

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2021
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALISATION PAPER FOR PHARMACY

Date	: October 31, 2021
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 must hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **9 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. What does therapeutic index indicate?
 - a) Efficacy
 - b) Potency
 - c) Safety
 - d) Toxicity

2. What is the effect on V_{max} and K_m in non-competitive inhibition?
 - a) V_{max} increases while the K_m remains unchanged
 - b) V_{max} remains unchanged while the K_m increases
 - c) V_{max} decreases while the K_m remains unchanged
 - d) V_{max} remains unchanged while the K_m decreases

3. All of the following are the effect or pathways through which G-protein coupled receptors function, EXCEPT
 - a) Adenylyl cyclase: cAMP pathway
 - b) Ion channel regulation
 - c) Gene expression regulation
 - d) Phospholipase C: IP_3 -DAG pathway

4. Which one of the following agents causes 'dissociative anaesthesia'?
 - a) Ketamine
 - b) Midazolam
 - c) Propofol
 - d) Thiopental sodium

5. What is the daily dose of folic acid supplementation recommended for prevention of neural tube defect?
 - a) 0.4mg
 - b) 4mg
 - c) 40mg
 - d) 400mg

6. Which of the following conditions is use of cannabidiol supported by RCT evidences?
 - a) Huntington's disease
 - b) Lennox-Gastaut syndrome
 - c) Sturge Weber syndrome
 - d) Turner's syndrome

7. Which of the following is the drug of choice for malignant hyperthermia?
 - a) Clonidine
 - b) Dantrolene
 - c) Etomidate
 - d) Prilocaine

8. Agonistic effect for which of the following opioid receptor is responsible for euphoria?
 - a) Delta
 - b) Epsilon
 - c) Kappa
 - d) Mu

9. Activity of all the following skeletal muscles can be blocked by neostigmine, EXCEPT
 - a) Atracurium
 - b) Rocuronium
 - c) Suxamethonium
 - d) Vecuronium

10. Which of the following diuretics is indicated for the treatment of hirsutism?
 - a) Chlorthalidone
 - b) Ethacrynic acid
 - c) Indapamide
 - d) Triamterene

11. Bromocriptine is indicated in all of the following, EXCEPT
 - a) Acromegaly
 - b) Galactorrhea
 - c) Grave's disease
 - d) Parkinson's disease

12. Which of the following beta blockers is used to manage symptoms of thyroid storm?
 - a) Atenolol
 - b) Carvedilol
 - c) Metoprolol
 - d) Propranolol

13. Which of the following anti-diabetic agents is not likely to cause hypoglycaemic symptoms?
 - a) Biguanides
 - b) Insulin
 - c) Meglitinides
 - d) Sulfonylureas

14. Which of the following is not a side effect of steroid?
 - a) Diabetes
 - b) Hypotension
 - c) Osteoporosis
 - d) Telengectesia

15. Which of the following anti-epileptics can cause gum hypertrophy?
- Carbamazepine
 - Gabapentin
 - Phenytoin
 - Sodium valproate
16. Which of the following anti-epileptics is not an inducer of cytochrome P450?
- Carbamazepine
 - Gabapentin
 - Phenobarbitone
 - Phenytoin
17. What is the optimal serum level of lithium recommended for maintenance treatment of bipolar disease?
- 0.6 – 1.2 mEq/L
 - 1.2 – 1.8 mEq/L
 - 1.8 – 2.4 mEq/L
 - 2.4 – 3.0 mEq/L
18. Which one of the following about nitrofurantion is TRUE?
- It is a narrow spectrum antibiotic.
 - No dose adjustment is required in renal impairment.
 - It is known to cause pulmonary fibrosis
 - It causes discolouration of urine.
19. Ampicillin has activity against all the organisms, EXCEPT
- Enterococcus faecium*
 - Listeria monocytogenes*
 - Streptococcus pyogenes*
 - Klebsiella pneumonia*
20. Which of the following protozoal infection is pyrimethamine + sulfadiazine, a drug of choice?
- Giardia lamblia*
 - Leshmaniasis donovani*
 - Pneumocystis jiroveci*
 - Toxoplasmosis gondii*
21. Which of the following monoclonal antibodies does not match with the indication provided?
- Bevacizumab – Multiple myeloma
 - Cetuximab – Colorectal cancer
 - Rituximab – Non-Hodgkin lymphoma
 - Tratuzumab –Breast cancer
22. First-pass metabolism happens in the liver for all the following, EXCEPT
- Benzylpenicillin
 - Cimetidine
 - Nitroglycerine
 - Propranolol

23. Which of the following poisoning is dimercaprol (BAL) contraindicated?
- Arsenic
 - Iron
 - Lead
 - Mercury
24. Following are the mechanisms through which antidiabetic agents work:
- Inhibition of glycogenolysis
 - Stimulation of glucose uptake and utilization
 - Inhibition of intestinal glucose absorption
 - Inhibition of reabsorption of glucose from the renal tubule
- Which mechanisms correspond to that of metformin?
- i, ii & iii
 - ii, iii & iv
 - i, ii & iv
 - i, iii & iv
25. Which of the following types of allergic reaction is cell-mediated?
- Type I
 - Type II
 - Type III
 - Type IV
26. What is the biological source of powder locally known as “Yungwa”?
- Dried rhizome of *Curcuma longa*
 - Dried inner bark of *Cinnamomum tamala*
 - Dried fruit of *Capsicum annuum*
 - Dried fruit of *Zanthoxylum armatum*
27. What is the ideal HLB range recommended for surfactants to be used as an emulsifying agent for water in oil emulsion?
- 0 – 3
 - 4 – 6
 - 7 – 9
 - 10 – 18
28. What is the Rotary-Die process used for?
- Compressed tablets
 - Hard gelatin capsule
 - Soft gelatin capsule
 - Suppository

29. Which of the following lubricants concentration is required higher than 1% in the tablet manufacturing process?
- a) Glyceryl behanate
 - b) Polyethylene glycol
 - c) Stearic acid
 - d) Talc
30. According to the Bhutan Medicines Rules and Regulations 2012, under which schedule are traditional medicines classified?
- a) A
 - b) D
 - c) E
 - d) F

PART II – Short Answer Questions [20 marks]

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

1. There are concerns that poor access to essential medicines in developing countries are being exacerbated by implementation of intellectual property rights. Discuss. (5 marks)
2. Enlist all the known B vitamins. Give the indications and dosing range for at least TWO of B vitamins. (2+3 marks)
3. Describe the principles of IR spectroscopy. What are the applications of IR spectroscopy in pharmaceutical analysis? (2+3 marks)
4. Fill in the blanks with correct medical gas or colour coding of cylinders as per the Indian Standard for colour identification coding for medical gas cylinders in the table below. (5 marks)

	Gas	Colour code
1	Air
2	Blue
3	Carbon dioxide
4	Black body with white shoulders
5	Nitrogen

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

Tshewang, a 48-year-old man presents to a community pharmacy with complaints of heartburn for four to five times a week over the last few months. Other symptoms includes episodes of regurgitation with an acidic taste in his mouth. The heartburn and regurgitation usually occurs after meals and occasionally between meals. These symptoms often wake him up at night. He has no difficulty swallowing. He has been taking Digene™ syrup upon the recommendation of the pharmacist during his last visit to the pharmacy. He is looking for other medication that could ‘completely relieve’ his ongoing symptoms.

He was diagnosed GERD and prescribed with ranitidine 150mg along with the routine medications during the last review with the physician. His past medical history include hypertension and hypercholesterolemia. He is an occasional drinker and currently smokes two sticks per day on an average. He is currently on the following medications:

- Losartan 50mg once daily
- Aspirin 75mg once daily
- Atorvastatin 20mg once at bed time
- Ranitidine 150mg twice daily for 2 weeks

Answer the following questions:

1. What is GERD? What are the common symptoms? (2+3 marks)
2. How his symptoms correlate with the disease severity? Is there any alarm symptoms present? (3+2 marks)
3. What are the common causes of GERD? What are the factors contributing to the development of GERD symptoms for Tshewang? (3+2 marks)
4. What are the goals of pharmacotherapy for his current clinical conditions? (2 marks)
5. What drug therapy issues can you identify for Tshewang? What changes would you recommend in his drug therapy, if any? (3+2 marks)
6. Should this patient be given an alternative empiric drug therapy over-the counter? Discuss pharmacotherapeutic alternatives available for treatment of GERD. (2+3 marks)
7. What are the factors that would compel you to refer this patient to the physician for further evaluation? (3 marks)
8. What is the link between *H. Pylori* and GERD? Should he be given treatment for eradication of *H. Pylori* if he tests positive for it? (2+3 marks)

9. Digene™ contains the following:

- i. Aluminium hydroxide gel
- ii. Magnesium hydroxide
- iii. Simethicone

Answer the following:

- a) How do the inorganic salts help in relieving the symptoms of GERD? (2 marks)
 - b) Why are the salts of aluminium and magnesium combined in the antacid formulation? (2 marks)
 - c) What is the mechanism of action of simethicone? (1 mark)
10. What is the mechanism of action of prokinetic agents? Discuss the role of prokinetic agents in treatment of GERD. (2+3 marks)
11. Discuss the non-pharmacological interventions Tshewang can consider. (5 marks)

CASE II

Mrs Karmo, a 46-year-old lady presents to Emergency Department with complaint of fever, chills and shortness of breath. Her symptoms started about 2 weeks ago. She had undergone incision and drainage of a skin abscess a month ago.

Upon examination by the physician on duty, her blood pressure was found 148/88mmHg, heart rate 112bpm, respiration rate 26 and temperature 39.0°C. S₁ and S₂ were normal, while S₃ and Systolic murmur was heard. Her ECG revealed non-specific T wave changes. Transesophageal echocardiography showed vegetation on mitral valve with regurgitation.

Her past medical histories include diabetes mellitus (10 years) and hypertension (12 years). She is allergic to penicillins.

Following are some of the laboratory parameters:

Haemoglobin	11.5g/dL	(11.0-16.0)
WBC	6.2 x 10 ⁹ /L	(4.0 – 11 x 10 ⁹)
Platelets	280 x 10 ⁹ /L	(150 – 450 x 10 ⁹)
Plasma sodium	136mmol/L	(135 -145)
Plasma potassium	6.5mmol/L	(3.5 – 4.5)
Plasma urea	6mmol/L	(3.3 – 6)
Plasma creatinine	1.5mg/dL	(0.8 – 1.4)
Plasma glucose (random)	172mg/dL	(110 - 160)
Alkaline phosphatase	210IU/L	(<140)
Alkaline aminotransferase	60IU/L	(<59)
Bilirubin	62µmol/L	(<59)

Her blood cultures were positive for *Staphylococcus aureus*. She was diagnosed as *S. aureus* endocarditis with hyperkalaemia and renal insufficiency. She was empirically started on intravenous vancomycin with dose adjusted for her renal insufficiency. Susceptibility testing subsequently showed the organism to be sensitive to oxacillin and vancomycin.

Answer the following questions:

1. What is endocarditis? What are the signs and symptoms that indicate presence of endocarditis in the patient? (2+3 marks)
2. What risk factors does Mrs Karmo have in developing infective endocarditis? (3 marks)
3. Enlist the common organisms (other than *S. aureus*) implicated in infective endocarditis? (2 marks)
4. What are the goals of pharmacotherapy for endocarditis? (3 marks)
5. Discuss the empirical treatment choices of antibiotics for native valve endocarditis. How is the treatment approach for prosthetic valve endocarditis different from native valve endocarditis? (3+2 marks)
6. Why do you think cloxacillin is not being used for Mrs Karmo despite *S. aureus* being sensitive to oxacillin? (2 marks)
7. Do you think vancomycin is appropriate antibiotic choice for Mrs Karmo? Why is dose adjustment required for vancomycin in renal insufficiency? (3+2 marks)
8. What is the mechanism of action of vancomycin? Describe its antimicrobial spectrum. (2+3 marks)
9. Enlist the adverse effects associated with vancomycin. What are the clinical and laboratory parameters that should be monitored to avoid adverse effects with vancomycin? (3+2 marks)
10. What is vancomycin flushing syndrome? How can it be prevented? (2+3 marks)
11. What is the recommended trough concentration of vancomycin? (2 marks)
12. What could have contributed to hyperkalaemia in this patient? (3 marks)
13. Who are at high risk of developing infective endocarditis? What are the scenarios in which antibiotic prophylaxis should be considered to prevent endocarditis? (3+2 marks)

TASHI DELEK