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

## PAPER II: GENERAL SUBJECT KNOWLEDGE PAPER FOR MEDICAL SCIENCE

**Date** : October 12, 2019
**Total Marks** : 100
**Writing Time** : 90 minutes (1.5 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 Parts: Part I & Part II**

   **Part I** consists of 70 multiple choice questions of 1 (one) mark each, and

   **Part II** consists of 10 short answer questions of 3 (three) marks each.

4. All questions are COMPULSORY.
5. 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.
6. 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.
7. Begin each Part in a fresh page of the Answer Booklet.
8. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
9. Use of any other paper including paper for rough work is not permitted.
10. **You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
11. This paper has **12 printed pages**, including this instruction page.

**GOOD LUCK!!!**

## Part I

### Multiple Choice Questions (70 marks)

**Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 71 (a). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.**

1. Which is NOT a characteristic of plant cell walls?
   a) It is semi-permeable.
   b) It is made of proteins.
   c) It surrounds the cytoplasm.
   d) It is a protection for cytoplasm.

2. All the following causes water absorption by the plant roots EXCEPT
   a) High Turgor Pressure of a plant cell.
   b) Transpiration pull force.
   c) Osmotic pressure of the soil water.
   d) Non osmotic pressure of the root hairs.

3. All of the following are fat soluble vitamins, EXCEPT
   a) Vitamin A
   b) Vitamin D
   c) Vitamin C
   d) Vitamin E

4. Choose the trace element which is required for iron metabolism in human body:
   a) Manganese
   b) Copper
   c) Zinc
   d) Magnesium

5. Dermatophytosis is an example of
   a) bacterial infection.
   b) parasitic infection.
   c) viral infection.
   d) fungal infection.

6. Choose the correct species of mosquito that transmits dengue virus:
   a) Aedes aegypti
   b) Aedes albopictus
   c) Anopheles mosquitoe
   d) Culex quinquefasciatus

7. Action potential is due to
   a) K+
   b) Cl-
   c) Ca+
   d) Na+

8. Choose the correct function of chloroplast:
   a) Rigidity and protection of plant cells.
   b) Takes part in plant cell division.
   c) Acts as food processing unit in the plant cells.
   d) Function as power house of the plant cells.

9. The nitrogenous base present in purine are
   a) adenine & guanine.
   b) adenine and thymine.
   c) gunine and uracil.
   d) cytosine and thymine.

10. One of the lipoprotein is called good cholesterol because it transports fatty acids from peripheral tissues to the liver for metabolism. Choose the good cholesterol from the following:
   a) Chylomicron
   b) Very low density lipoprotein cholesterol
   c) Low density Lipoprotein cholesterol
   d) High density Lipoprotein

11. Cell division takes place in four phases. Choose the correct phase of the cell division from the diagram provided on the right side.
   a) Prophase
   b) Metaphase
   c) Anaphase
   d) Telophase

12. Eukaryotic cells differ from prokaryotic cells due to
   a) mode of cell division.
   b) multi-cellular in nature.
   c) shape and size of the cells.
   d) motility of the cells.

13. All of the following are intestinal parasites EXCEPT:
   a) Ascaris lumbricoide
   b) Trichiuris trichiuria
   c) Ancylostoma duodenale
   d) Wuchereria bancrofti

14. Recent studies on locally brewed alcohol called ‘Ara’ were found to have high chemical toxic to the liver. Choose the chemical that has been found in unacceptable level in Ara that is toxic to the liver:
   a) Suphur oxide
   b) Methanol
   c) Aldehyde
   d) Ethanol

15. Why is flu common in winter?
    a) Flu virus can survive only in winter.
    b) Lowering of immune system in winter.
    c) Cold temperature favors the multiplication of virus.
    d) Due to low humidity and more indoor stay of people in winter.

16. Choose the correct pH level of normal human urine:
    a) Average 6.0, range 4.5-8.0
    b) Average 5.0, range 4.0-7.5
    c) Average 6.5, range 5.0-8.5
    d) Average 7.0, range 5.0-8.0

17. Smallest unit of the compound capable of existing on its own is
    a) protons
    b) atom
    c) elements
    d) molecule

18. The vitamin which helps in synthesis of coagulation is
    a) vitamin A
    b) vitamin K
    c) vitamin B Complex
    d) vitamin D

19. Common bacteria that cause diarrhoea in Bhutan is
    a) E. coli
    b) Salmonella
    c) Shigella
    d) Staphylococcus species

20. All of the following are functions of bones EXCEPT:
    a) Protection for the internal organs.
    b) Provide shape to the body.
    c) Provide support to the whole body.
    d) Shock absorber of various organs.

21. Each sensory organ has cells with specified functions. Choose the wrongly matched pair from the following:
    a) Taste - gustatory cells
    b) Smell - olfactory neuron
    c) Hearing - stereocilia
    d) Vision - rod cells

22. All the following are cold blooded animal EXCEPT:
    a) Frog
    b) Turtle
    c) Crocodile
    d) Penguin

23. Which part of the human brain is concerned with the body balance in movement?
    a) Medulla oblongata
    b) Cerebellum
    c) Cerebrum
    d) Hypothalamus

24. A hormone that helps in uterine contraction and control of bleeding is
    a) prolactin.
    b) serotonin.
    c) oxytocin.
    d) rennin.

25. Which of the following is responsible for connecting bone to bone?
    a) Tendon
    b) Fibrous cartilage
    c) Hyaline cartilage
    d) Ligament.

26. Function of canine teeth is
    a) grinding.
    b) cutting.
    c) tearing.
    d) All the above.

27. Choose the INCORRECT function of liver?
    a) Detoxification of harmful substances.
    b) Excretion of bilirubin.
    c) Synthesis of proteins.
    d) Production of blood cells.

28. The world's AID's Day is observed on
    a) 24$^{th}$ March.
    b) 1$^{st}$ April.
    c) 1$^{st}$ December.
    d) 28$^{th}$ September.

29. Which of the following functions is the least important for proteins?
    a) Become blood osmotic proteins.
    b) Converted to enzymes.
    c) Utilization for energy.
    d) Component of body structure.

30. Choose the tissue which cannot store glycogen or lipids for energy:
    a) Nerve tissues
    b) Muscle tissues
    c) Liver tissues
    d) Cardiac muscle tissues

31. All of the following are correct for Saponification EXCEPT:
    a) Involve hydrolysis of an ester under acidic or basic conditions.
    b) Reaction forms an alcohol and the salt of a carboxylic acid.
    c) Reaction is used for production of soaps.
    d) It is an example of Redox reactions.

32. Sesamoid bones are seen in all the following parts of the body EXCEPT:
    a) Knee
    b) Foot
    c) Hand
    d) Arms

33. Black water fever is associated with
    a) typhoid.
    b) dysentery.
    c) cholera.
    d) malaria.

34. The primary ions involved in gaseous exchange in and out of lung is
    a) $H^+$ only
    b) $HCO_3^-$ only
    c) $H^+$ & $HCO_3^-$
    d) $PO_4$ only

35. All of the following are characteristics of Catalyst EXCEPT:
    a) Does not initiate chemical reaction but enhance the reaction.
    b) Remains unchanged in chemical composition.
    c) Does not alter the final position of chemical equilibrium.
    d) Act as reactant in the chemical reaction.

36. Children are discouraged to play with the paints containing chemicals that affect behavior and intelligence in children on high exposure. Choose the correct chemicals/substance from the following that cause the above effect:
    a) Lead
    b) Mercury
    c) Graphite
    d) Carbon

37. Department of Roads uses salt to melt the ice faster on the road on the high mountains. What is the effect of salt on the ice?
    a) Lowers vapour pressure of the ice.
    b) Lowers melting point of the ice.
    c) Increases the freezing point of the ice.
    d) Lowers the freezing point of the ice.

38. Food is cooked faster in Phuntsholing than Bumthang. Choose the correct reason from the following:
    a) Due to increase humidity and high temperature in low altitude.
    b) Due to decrease in boiling point and decrease in atmospheric pressure in low altitude.
    c) Due to increase in boiling point and increase in atmospheric pressure in low altitude.
    d) Due to increase in vapour pressure in low altitude.

39. Choose the correct Boyle's law:
    a) If the volume of the lungs is increased, the pressure also increases proportionately.
    b) If the volume of the lungs is increased, the pressure decreases proportionately.
    c) If the volume of the lungs is increased, the pressure remains the same.
    d) If the volume of the lungs is decreased, the pressure also decreases proportionately.

40. Dry ice is formed due to
    a) hydrogen bond.
    b) covalent bond.
    c) electrostatic bond.
    d) van der waals forces.

41. Molality of the solution is defined as the number of
    a) moles of a substance per liter of solution.
    b) moles of solute per kg of solvent.
    c) equivalent weights of solute per liter of solution.
    d) grams of solute per kilogram of solvent.

42. Choose the INCORRECT application of the following halogens:
    a) Chlorine- bleaching agent
    b) Iodine- antiseptic
    c) Bromine- flame retardants
    d) Fluorine- insecticide

43. Choose the paramagnetic metal from the following:
    a) Copper
    b) Lead
    c) Iron
    d) Brass

44. Catalytic dehydrogenation of a primary alcohol gives
    a) secondary alcohol.
    b) aldehyde.
    c) ketone.
    d) ester.

45. Primary composition of the drinking glass is
    a) sodium oxide.
    b) silicon dioxide.
    c) calcium oxide.
    d) lead oxide.

46. The main composition of the white paper is
    a) cellulose.
    b) hemi-cellulose.
    c) lignin.
    d) rosin.

47. Choose the correct description of denatured alcohol:
    a) It is fit for consumption.
    b) It contains ordinary ethyl alcohol.
    c) It is used as cleaning agent.
    d) It is usually prepared by adding methanol.

48. Choose the correct reaction for the production of sulphuric acid:
    a) $SO_2 + H_2O_2 = H_2SO_4$
    b) $SO_3 + H_2O = 2H_2SO_4$
    c) $SO_3 + H_2O = H_2SO_4$
    d) $SO_4 + H_2O = H_2SO_4$

49. The removal of 2 hydrogen atoms from an alcohol yields
    a) an acetide.
    b) a aldehyde.
    c) a polyene.
    d) a ketoacetone.

50. Amphoteric substance is the one which
    a) acts both as an acid and as a base.
    b) exists in two distinct crystalline forms.
    c) acts as only acid.
    d) acts as only base.

51. The correct formula for vinegar is
    a) $CH_3COOH$.
    b) C6H8O7.
    c) NaHCO3.
    d) HCOOH.

52. Compound that is easily absorbed through walls of stomach is
    a) sugar.
    b) protein.
    c) fat.
    d) alcohol.

53. 2 molar NaCl solution can be prepared by adding
    a) 1 moles of NaCl into 2 liters of solvent.
    b) 5 moles of NaCl into 2.5 liters of solvent.
    c) 2.5 moles of NaCl into 1 liter of solvent.
    d) 1 moles of NaCl into 2.5 liter of solvent.

54. All the following are uses of baking soda EXCEPT:
    a) Natural toothpaste
    b) Deodorant
    c) Pain reliever
    d) Insecticide

55. Nickel is used as catalyst in
    a) saponification.
    b) hydrogenation of oil.
    c) dehydrogenation.
    d) oxidation of alcohol.

56. The electrical current (I) flowing in a circuit is proportional to the voltage (V) and inversely proportional to the resistance (R). It is called
    a) Coulomb's law
    b) Faraday's law
    c) Law of conservation of charge
    d) Ohm's Law

57. Choose the correct effect of resistance of a conductor:
    a) Inversely proportional to the length of conductor.
    b) Directly proportional to the cross section of the conductor.
    c) Inversely proportional to the temperature.
    d) Directly proportional to the density of electrons in the conductor.

58. The unit of an electric current is
    a) coulomb
    b) watt
    c) electron volt
    d) ampere

59. All of the following are properties of concave lens EXCEPT:
    a) One surface that curves inwards
    b) Converges parallel rays to a focal point
    c) Have negative focal lengths
    d) Correct short-sightedness

60. Rutherford's scattering experiment is related to the size of
    a) nucleus
    b) atom
    c) electron
    d) neutron

61. The electromagnetic radiation with maximum wavelength is
    a) ultraviolet rays
    b) radio waves
    c) x-rays
    d) infra-red rays

62. The acceleration of a system is directly proportional to and in the same direction as the net external force acting on the system, and inversely proportional to its mass. It is the law of
    a) Newton's First Law
    b) Newton's Second Law
    c) Newton's Third Law
    d) Newton's law of universal gravitation

63. A 10 kg mass and 5 kg mass are moving with equal kinetic energies. The ratio of the magnitudes of their linear momentum is
    a) 1 : 2
    b) 1 : 1
    c) 4 : 1
    d) 2 : 1

64. Mercury is no more recommended to be used in sphygmomanometer because
    a) it is toxic to the human body.
    b) it is not easily available.
    c) it is difficult to handle.
    d) it provides incorrect blood pressure reading.

65. The best example of converting potential energy into electrical energy is
    a) moving dynamo.
    b) moving of turbine by water.
    c) solar panel.
    d) wind mill.

66. The type of pulleys used by the crane to lift the construction material is
    a) fixed pulley.
    b) movable pulley.
    c) compound pulley.
    d) combination of all.

67. Bhutan Power Corporation encourages using LED bulb for lighting the home because
    a) it is energy efficient compared to other bulbs.
    b) it does not emit polluting radiation which is prevents health hazard.
    c) it does not emit UV rays.
    d) it does not produce heat in the room.

68. Rainbow is formed by
    a) reflection, refraction and dispersions of sunlight by water droplets.
    b) reflection of sunlight by water droplets.
    c) refraction of sunlight by water droplets.
    d) dispersions of sunlight by water droplets.

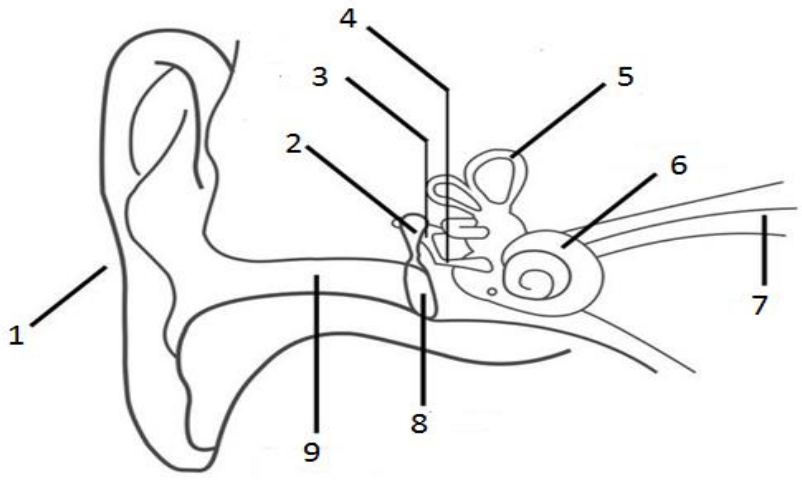
69. Two bulbs, one of 50W and other of 25W, are connected in series to a supply of 200v. What is the ratio of the current flowing through them?
    a) 0.5
    b) 0.15
    c) 2.0
    d) 1.0

70. Which one has more resistance: a 100-watt bulb or a 60-watt bulb?
    a) 100-watt bulb has more resistance.
    b) 60-watt bulb has more resistance.
    c) Both have the same resistance.
    d) There is no difference in resistance.

## PART II – Short Answer Questions (30 marks)

**Answer ALL 10 short answer questions. Each question carries 3 marks.**

1. What were the causes of dengue outbreak in Phuentsholing that last for almost 3 months?
2. List down the dengue preventive measures you would advise the people?
3. Bhutan has the highest number of Multi-drug Resistant Tuberculosis (MDR-TB) in south East Asia with detection gap of 63%. How would you help the Ministry of Health to reduce this detection gap?
4. What are the differences between RNA and DNA?
5. Explain the working principle of X-Ray Tube and image formation.
6. What is acid base balance?
7. Label the following diagram of the human ear numbered 1-9:




8. Describe menstrual cycle of the human female.
9. The recent surveillance on hospital acquired infections (HAIs) at JDWNRH found that surgical site infections are the highest (32%), followed by clinical sepsis (24%) and ventilator-associated pneumonia (12%). What could be the cause of high rate of HAIs at JDWNRH and what would you initiate to reduce the incidence of HAIs at JDWNRH.
10. Describe osmotic pressure and its applications.

**TASHI DELEK**