ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2015
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALIZATION PAPER for *Public Health*

Date	: 11 October 2015
Total Marks	: 100
Examination Time	: 150 minutes (2.5 hours)
Reading Time	: 15 Minutes (prior to examination time)

GENERAL INSTRUCTIONS:

1. Write your Roll 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 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 two Case Studies. Choose only **ONE** case study and answer the questions under your choice.
4. 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 any or correct Section, Part and Question Number will NOT be evaluated and no marks would be awarded.
5. Begin each Section and Part in a fresh page of the Answer Booklet.
6. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
7. Use of any other paper including paper for rough work is not permitted.
8. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
9. This paper has 12 printed pages in all, 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 the correct answer chosen 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. The recent outbreak of Ebola in West Africa sent scares around the world. From public health perspective Ebola as an epidemic is best classified as a
    A. Common- source epidemics
    B. Mixed epidemic.
    C. Propagated epidemics.
    D. Pandemic.

2. Disease X was reported for the first time in a population and was notified to an epidemiologist. In epidemiological concept disease X becomes the
    A. Index case.
    B. Primary case.
    C. Secondary case.
    D. Suspect case.

3. Quarantine include
    A. Screening and separation of healthy individuals.
    B. Separation of individuals who exhibits symptoms from healthy individuals.
    C. Separation of people who have been exposed to an illness.
    D. Separation and treatment of actively ill individuals.

4. Careful arraying of data and sequential assessment of risk and benefit in public health upholds the ethics of
    A. Beneficence.
    B. Deontology.
    C. Respect of person.
    D. Social justice.

5. As per Annual Health Bulletin (AHB) of Bhutan, 2014 diarrheal diseases is reported to be the number one cause of morbidity in and hospitalization of population, especially in summer season. As per descriptive epidemiology the above case best answers the factor of
    A. Why.
    B. Who.
    C. When.
    D. Where.

6. As per AHB, 2014 morbidity attributed to diarrheal diseases was 51373 (in 2013). If a denominator of 765, 735 (total population of Bhutan) is added to the cases, we would get the epidemiological measure called
    A. Count.
    B. Proportion.
    C. Rate.
    D. Ratio.

7. The knowledge of chain of infection helps public health personnel to direct the intervention strategy at
    A. Controlling agents at the source of transmission.
    B. Eliminating agents at the source of transmission.
    C. Protecting portals of entry.
    D. Rehabilitating the host post-exposure only.

8. As a public health personal your main job responsibility would be to
    A. Advocate rigorously the ministry of health strategies.
    B. Bridge the gap between the ministry of health and the local health care workers.
    C. Prevent diseases and promote health.
    D. Provide curative measures to the clients.

9. Gender is a _____ variable.
    A. Continuous
    B. Nominal
    C. Ordinal
    D. Quantitative

10. "Impact of Social support during grieving on life and job satisfaction" . In this proposed study topic the independent variable is
    A. Impact.
    B. Social support.
    C. Grieving.
    D. Life and job satisfaction.

11. The first contact with the pregnant women and instituting antenatal care in Bhutan follows drawing up a table with each row typically representing one pregnant women, and each column representing variables such as Identity, age, education level etc. This type of method of drawing up data is called
    A. Simple data collection.
    B. Basic information of all pregnant women.
    C. Line listing.
    D. Antenatal booking.

12. The importance of pharmacoepidemiology in public health sphere is to
    A. Ensure steady drug supply chain.
    B. Predict and explain the interaction of drugs to patient's health.
    C. Provide an autonomy to the treating physician.
    D. Study the effectiveness of drugs in a health setup.

13. An example of live attenuated vaccine is
    A. Smallpox vaccine.
    B. Chickenpox vaccine.
    C. Human papillomavirus (HPV) vaccine.
    D. Haemophilus influenza.

14. A total of 140 guests was invited to a birthday party. Following day 60 guests developed symptoms of food poisoning. An investigation by a health officer found that the source of infection was the Dal that was served to the guests. It was reported that out of 140 guests only 120 of them consumed dal. Specific attack rate would be then
    A. 30%
    B. 40%
    C. 50%
    D. 60%

15. Topic: "The Effect of working for pay on adolescent Tobacco use" by Ramchand et al. (2007), reported that adolescents who work for pay have higher risk of initiating tobacco use. This is a typical example of
    A. Cohort studies.
    B. Prospective cohort studies.
    C. Retrospective cohort studies.
    D. Experimental cohort studies.

16. An odds ratio (and the lower and upper bound of its 95%CI) of less than 1 suggests
    A. Harmful effect.
    B. No effect.
    C. Protective effect.
    D. The need to repeat the study.

17. Following are the essential environmental public health services EXCEPT
    A. Assure.
    B. Link.
    C. Mobilize.
    D. Treat.

18. Hazardous air pollution (HAPs) is known to cause cancer or other serious ill health effects. One of the contributing factors to HAPs is
    A. Existent of functional mega factories.
    B. Increase in small-medium cottage industries.
    C. Rearing of cattle on large scale.
    D. Deforestation.

19. Presence of nitrogen oxide (PM_{10}) in the air causes
    A. Adverse impact on intellectual development.
    B. Enhanced risk of respiratory problems.
    C. Hypoxia.
    D. Skin cancers.

20. Hypothesis: "Oral contraceptive use cause ovarian cancer". In this study Oral contraceptive is the
    A. Case.
    B. Control.
    C. Exposure.
    D. Outcome.

21. Late maternal death in community can be defined as death of women
    A. While pregnant or within 24 hrs of termination of pregnancy.
    B. From direct or indirect causes within 42 days of termination of pregnancy.
    C. From direct or indirect cause, more than 42 days but less than one year after termination of pregnancy.
    D. From indirect cause, more than one year but less than 24 months.

22. Reproductive-age mortality studies (RAMOS) requires all data sources EXCEPT
    A. Family members interviews.
    B. Health facility records.
    C. Interviewing a representative respondent about the survival of their siblings.
    D. Vital registration.

23. Perhaps the greatest impact of instituting family planning rigorously is
    A. Aging world.
    B. Alleviation of poverty.
    C. Disparity in wealth distribution.
    D. Proper birth-spacing.

24. The structural social determinants commissioned by WHO in 2008 reflects
    A. Inequalities in income.
    B. Access to education.
    C. Heath care and leisure
    D. Condition of work.

25. Identify viral Sexually transmitted infection (STIs)
    A. Gonorrhea.
    B. Genital warts and cervical cancer.
    C. Syphilis.
    D. Chancroid.

26. If the formula $R_o=\beta$ x c x D measure the rate of spread of STIs where
    β - Mean probability of transmission per exposure
    C- Mean rate of sexual partner change within the population
    D- mean duration of infectiousness of the newly infected person
    Then R_o <1 from the above equation would imply that the infection will
    A. Eventually disappears from the population.
    B. Increase in population.
    C. Not require any rigorous screening and treatment.
    D. Enhance the rate of spread of STIs.

27. In a community with high incidence of Malaria, surveillance is carried out to recognize person with disease and ensure that adequate treatment is given. To achieve this objective the data collection should be:
    A. More Frequently.
    B. Sensitive.
    C. Validated.
    D. With minimum bias.

28. Rubella is one of the notifiable disease in Bhutan because of
    A. Likelihood of producing immediate and increased threats to public health.
    B. Increased risk of congenital rubella syndrome.
    C. Low incidence of rubella.
    D. It being vaccine preventable disease.

29. Which of the following is a statistical artifice that always predicts the absence of a relationship between the variable?
    A. Hypothesis.
    B. Null hypothesis.
    C. Theory.
    D. Power.

30. If the P value is <0.05 then one can state that there is
    A. Less than 5 chances in 100 that the result is a false positive.
    B. Less than 5 chances in 100 that the result is false negative.
    C. More than 5 chances in 100 that the result is a false positive.
    D. More than 5 chances in 100 that the result is false negative.

PART II – Short Answer Type Questions (20 Marks)

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

Question 1. ***Alternative Response: True and False (05 Marks)***

Choose the correct option and write down the option of choice against the **SUB-QUESTION** number in the Answer Booklet. E.g 6. True.

1. When calculating attack rate for measles, people who have been vaccinated against it is included in the denominator. (1 Mark)

2. Risk of contracting gonorrhea, syphilis and HPV is higher among circumcised men than among uncircumcised ones. (1 Mark)

3. In epidemiology, ratios are used as descriptive measures and as analytical tool. (1 Mark)

4. Stratified random sampling increases the precision of the sample by guarding against the chance of under- or over-representation of certain groups in the population. (1 Mark)

5. Analytical epidemiology is usually associated with statistical analysis using multiple logistic regressions. (1 Mark)

Question 2:

Column A lists environmental exposure. For exposure, choose from column B adverse effects. Write the letter of the adverse effects on Answer booklet against the number of environmental exposure. E.g 6. G (1 Mark Each)

Column A: Exposure	**Column B: Adverse effects**
1. Thalidomide for morning sickness	A. Neurological damage
2. Diethylstilbestrol (DES) to prevent miscarriage	B. Cancers
3. Radon gas: everyday living	C. Scrotal cancer

4. Lead-based paint, plumbing, lead-tainted toys	D. Carcinogen
5. Aflatoxins: Fungal toxins found in toxins	E. Learning disabilities
	F. Vaginal cancer
	G. Mental retardation
	H. Phocomelia

Question 3:

In the table below Column A has the list of measures used in Public health and epidemiology while Column B contains the formula to calculate the measures. Match Column A to Column B. After matching please write appropriate response in the Answer Booklet. E.g 1. A. (1 Mark each)

Column A	Column B
1. Crude death rate	A. $\frac{Mortality\ (or\ frequency\ of\ a\ given\ disease)}{Population\ size\ at\ midpoint\ of\ time\ period}\ x\ 100{,}000$
2. Crude birth rate	B. $\frac{Number\ of\ persons\ ill}{Average\ poultaion}\ during\ a\ time\ period$
3. General fertility rate	C. $\frac{Number\ of\ persons\ ill}{total\ number\ in\ the\ group}\ at\ a\ time\ point$
4. Age specific rate	D. $\frac{Number\ of\ deaths\ among\ those\ aged\ 5-14\ years}{number\ of\ persons\ who\ are\ aged\ 5-14 years\ (during\ time\ period)}\ x\ 100{,}000$
5. Period prevalence	E. $\frac{Number\ of\ live\ birth\ within\ a\ given\ period}{population\ size\ at\ the\ middle\ of\ the\ period}\ x\ 1{,}000\ population$
	F. $\frac{Nuber\ of\ deaths\ assigned\ to\ causes\ related\ to\ childbirth}{number\ of\ live\ births}\ x\ 100{,}000\ live\ births\ (during\ a\ year)$
	G. $\frac{number\ of\ live\ birth\ within\ a\ year}{Number\ of\ women\ aged\ 15-44\ years\ during\ the\ midpoint\ of\ the\ year}\ x\ 1{,}000\ women\ aged\ 15-44$
	H. $\frac{number\ of\ death\ in\ a\ given\ year}{Reference\ population\ (during\ midpoint\ of\ the\ year)}\ x\ 100{,}000$

Question 4: ***Short answer (05 Marks)***

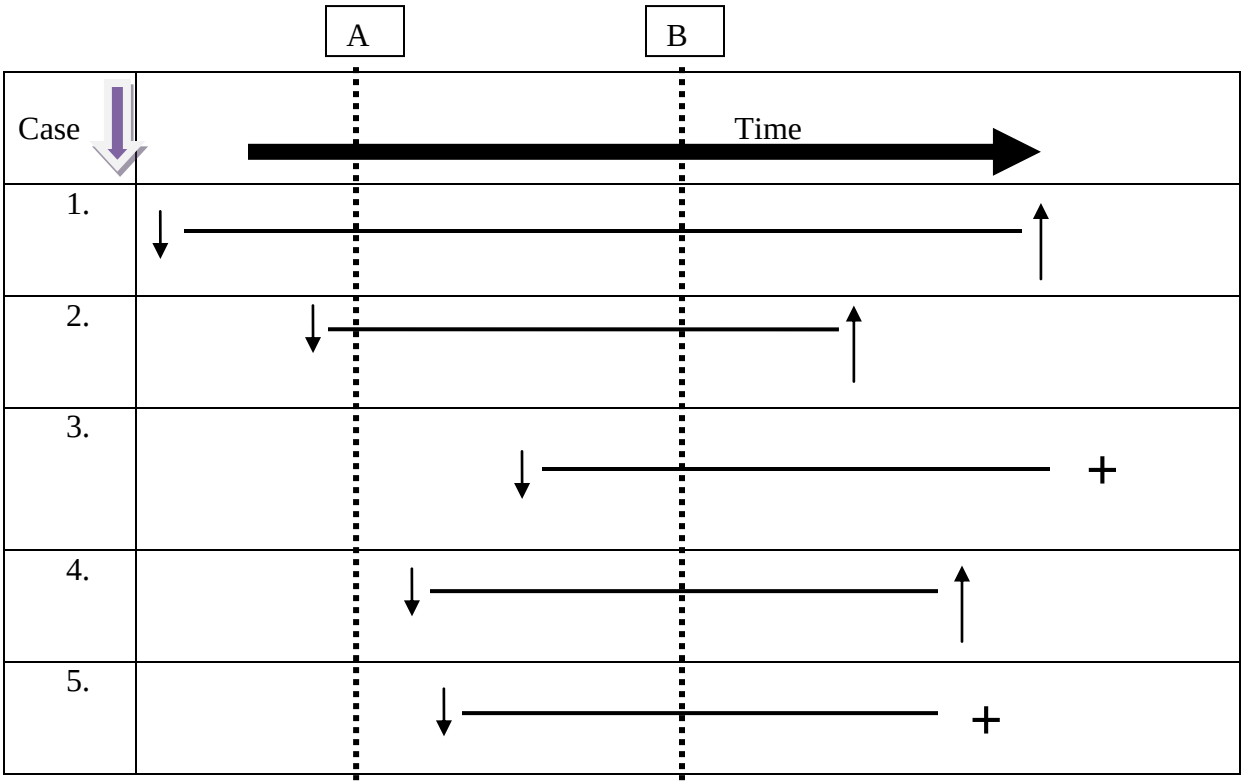
This question has 3 question and sub-question. Marks for each questions are indicated in brackets ( ) against each questions. **ALL** questions are **compulsory**. Write the answers for these questions in the Answer Booklet provided.

1. Define Public Health as defined by Charles Edward Amory Winslow. (1 Mark)

2. A major cause of cervical cancer is infection with human papillomavirus, or HPV, a sexually transmitted infection. Mention at least one prevention effort across all three levels of prevention. (2 Marks)

3. Examine figure 2 carefully and answer the sub-question (a) and (b).

Figure 2: Disease X observed over a time



Where:

↓ First Contact of disease

\+ Died

↑ Survived

a. What is the prevalence of disease X at point of time A and B? (1 Mark)

b. What is the incidence of disease X over the time period of A and B? (1 Mark)

SECTION B

Case Study

Choose either Case 1 or Case 2 from this Section. Each Case carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE STUDY 1

Tashi Phuntsho, reported the following case on Kuensel-That the people shall be informed, daily newspaper of Bhutan on 23rd July, 2015.

"..... The first case was reported in a three-year-old boy on June 14. After seeing similar cases over the days, Tsamang basic health unit's health assistant reported the outbreak to the dzongkhag health officer and Mongar regional referral hospital on June 17. ....." .

During this outbreak of diarrhoea, 21 residents of Tokari village in Tsamang, Mongar on June 14 reported being sick out of which 12 were children. People reported being sick to BHU following the day of kharphu festival celebration in the village. By 22nd July, 2015 the outbreak appeared to have subsided. Hypothetical consideration: 250 people attended the village festival out of which 50 were children (below 18 years). Two deaths were reported from the cases that were referred to Mongar hospital.

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

1. What is diarrhea? What do you understand by an infectious disease? (2 Mark)

2. What are the common causes of diarrheal disease? (3 Marks)

3. What could be the sources of infection in the above case study? Mention two. (1 Mark)

4. When is an outbreak of disease declared and why? (2 Marks)

5. In **general**, explain the mechanism by which an infectious agent is spread from a source or reservoir to a person with an example of epidemiologically significant infectious disease. (12 Marks)

6. What is inapparent infection? Give at least two example. Explain its epidemiological importance. (3 Marks)

7. Discuss host response to infectious disease agents. (5 Marks)

8. Calculate the attack rate and determine the severity of the outbreak of the disease from the case presented. (2 Marks)

9. Define and Calculate case fatality rate (CFR) per 100. (2 Mark)

10. To investigate this outbreak what are steps to be followed. Prioritize and explain your actions (practical application) briefly as a public health care worker. (13 Marks)

11. "Laboratory tests yesterday confirmed that the contaminated village drinking water had caused diarrhoea in 21 residents of Tokari village in Tsamang, Mongar on June 14." (Phuntsho, 2015).
    What strategy would you suggest to address this issue? Give rationale. (5 Marks)

CASE STUDY 2

A total of 3050 women within the age group of 18-44 years were observed for the association of intrauterine device (IUD) and pelvic inflammatory disease (PID). Following table gives the data.

	Disease		Total
	Yes	No	
Exposed	841	518	1359
Non-exposed	724	967	1691
Total	1565	1485	3050

Answer the following questions.

1. What kind of epidemiological study is it? (2 Mark)

2. Who are the cases? Mention the source to select the cases. (3 Mark)

3. Who should have been control in the study? How should the controls be selected? (5 Marks)

4. Mention at least two source to identify the controls. (2 Mark)

5. What are the exposure and the outcome in the study? (4 Mark)

6. From the above data table calculate ODDS of exposure for control and for cases. (4 Marks)

7. Calculate the ODDS ratio from the data presented in the table. (3 Marks)

8. Why is ODDS ratio used? Draw conclusion of the ODDS Ratio. (4 Marks)

9. Define confounder. Mention at least two confounder in the above study. (4 Marks)

10. How can bias be reduced? (5 Marks)

11. Identify one of the aspect that the author used to deal with confounder (1 Mark).

12. Discuss the advantages and disadvantages of such type of study design. (6 Marks)

13. If the study suggests those women who uses IUD are more at risk of developing PID discuss the impact of it on public health and how you and other players of public health can address this problem. (7 Marks)