

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2016  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALIZATION PAPER FOR PHARMACY**

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Date: 2 October 2016  
Total Marks: 100  
Examination Time: 150 minutes (2.5 hours)  
Reading Time: 15 minutes (*prior to examination time*)

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**GENERAL INSTRUCTIONS**

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is being provided to check the number of pages, printing error, clarify doubts and to read instructions in Question Paper. You are NOT permitted to write during this time.
3. This paper consists of **TWO Sections, namely Section A and 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 2 case studies. Choose only **ONE** case study and answer the questions under 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 correct Section, Part and Question Number will NOT be evaluated and no marks would 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. The Question 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 (c). 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 beta blockers does not require dose adjustment in renal impairment?
  - a. Atenolol
  - b. Bisoprolol
  - c. Nebivolol
  - d. Metoprolol
  
2. Which of the following should be known, to determine the loading dose of a drug?
  - a. Elimination half life & AUC
  - b. Apparent volume of distribution & desired drug plasma concentration
  - c. AUC & peak plasma concentration
  - d. Fraction of drug eliminated unchanged in urine
  
3. Which of the third generation cephalosporins is highly protein bound?
  - a. Ceftazidime
  - b. Ceftriaxone
  - c. Cefotaxime
  - d. Cefpodoxme
  
4. Which of the following antibiotic's bactericidal effect is concentration-dependent?
  - a. Vancomycin
  - b. Ampicillin
  - c. Amikacin
  - d. Ceftazidime
  
5. All of the following statements about olanzapine are correct, EXCEPT:
  - a. It is an atypical antipsychotic.
  - b. It is metabolized by CYP450 oxidation.
  - c. It can cause weight gain.
  - d. It is contraindicated in mania.
  
6. Which of the following antiviral agent is also useful in Parkinson's disease?
  - a. Amantadine
  - b. Ganciclovir
  - c. Ribaverin
  - d. Oseltamivir

7. Which of the following is a NOT a pro-drug?
- Carbimazole
  - Enalapril
  - Clopidogrel
  - Nifedipine
8. All the following statements pertaining to volume of distribution ( $V_D$ ) are true, EXCEPT:
- Drugs with higher rate of ionization have larger  $V_D$
  - Drugs which are highly protein bound have smaller  $V_D$ .
  - Drugs with high lipid solubility have larger  $V_D$
  - Polar drugs have smaller  $V_D$
9. Which of the following interaction can lead to decrease in therapeutic effect of the either drug?
- Erythromycin and fluconazole
  - Rifampicin and nevirapine
  - Alcohol and antihistamines
  - Simvastatin and gemfibrozil
10. Mr. A 42/M, a type II diabetes patient is on following medication:
- Metformin 1gm twice daily
  - Glipizide 5mg twice daily
  - Enalapril 5mg daily
  - Atorvastatin 20mg daily
- On his recent visit, his serum creatinine was found to be 1.5mg/dL, an increase by 0.3mg/dL in a month. Which drug is the chief suspect?
- I
  - II
  - III
  - IV
11. Which of the following is not an indication of carbonic anhydrase inhibitors?
- Glaucoma
  - Altitude sickness
  - Ocular hypertension
  - Motion sickness
12. Which of the following drugs do not correspond to their long term complications?
- Metoclopramide: Extrapiramidal side effects
  - Lithium: Nephropathy
  - Amiodarone: Thyrotoxicosis
  - Spironolactone – Gynaecomastia

13. Following are the statements about Piperacillin

- I. It is an unredipencillin.
- II. It is an extended-spectrum penicillin and act mainly against gram positive organisms.
- III. It has anti-pseudomonal activity.
- IV. It is usually combined with tazobactam.
- V. It is available both as oral and parenteral formulations.

Which of the two statements above are FALSE?

- a. I & II
- b. I & III
- c. III & IV
- d. II & V

14. Decreased level of one of the following lipoproteins is associated with increased risk of acute coronary syndrome:

- a. LDL
- b. HDL
- c. VLDL
- d. Triglyceride

15. Which of the following antihypertensives is  $\alpha_2$  adrenergic receptor agonist?

- a. Clonidine
- b. Oxymetazoline
- c. Prazosin
- d. Phenylephrine

16. Which of the following diuretics act mainly at the proximal renal tubule?

- a. Loop diuretics
- b. Thiazide diuretics
- c. Aldosterone antagonist
- d. None

17. Which of the following is both substrate and inhibitor of CYP450?

- a. Warfarin
- b. Rifampicin
- c. Carbamazepine
- d. Fluoxetine

18. All the following are risks associated Hormone Replacement Therapy, EXCEPT:

- a. Venous thromboembolism
- b. Osteoporosis
- c. Dementia
- d. Breast cancer

19. Which of the following counselling point is NOT relevant to warfarin?
- Take each dose at the same time of the day.
  - Maintain consistent diet intake.
  - Report signs of bleeding (bleeding gums, haematuria, bruising, malaena, etc).
  - Avoid food rich in vitamin K.
20. Which of the following is an antidote for methanol poisoning?
- Ethanol
  - Acetylcysteine
  - Penicillamine
  - Ethylene glycol
21. One of the following laxatives is also used for prophylaxis and treatment of hepatic encephalopathy:
- Sennosides
  - Lactulose
  - Bisacodyl
  - Ispaghula husk
22. Which of the following iron salts has the highest elemental iron content per milligram?
- Ferrous fumarate
  - Ferrous gluconate
  - Ferrous sulphate
  - Dried ferrous sulphate
23. Which of the following anticancer agent is associated with high incidences of emetogenicity?
- Vincristine
  - Etoposide
  - Bleomycin
  - Cisplatin
24. Which of the following doses of cefixime is the most appropriate for treatment of uncomplicated gonorrhoea?
- 400mg single dose , orally
  - 400mg twice daily for 5 days, orally
  - 400mg single dose, by IM injection
  - 400mg twice daily for 5 days , by IM injection
25. One of the following agents can cause disulfiram-like reaction when taken with alcohol:
- Rifampicin
  - Doxycycline
  - Metronidazole
  - Cloroquine

26. Which of the following antifungal agents do not contain triazole ring in its chemical structure?
- Clotrimazole
  - Fluconazole
  - Posaconazole
  - Voriconazole
27. Which of the following biological sources do not correspond to the major chemical compounds produced?
- Diocorea sp.*: Steroid
  - Glycyrrhiza glabra*: Tannin
  - Datura stramonium*: Glycoside
  - Rawolfia serpentina*: Alkaloid
28. Goldbeater's skin test is an identification test for which of the following class of compounds?
- Glycosides
  - Tannins
  - Monoterpenes
  - Alkaloids
29. Which of the following is NOT a criteria that an over-the-counter drug must satisfy:
- It must be safe
  - It must be effective
  - It must be cheap
  - It must be useful in conditions that the patients can manage without supervision of a health professional.
30. "Testing of drug is done on healthy volunteers, often in sub-therapeutic dose to check whether the drug is safe for check of efficacy". Which of the following phases of clinical trial correlates well with the statement?
- Phase I
  - Phase II
  - Phase III
  - Phase IV

**PART II – Short Answer Questions (20 marks).**

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

- Describe the mechanism of action of NSAIDs. Enlist (at least 4 each) their indications and class-related adverse effects, respectively. (3 + 2)

2. What are “Drug enantiomers”? Discuss with a suitable example, the role of enantiomers in pharmacology. (2 + 3)
3. What do you understand by the term P-drug? How do you distinguish P drugs from the concept of Essential drugs? What are the benefits of having P-drugs? (1+ 2 + 2)
4. What do you understand by the term “Bioequivalence”? Discuss the setting in which principle of bioequivalence is applied. (2 + 3)

## SECTION B

### Case Study

**Choose either Case 1 or 2 from this section. Each case study carries 50 marks.**

#### Case 1

A 78 year old man was admitted to hospital with symptoms of nausea and excessive diarrhoea, which started since three days ago. Medicines on admission included the following:

- i. Digoxin 0.25mg once in the morning
- ii. Enalapril 5mg twice daily
- iii. Furosemide 40mg twice daily
- iv. Erythromycin 500mg four times daily (started 5 days ago)
- v. Fluoxetine 40mg once daily

His past medical history included heart failure, anxiety and depression.

On admission, he was found to be confused. He was frequently passing loose stools and vomited on one occasion. He appeared dehydrated and lethargic. His blood pressure was 130/80 mmHg and his pulse was regular at 96 beats per minute. His body temperature was 37.8 degree Celsius.

His laboratory investigations revealed the following data:

Haemoglobin	13.5g/dL	(13.0-18.0)
WBC	15.2 x 10 <sup>9</sup> /L	(4 x 11 x 10 <sup>9</sup> )
Platelets	250 x 10 <sup>9</sup> /L	(150 – 450 x 10 <sup>9</sup> )
Plasma sodium	145mmol/L	(135 -145)
Plasma potassium	4.5mmol/L	(3.5 – 5)
Plasma urea	19.5mmol/L	(3.3 – 6)
Plasma creatinine	4.1mg/dL	(0.8 – 1.4)
Plasma glucose (random)	131mg/dL	(110 - 160)
Alkaline phosphatase	165IU/L	(<140)
Alkaline aminotransferase	47IU/L	(<59)
Bilirubin	15µmol/L	(<59)

An initial diagnosis of acute renal failure secondary to dehydration was made. He was started on intravenous sodium chloride 0.9%, 500ml every 4 hours.

Answer the following questions:

- a) Which of the above laboratory test data is relevant to the diagnosis of acute renal failure?  
(1 mark)
- b) Explain the link between acute renal failure and diarrhoea? (2 marks)
- c) What do you think is the probable cause of diarrhoea? Could it be drug induced? If so, discuss the possible drug related cause(s)? (4 marks)
- d) Enlist the causes of acute renal failure. (4 marks)
- e) Describe the role of digoxin, enalapril and furosemide in treatment of heart failure.  
(6 marks)
- f) Describe the symptoms of heart failure. (5 marks)
- g) Discuss the evidence of Angiotensin Converting Enzyme inhibitors in treatment of heart failure? What is the maximum daily dose of enalapril that can be given in heart failure?  
(4 marks)
- h) What are the other antihypertensives that can be used in heart failure? Discuss in sufficient detail, at least three of them. (5 marks)
- i) Furosemide has been prescribed as a twice daily regimen. Discuss how you would you space the timing of administration of each dose in a day? (2 marks)
- j) Recommend the lifestyle and dietary changes required for the patient. (2 marks)
- k) To what pharmacological category does fluoxetine belong? Why do you think the patient is receiving it? (2 marks)
- l) Do you see any significant drug interaction in his prescription? If so, describe the scenario of drug interaction. What changes would you recommend in the prescription?  
(5 marks)
- m) Which drug (that the patient is on) can cause serotonin syndrome? What are the symptoms?  
(4 marks)
- n) Do you think the patient will need anti-diarrhoeal agent? If so, recommend an anti-diarrhoeal agent appropriate to his condition. (2 marks)
- o) What parameters should be monitored in patients with heart failure (2 marks)

**OR**



**Case 2**

Ms. Khandu, a 58 year old lady is a known case of rheumatoid arthritis (RA). Her past medical histories include hypothyroidism and epilepsy. She has come to the pharmacy for refill of her medications after review by a medical specialist. She is currently on following medications:

- i. Methotrexate 7.5mg once weekly
- ii. Hydroxychloroquine 200mg once daily
- iii. Prednisolone 5mg once daily
- iv. Thyroxine 50mcg once daily
- v. Carbamazepine 200mg twice daily
- vi. Conjugated estrogen 0.625mg once daily
- vii. Folic acid 5mg once daily
- viii. Omeprazole 20mg twice daily

Data of her laboratory investigations are as follows:

Haemoglobin	9.8g/dL	(11.5-16.0)
WBC	10.2 x 10 <sup>9</sup> /L	(4 x 11 x 10 <sup>9</sup> )
Platelets	151 x 10 <sup>9</sup> /L	(150 – 450 x 10 <sup>9</sup> )
Plasma sodium	136mmol/L	(135 -145)
Plasma potassium	4.2mmol/L	(3.5 – 5)
Plasma urea	5mmol/L	(3.3 – 6)
Plasma creatinine	1.1mg/dL	(0.8 – 1.4)
Alkaline phosphatase	133IU/L	(<140)
Alkaline aminotransferase	42IU/L	(<59)
Bilirubin	15µmol/L	(<59)
Thyroid stimulating hormone	0.2mU/L	(0.2 – 5)
Free thyroxine	28pmol/L	(9 – 25)

Answer the following questions:

- a) What is rheumatoid arthritis? What are the signs and symptoms? (5 marks)
- b) What is the role of methotrexate in treatment of RA? Why is folic acid supplementation required with long term methotrexate use? (4 marks)
- c) What are the important adverse effects associated with its long term use of chloroquine? Enlist at least 2 indications other than RA (4 marks)
- d) What is the role of steroids in RA? Does Khandu's past medical history explain possibility of any alternate indication? (3 marks)
- e) Why do you think Khandu is on conjugated estrogen? (2 marks)
- f) What are the risks associated with long term use of estrogen? (4 marks)
- g) Khandu has no medical history of peptic ulcer disease but is on proton pump inhibitor. What could be the possible reason(s)? (2 marks)
- h) Which of the above drug is associated with corneal changes or deposits leading to visual disturbance? How frequently should her vision be checked? (2 marks)

- i) Carbamazepine is an inducer of enzyme cytochrome P450. Which are the drugs in the prescription whose metabolism will be induced? Enlist at least 4 examples of drugs other than carbamazepine (not restricted to the prescription) which can induce cytochrome P 450. (3 marks)
- j) Discuss the clinical manifestations of hypothyroidism? What are the possible causes of hypothyroidism? (5 marks)
- k) When should monoclonal antibodies be considered in treatment of RA? What are the current drawbacks of their use in RA? (3 marks)
- l) What are the options of non pharmacological management of RA that Khandu could consider? (3 marks)
- m) Give counselling points for any of the four medicines below:
  - i. Methotrexate
  - ii. Hydroxychloroquine
  - iii. Prednisolone
  - iv. Thyroxine
  - v. Carbamazepine

The counselling points should include the details of i) whether to be taken with or without food, ii) expected adverse effects and iii) any other advice unique to a particular drug. (10 marks)

\*\*\*TASHI DELEK\*\*\*