity.
 - b) Longer half life.
 - c) Additional activity against Hepatitis C virus.
 - d) Demonstrated safety in Children below 10 years.
3. Which of the following directly acting antivirals is effective against all subtypes of Hepatitis C virus?
 - a) Daclatasvir
 - b) Ledipasvir
 - c) Sofusbuvir
 - d) Veltapasvir
4. Which of the following is NOT an indication of metformin?
 - a) Type I diabetes
 - b) Type II diabetes
 - c) Infertility
 - d) Obesity
5. What is the elimination half life of warfarin based the general population pharmacokinetics?
 - a) 2 - 6hrs
 - b) 6 - 12 hrs
 - c) 12 - 24 hrs
 - d) 24 - 60 hrs
6. Which of the following anti-asthmatic agents is not effective as an inhalation?
 - a) Beta agonist
 - b) Antimuscarinic agent
 - c) Methylxanthines
 - d) Steroids

7. Which of the following adrenergic agonist is cardioselective?
- Dobutamine
 - Epinephrine
 - Isoprenaline
 - Phenylephrine
8. All of the following about atorvastatin is correct, EXCEPT
- It decreases de novo synthesis of cholesterol through inhibition of HMG-CoA reductase.
 - It is best taken at bed time.
 - It is an inducer of CYP450 enzyme complex.
 - It has pleiotropic effect on the cardiovascular system.
9. Which of the following macrolides has a good activity against *Helicobacter pylori*?
- Azithromycin
 - Clarithromycin
 - Erythromycin
 - Roxithromycin
10. What is the general dosing recommendation for polymixin B, when given intravenously?
- 15,000-25000units/kg/day once daily.
 - 25,000-50000 units/kg/day once daily.
 - 15,000-25000units/kg/day in two divided doses.
 - 25,000-50000 units/kg/day in two divided doses.
11. What is the serum trough level recommended for gentamicin?
- 1-2mg/L
 - 2-4mg/L
 - 4-8mg/L
 - 4-12mg/L
12. Which of the following conditions is once daily dosing of gentamicin NOT recommended?
- Pneumonia
 - Endocarditis
 - Septicaemia
 - Urinary tract infection
13. Which of the following conditions is deficiency of α 1-antitrypsin a risk factor?
- Asthma
 - Chronic obstructive lung disease
 - Sinusitis
 - Quinsy
14. All of the following drugs affect the renin-angiotensin aldosterone system, EXCEPT
- Aliskiren
 - Enalapril
 - Losartan
 - Methyldopa

15. Which of the following is not an indication of cholinesterase inhibitors?
- Neuromuscular blockade
 - Parkinson's disease
 - Dementia
 - Myasthenia gravis
16. Which of the following stage of cell division is vincristine specific to?
- M phase
 - G₀ phase
 - G₁ phase
 - S phase
17. Which of the following antibiotics is suitable for chemoprophylaxis of meningococcal meningitis in pregnant women?
- Azithromycin
 - Ceftriaxone
 - Ciprofloxacin
 - Rifampicin
18. Which of the following should be monitored when initiating sodium valproate?
- Liver function
 - Renal function
 - Thyroid function
 - Cognitive functions
19. Following are some of the mechanism of actions attributed to anti-epileptic drugs:
- Increase GABA transmission
 - Interfere with Glutamate release
 - Blocks voltage-gated Na⁺ channel
 - Block T type Ca⁺⁺ channels
- Which of the above mechanism of actions are relevant to Lamotrigine?
- I & II
 - II & III
 - II & IV
 - III & IV
20. Which of the following dopamine pathway, when inhibited is responsible for extrapyramidal side effects?
- Mesolimbic
 - Mesocortical
 - Nigrostriatal
 - Tubero-infundibular

21. Mixture consisting of two compounds that are completely miscible in the liquid state but only to a certain extent in the solid state is referred to as _____.
- Simple mixture
 - Complex mixtures
 - Eutectic mixture
 - Entropic mixture
22. Which pharmacological class of medicines does the ophthalmic colour code pink represent?
- Steroids
 - Anti-infectives
 - Beta blockers
 - Mydiatics
23. Which of the following dosage form is rotary-die machine used for?
- Compressed tablet
 - Hard gelatin capsule
 - Soft gelatin capsule
 - Lozenge
24. Cellulose acetate phthalate and polyvinyl acetate phthalate are best suited for use in which of the following coating process?
- Enteric coating
 - Film coating
 - Sustained-release coating
 - All of the above.
25. How is paracetamol structurally unique from that of general NSAIDs?
- It has 4-OH substitution.
 - The aromatic ring is unsaturated.
 - It lacks carboxylic function and therefore, neutral.
 - It lacks polar linking group.
26. Which of the following is not a part of the chemical structure of acetylcholine?
- Quarternary ammonium group
 - Ethylene bridge
 - Benzene ring
 - Ester group
27. Which of the following is the correct biological source of Ergot?
- Dried sclerotium of *Claviceps purpurea* developed on rye plants
 - Dried sclerotium of *Claviceps purpurea* developed on rice plants
 - Dried sclerotium of *Claviceps paspali* developed on rye plants
 - Dried sclerotium of *Claviceps paspali* developed on rice plants

28. In VEN analysis, what does letter 'V' stand for?
- Valuable
 - Vital
 - Vibrant
 - Vulnerable
29. What type of climate does Zone IVa conditions represent according to the ICH guidelines for stability studies?
- Temperate zone
 - Sub-tropical zone
 - Hot dry zone
 - Tropical zone
30. According to the Medicines Act of the Kingdom of Bhutan 2003, all the medicinal products are required to be registered with the Drug Regulatory Authority. Which of the following is NOT the condition for requirement of registration of a medicinal product with the Authority?
- Manufacture
 - Sale
 - Import
 - Research

PART II – Short Answer Questions (20 marks)

This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.

1. There is much hype about legalizing use of cannabis for medicinal purpose in some countries. Summarize the current evidence available on efficacy and safety of cannabis in various medical conditions in question? (5 marks)
2. There is a lack of consensus on how the dietary supplements are to be regulated. A product considered to be a dietary supplement and regulated as food in one country may be regulated as therapeutic good or even a controlled substance in another country. Give your views on how Bhutan should approach regulation of dietary supplements. (5 marks)
3. What do understand by the AWARE classification of antibiotics? Describe with suitable examples how antibiotics are classified according to the classification system. (2+3 marks)
4. Discuss the pharmacology of at least TWO new anti-TB drugs which have been included in the mainstream treatment of MDR-TB. (5 marks)

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

Aum Dago, a 58 year old woman was brought to the Emergency Department after she became short of breath while attempting to climb stairs at her home. She had been gaining weight and having progressively worsening dyspnoea on exertion over last 5 days. Her past medical histories include type 2 diabetes, hypertension, and hypercholesterolemia. Her current medications include the following:

- a) Metformin 1g PO twice daily
- b) Glipizide 5mg PO once daily
- c) Atorvastatin 20mg PO once daily
- d) Hydrochlorothiazide 25mg PO once daily

Upon physical examination, fine crackles were heard in both the lungs. An echocardiogram revealed left ventricular hypertrophy with ejection fraction estimated at 20%. Her blood pressure was 155/89mmHg and her heart sounds were normal. Following are some of the recent laboratory test results:

Haemoglobin	12g/dL	(13.0-18.0)
WBC	$7.8 \times 10^3/\mu\text{L}$	(4.0 – 11 x 10 ³)
Platelets	$140 \times 10^3/\text{L}$	(150 – 450 x 10 ³)
Plasma sodium	142mEq/L	(135 -145)
Plasma potassium	4.3mEq/L	(3.5 – 4.5)
Plasma urea	12mg/dL	(15 – 45)
Plasma creatinine	1.1mg/dL	(0.8 – 1.4)
Plasma glucose (random)	131mg/dL	(110 - 160)
Glucose Random	168mg/dL	(79-140)
HbA1C	6.9%	<6

She was diagnosed as a case of new-onset congestive heart failure. She was shifted to the medical ward and was initiated on treatment of heart failure.

Her prescription on discharge reads as follows:

- a) Enalapril 5mg PO twice daily
- b) Metoprolol 25mg PO once daily
- c) Furosemide 40mg PO twice daily
- d) Metformin 1g PO twice daily
- e) Glipizide 5mg PO once daily
- f) Atorvastatin 20mg PO once daily

Answer the following questions:

1. What are the signs and symptoms that indicate the presence and severity of the heart failure? What would be the current stage of the heart failure of Aum Dago, according to the New York Heart Association classification? (3 + 2 marks)
2. What could be the causes of heart failure for Aum Dago? Could it be drug therapy related? Justify. (3+2 marks)
3. Discuss the general goals of treatment of heart failure? (3 marks)
4. Why do you think hydrochlorthiazide was omitted after initiation of treatment for heart failure? (2 marks)
5. Aum Dago is also a diabetic patient. What drug therapy issues do you anticipate in optimizing treatment of her diabetes with the new diagnosis of heart failure? (3 marks)
6. Discuss the current evidence on use of ACE inhibitors in treatment of heart failure? (5 marks)
7. Beta blockers are to be used with gradual up-titration. Why? (2 marks)
8. Which beta blockers are recommended for use in treatment of heart failure? (3 marks)
9. What is the role of loop diuretics in treatment of heart failure? How should the dosing frequency of furosemide be spaced out to ensure there is minimal sleep disturbance? (3 + 2 marks)
10. Do you think the control of diabetes was well optimized during the recent past? Justify your answer. (1 + 2 marks)
11. Do you think Aum Dago is a good candidate for initiation of oral digoxin? Justify (2 marks)
12. Discuss other therapeutic options available for treatment of heart failure. (5 marks)
13. Discuss the non-pharmacological treatment of heart failure. (5 marks)
14. What is the maximum daily dose of enalapril that can be used in heart failure? (2 marks)

CASE II

Dorji is a 55-year-old man who has come to the medical OPD with a 3-day history of worsening shortness of breath, subjective fevers, chills, right-sided chest pain, and a productive cough. The patient states that his initial symptom of shortness of breath began approximately 1 week ago. After several days of not feeling well, he went to the local pharmacy and was given paracetamol and an over-the-counter cough and cold preparation. But he feels that his symptoms are worsening every passing moment. He looked fairly disoriented and anxious. He was admitted to the Medical Ward immediately by the examining physician.

His past medical history includes hypertension (15 years) and COPD (10 years). He used to be a heavy smoker but managed to stop smoking 10 years ago. Following are the medications he was on, prior to admission:

Losartan 25mg mg PO once daily

Hydrochlorothiazide 12.5 mg PO once daily

Salbutamol MDI two inhalations PRN shortness of breath

Paracetamol 500mg po Q 6 h PRN pain

Guaifenesin/dextromethorphan (100 mg/10 mg/5 mL) 2 teaspoonfuls Q 4 h PRN cough

Following are the results of the investigations carried out:

Physical Examination

Vitals: BP 156/90, P 127, RR 31, T 39.1°C;

Lungs: Tachypneic, laboured breathing; coarse rhonchi diffusely throughout right lung fields; decreased breath sounds in right middle and lower lung fields;

Cardiovascular: Audible S1 and S2; tachycardic with regular rhythm

Laboratory

Haemoglobin	12.6g/dL	(13.0-18.0)
WBC	17.8 x 10 ³ /μL	(4.0 – 11 x 10 ³)
Platelets	220 x 10 ³ /L	(150 – 450 x 10 ³)
Plasma sodium	140mEq/L	(135 -145)
Plasma potassium	4.3mEq/L	(3.5 – 4.5)
Plasma urea	12mg/dL	(15 – 45)
Plasma creatinine	1.1mg/dL	(0.8 – 1.4)

Chest X-Ray: Right middle and lower lobe airspace disease, likely pneumonia. Left lung is clear. Heart size is normal.

Sputum Gram Stain: Gram (+) cocci in pairs;

Sputum Culture: Pending

He was diagnosed as probable multi-lobar community-acquired pneumonia (CAP) and was put on antibiotic therapy.

Answer all the questions:

1. What clinical, laboratory, and radiographic findings are consistent with the diagnosis of CAP in this patient? (3 marks)
2. Can CURB-65 scoring be used for calculating the severity of pneumonia for Dorji with the information provided above? Justify. (1+ 2 marks)
3. What are the common causative bacteria of CAP? (2 marks)

4. Sputum gram stain has indicated 'Gram (+) cocci in pairs'. Is the finding consistent with the common causative bacteria of CAP? (2 marks)
5. What are the goals of pharmacotherapy in the treatment of CAP? (2 marks)
6. Which antibiotic(s), dose and route of therapy is the most appropriate for Dorji? (3 marks)
7. What are other alternative antibiotics that could be considered? (3 marks)
8. When is it appropriate to convert from IV to oral therapy? (2 marks)
9. Enlist how Hospital-acquired Pneumonia (HAP) is different from CAP. How does the empirical choice of antibiotics differ for treatment of HAP? (3+2 marks)
10. Does his past medical history of COPD have any bearing on his current issues? (2 marks)
11. What other supportive management do you think will Dorji require in addition to antibiotic therapy? (3 marks)
12. Do you think the treatment of his COPD require optimization? (3 marks)
13. Which agent should be considered if his symptoms of COPD are not controlled by PRN Salbutamol MDI? (3 marks)
14. Describe the steps involved in use of Metered Dose Inhalation (MDI) device. (5 marks)
15. To what pharmacological category of antihypertensives does hydrochlorothiazide belong? Give its mechanism of action.(2+3 marks)
16. Which of the prior medicines that he was on should be stopped upon discharge? (2 marks)
17. What can be done to prevent pneumonia in susceptible population? (2 marks)

TASHI DELEK