ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2018
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALISATION PAPER FOR PUBLIC HEALTH

Date	: 7 October 2018
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 being provided 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 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 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 **13 printed pages,** including this instruction page.

GOOD LUCK

SECTION A

PART I: Multiple Choice Questions

Choose the correct answer and write down the letter of the correct answer chosen in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark.

1. In 1964, the World Medical Association developed a set of ethical principles to guide physicians conducting biomedical research with human subjects. It is called
   a) The Declaration of Belmont
   b) The Declaration of Ottawa
   c) The Declaration of Helsinki
   d) The Declaration of Nuremberg

2. Which one is NOT a part of descriptive study?
   a) Case studies
   b) Case control studies
   c) Case series
   d) Cross sectional studies

3. The risk of lung cancer in human is greater when exposed to both radon and cigarette smoke at the same time. This effect is called
   a) Additivity
   b) Antagonism
   c) Potentiation
   d) Synergism

4. Generally, the levels of disasters are classified into
   a) Two levels
   b) Three levels
   c) Four levels
   d) Five levels

5. The key elements to revitalizing primary health care is
   a) Reform in research and development
   b) Reform in medical product distribution
   c) Reform in the training curriculum of health workers
   d) Reform to increase stakeholder participation

6. Mesothelioma is caused due to prolonged exposure to
   a) Silica
   b) Particulate matter less than 2 microns
   c) Asbestos
   d) Cement

7. Smallpox was eradicated from the world in which year?
    a) 1982
    b) 1977
    c) 1959
    d) 1975

8. Which of the following is used while presenting an epidemiological data?
    a) Pie chart and bar chart only
    b) Line graph and histogram only
    c) Pie chart, bar chart, line graph and histogram
    d) None of the above

9. The shape of Bhutan's Age Pyramid as of 2017 is
    a) Very broad base with a tapering top.
    b) Narrow base with a bulge in the middle.
    c) Broad at top of pyramid.
    d) Tapers off very fast at the top of pyramid.

10. On September 1, 2018, the national newspaper *Kuensel* reported that 11 preterm babies died of Klebsiella pneumonia infection within a span of 19 days in the neonatal intensive care unit at the national referral hospital in Thimphu (JDWNRH). A total of 80 babies were admitted in the NICU in the month of July through 8 August 2018. What is the case fatality rate during the said period?
    a) 1.25%
    b) 2.60%
    c) 4.21%
    d) 5.26%

11. All of the diseases below are nationally notifiable EXCEPT:
    a) Acute watery diarrhoea
    b) Malaria
    c) Dengue
    d) Myocardial Infarction (MI)

12. The purpose of "Double Blind" study is to
    a) avoid interviewee bias and sampling variations.
    b) reduce the effect of sampling variations.
    c) avoid observer and interviewee bias.
    d) achieve comparability of cases and controls.

13. All are true of probability sampling EXCEPT:
    a) Voluntary sampling
    b) Cluster sampling
    c) Multistage sampling
    d) Stratified sampling

14. The "mission" of an organization is
    a) A statement of hope for the future
    b) A statement of guiding principle
    c) A statement for overarching end result
    d) A statement of distinctiveness

15. Amongst the Multilateral Environmental Agreements on Chemicals, Bhutan is signatory to
    a) Minamata Convention on Mercury
    b) Rotterdam Convention on Prior Informed Consent
    c) The Stockholm Convention on persistent organic pollutants
    d) Basel Convention on the Control of trans-boundary movement of hazardous wastes and their disposal

16. In Bhutan, the most common method of diagnosing HIV/AIDS status of a person is through
    a) Voluntary counselling and testing
    b) Routine medical check-up
    c) Sentinel survey
    d) Screening during blood donation

17. In a typical Public Health Program Evaluation, measuring input and output is a part of
    a) Process Evaluation
    b) Outcome Evaluation
    c) Impact Evaluation
    d) Effect Evaluation

18. Which of the following quality improvement tools would best be used to help in the planning and managing quality improvement project?
    a) Brainstorming
    b) Gant Chart
    c) Prioritization Matrix
    d) Voting

19. Name, age, sex, occupation, religion are set of
    a) Ordinal data
    b) Categorical data
    c) Nominal data
    d) Interval data

20. All of the following are examples of quantitative data EXCEPT:
    a) Shorter waiting times
    b) How a patient felt about the care given
    c) Reduced staff turnover
    d) Improved employee safety record

21. The 5S principles of continuous quality improvement in a work place are

    a) Sort, set in order, standardize, spread, sustain
    b) Sort, set in order, shine, seek, standardize
    c) Sort, set in order, shine, standardize, sustain
    d) Shine, standardize, skip, sort, sustain

22. As per the Ambient Air Quality Standards of the National Environment Commission, the maximum permissible limits of the respirable particulate matter (PM 10) in the residential area in a day is

    a) 100 $\mu g/m^3$
    b) 200 $\mu g/m^3$
    c) 300 $\mu g/m^3$
    d) 400 $\mu g/m^3$

23. The vector mosquitoes of dengue is different from malaria vectors as it

    a) bite during the day
    b) bite during night
    c) bite all day and night
    d) breed in manmade containers

24. A "Bias" in research means

    a) the probability of a Type I error in a test of hypothesis.
    b) the probability of a Type II error in a test of hypothesis.
    c) a systemic error that introduces uncertainty in estimates of effect or association.
    d) combination of (a), (b) and (c)

25. An investigator reviewed the medical records of 200 children admitted in the paediatric ward of JDWNRH in the past year who were between the age of 8 and 12 years old, and identified 40 with asthma. He also identified 40 children of the same ages who were free of asthma. Each child and the family were interviewed to assess whether there might be association between certain environmental factors, such exposure to second-hand smoke, and asthma. This study is an example of

    a) Randomized controlled trials
    b) Case control study
    c) Cohort study
    d) Cross sectional study

26. Which one of them is NOT used as a criterion in priority setting of health problems in the community?

    a) Severity
    b) Magnitude
    c) Money
    d) Concern

27. A hypertensive patient reported to the diabetic clinic in JDWNRH for a routine check-up. The health worker found out that he weighed 82 kg with a height of 6 feet. Calculate his BMI?
    a) 20.5
    b) 22.5
    c) 24.5
    d) 26.5

28. The 4 by 4 table of a Logical framework for project execution contains
    a) Outcome in the last column
    b) Inputs in in the last column
    c) Verification means in the last column
    d) Assumptions in the last column

29. Active surveillance involves
    a) Sampling of clinically normal samples
    b) Sampling of clinically affected cases
    c) Sampling of clinically normal samples & clinically affected cases
    d) Sampling in sentinel sites only.

30. In Rheumatic fever, the causative organism is:
    a) Group A Beta - Haemolytic Streptococcus
    b) Group B Beta - Haemolytic Streptococcus
    c) Group A Beta - Haemolytic Staphylococcus
    d) Group B Beta - Haemolytic Staphylococcus

PART-II: Short Answer Questions (20 marks)

Answer ALL the questions. Each question carries 5 marks. Mark for each sub question is indicated in brackets.

Question 1:

a) Define health, public health and global health? (1 mark)

b) What are some examples of global health issues? (1 mark)

c) What are the sustainable development goals and how do they relate to health? (1 mark)

d) What were some of the keys to the eradication of smallpox? What lessons does the smallpox eradication program suggest for other public health programs? (2 marks)

Question 2:

a) If you could only pick one indicator to describe the health status of Bhutan, which indicator would you use and why? (1 mark)

b) Why is it valuable to have composite indicators like DALYs to measure the burden of disease? (1 mark)

c) As countries develop economically, what are the most important changes that occur in their burden of disease? Why do these changes occur? (2 marks)

d) In Bhutan, what population groups have the worst health status and why? (1 mark)

Question 3:

a) What is a health system? Describe its functions? What are the building blocks of a health system? (2 marks)

b) What is the relationship between a country's expenditure on health as a share of national income and its health status? (1 mark)

c) What is the difference between "diseases" and "illness"? (1 mark)

d) Explain in brief the "Health Belief Model"? (1 mark)

Question 4:

a) Define environmental health? Give some examples of key environmental health issues? (2 marks)

b) What are some of the most cost effective investment that should be made to improve the health of women in Bhutan? (1 mark)

c) Give one example each of emerging, re-emerging infectious diseases and antimicrobial resistance by disease? (1 mark)

d) Of so many key actors for health in Bhutan, what are the main functions of WHO, UNICEF, UNFPA and UNAIDS? (1 mark)

SECTION B

Case Study

Choose either Case I OR II from this section. Each case study carries 50 marks.

Case I

Prevalence of Thiamine and Cobalamin Deficiency in Boarding School Children from Districts of Bhutan with History of Peripheral Neuropathy Outbreaks

Between 1998 and 2012 there had been a total of 14 Peripheral neuropathy (PN) outbreaks and the majority of these outbreaks, including the last 7 outbreaks, had been reported from among the boarding school children of seven districts in Bhutan. The first mortality as a result of PN outbreak occurred in the December 2011 in Orong Higher Secondary School. Two school children died and 34 more were admitted at a Samdrup Jongkhar district hospital. The deaths of the two schoolchildren were reported to be caused by beriberi which is a deficiency disease of thiamin. This was based from the sick student's response with thiamin treatment, inadequate micronutrients including thiamine and cobalamin in the school menu and a lab test which showed borderline thiamin level despite being supplemented with the vitamin. Based on the investigation reports, the neuropathies were suspected to be caused by nutritional deficiencies, the most likely being thiamine deficiency. Cobalamin deficiency was also suspected to be highly prevalent in these schoolchildren owing to their poor dietary intakes of animal sourced proteins. Therefore; this study was conducted with the aim to generate evidence for the status of thiamine and cobalamin deficiencies in the boarding schoolchildren from districts of Bhutan with previous history of PN outbreaks.

In order to ascertain the variation in the whole-blood concentration of thiamine throughout the school academic year, data was collected from four study periods (SP). SP1 and SP3 corresponded to the time when the schoolchildren just joined the school at the start of the school academic year and after the short summer break respectively. The blood nutrient levels in the two study period was indicative of the adequacy of nutrient intakes at home. SP2 was the period that represented the first half of the school academic year while SP4 represented the second half. The blood nutrient levels in SP2 and SP4 was indicative of the adequacy of nutrients intake while in schools. Whole blood thiamine was assessed in all four study periods while serum cobalamin was assessed only in the fourth study period. Dietary intake of nutrients was determined in all the study periods as below.

Characteristics			**Study Period**			
			1	**2**	**3**	**4**
		Req.				
Thiamine	Deficiency	-	50.58 %	90.13 %	91.8 %	79.82 %
	Dietary intake (mg)	0.9	0.77	0.65	0.71	0.57
Cobalamin	Deficiency	-	-	-	-	64.7 %
	Dietary intake (µg)	0.9	0.61	0.11	0.42	0.07

Answer the following questions. Please indicate the case study question numbers clearly.

1. Discuss, interpret and infer the result of this study? (10 marks)

2. Based on the findings of the study, what recommendations would you offer to the Ministries and school management for the benefit of the students of boarding schools in Bhutan? (5 marks)

3. In most of the health studies, sample size determination formula developed by S Lemeshow & SK Lwanga is widely used. Illustrate the formula for calculating the sample size?

   In one such study, a confidence interval of 95% was decided, with margin of error 0.05 and a standard deviation of 0.5. Further, a drop-out rate/refusal rate of 5% was expected in the study. Using the above formula, calculate the sample size required for the study. (10 marks)

4. Describe the determinants of nutritional status? (6 marks)

5. What are the most important micronutrient deficiencies and what health problems do they cause? (4 marks)

6. What is the importance of nutrition to the SDGs? (3 marks)

7. What are stunting and wasting? (2 marks)

8. What factors are causing the "epidemic" of diabetes worldwide? (3 marks)

9. What are the most important causes and risk factors for cancers in Bhutan? (4 marks)

10. What are some of the healthcare services offered for cancer patients in Bhutan? (3 marks)

CASE II

You are working in Bumthang district as an assistant district health officer. As a trained public health professional, you had observed that the health, hygiene and sanitation status, and disaster preparedness in the monastic institutions in Bumthang is deplorable. Since then, you had always aspired to improve the health status and disaster preparedness of monks/nuns through a targeted intervention program. However, before you start any public health interventions, you wanted to collect data from the monastic institutions to substantiate your claim. As always, there is no adequate funds from the government to support your ideas. Coincidently, in a recent *Kuensel* advertisement it had come to your notice that an NGO working in Bhutan is willing to fund the assessment study of the monastic institutions with the following terms and conditions.

Term of Reference for the assignment (TOR)

A. Background

The Bhutan Health Partners - a not for profit organization in collaboration with the Department of Disaster Management, Ministry of Home and Cultural Affairs, Ministry of Health and Ministry of Education, with support from ECHO, has been implementing consecutive disaster risk reduction and preparedness projects in Bhutan, especially for the Education Sector.

the development and endorsement of Ministry of Education's Disaster Management and Contingency Plan in 2016 and with sustained efforts at schools level, all schools and Early Childhood Care and Development Centers (ECCD) have functional and trained personnel. However, within this scenario, monastic schools and institutions remain a vulnerable section in need of urgent risk reduction and increased disaster preparedness.

The monastic schooling system is categorized into Primary, Secondary and Tertiary College. Currently there are 200 registered monastic schools and 3 nunneries (there are 30 nunneries across the country) in the country, housing over 12,000 novices in the monastic schools, with 1.5% being 6 -12 years old children.

Monastic schools and institutions often serve as refuge for poor, disabled and very young children. They often live in unhygienic conditions due to inadequate WASH facilities and practices and in old vulnerable traditional structures located in remote and usually inaccessible areas.

Within this context, under the 3rd round of ECHO project, in collaboration with the Ministry of Education, Dratshang Lhentshog and the Department of Disaster Management; Bhutan Health Partners developed and implemented a pilot disaster risk management and capacity building program in 4 monastic schools in 2016. In the pilot program, in addition to the development of a DRM program, appropriate teaching and learning/awareness materials were developed for monastic schools in the form of stories and posters in Dzongkha and English.

B. Purpose of the need assessment

The purpose of the situation analysis/needs assessment study in the monastic institutions is to acquire a better understanding of the needs of the monastic schools in terms of WASH, Protection, and Disaster Risk Management. The situation analysis/needs assessment study should provide recommendations to inform the formulation of a comprehensive 'resilience' focused program for monastic schools and institutions.

C. Scope of the study

The study will be conducted in two pilot Dzongkhags of Bumthang and Paro Dzongkhag and cover all government and privately owned monastic institutions and schools, including nunneries in the two Dzongkhags.

The study should provide, but not limit to collecting, assessing and presenting the following data/ information:

1) Information on **existing policies** related to the governing of monastic schools and institutions;

2) **General information** in the 2 pilot districts:
   - Number of monastic institutions, schools, including nunneries (government and private);
   - Number of monks and nuns (disaggregated by age; per institutions/ school);
   - Number of children with disabilities (disaggregated by sex, age and impairment per school/ institute);
   - Number of orphaned children (by sex and age per school/institute);
   - Number of children with single parents (by sex and age per school/institute);
   - Number of children from broken families (by sex and age per school/institute); and
   - Number of children with any health condition (by sex, age, condition per school/ institute).

3) **Disaster risk management related information**
   - Information in terms of school/ institution's accessibility/ location;
   - Availability or lack of communication;
   - History of impact from natural hazards in the schools/ institutions;
   - Existing disaster risk management capacities or gaps, such as – disaster management plans, fire extinguishers, water reservoirs, trained teachers/ students, open grounds, etc.;
   - Information on structures – age, type of building, vulnerabilities observed, use of engineered designs, whether building standards followed; and
   - Level of awareness on risk reduction and protective actions and perceptions on hazard, risk and preparedness.

4) **Protection**
   - Number of schools/ institutes with child protection focal person;
   - Information on disciplinary issues and process of dealing with such issues;
   - System of taking care of younger children;
   - Perception on various forms of abuse (physical, emotional, sexual, bullying, corporal punishment) and process of dealing with such issues; and
   - Level of awareness of the child protection requirement and services.

5) **WASH, Health and Nutrition**
   - Number of schools with access to safe drinking water;
   - Number of schools with access to proper toilets and wash rooms;
   - Level of hygiene in hostels;
   - Number of children in each room;
   - Availability of WASH materials (soap, toothbrush, toothpaste, sanitary pads);
   - Availability of clothing, including undergarments;
   - Access to medical care; and
   - Availability of food/ nutrition requirement.

6) **Challenges and Expectations**
   - Challenges faced by monastic institutions/schools to ensure children are safe, protected, healthy and learning; and
   - Expectations to improve overall well-being of children and teachers.

7) **Conclusions and Recommendations**
   - Identify the main gaps in the focus areas;
   - Provide recommendations and priority activities in the focus areas for improvement and to meet the gaps; and
   - Identify any knowledge/ information gaps and additional research requirements.

D. Duration of assignment: 40 working days between October - November 2018

E. Remuneration: Bhutan Health Partners Country Office will pay the Consultant a reasonable amount as consultancy charges, which are in line with Bhutan Health Partner's hiring policy.

F. Tax: Bhutan Health Partners will deduct 5% tax at source (TDS) as per the Income Tax Act of the Kingdom of Bhutan.

G. For clarification – please contact the office of Bhutan Health Partners at the following email: bhutanhealthpartners@gmail.com.

Against this backdrop of TOR for consultancy assignment, please answer the following questions. Please indicate the case study question numbers clearly.

1. Describe your understanding of the Terms of Reference for this assignment? (5 marks)

2. Write a brief project proposal to the funding agency for their support. The proposal should contain both technical and financial proposal with adequate cost breakdown for the project. What are the methodologies that you would adopt to collect information from the monastic schools in Bumthang Dzongkhag? (20 marks)

3. Prepare a Gantt chart to specify the project activities and time line for completion? (10 marks)

4. What approach would you take to enhance access to better water supplies in monastic institutions and why? (2 marks)

5. What are some of the health problems associated with indoor air pollution in the monastic institutions? (2 marks)

6. Why is it important to promote hand washing? (1 mark)

7. What do you understand by term disaster? What are the health effects of a natural disaster such as a massive earthquake? (3 marks)

8. Bhutan is very much vulnerable to frequent earthquakes. As a health worker, formulate a Disaster Preparedness Plan in order to reduce their health impacts. (3 Marks)

9. Name some climate sensitive diseases? (2 Marks)

10. Describe the symptoms of dengue haemorrhagic fever? (2 Marks)

TASHI DELEK