INTER-DISCIPLINARY PROGRAMME IN EDUCATIONAL TECHNOLOGY
SAMPLE ENTRANCE TEST FOR Ph.D. PROGRAMME

Guidelines:
- There are 22 questions in this test.
- Questions 1-20 are multiple choice questions. There is only one correct answer each question. Please choose the best possible answer and write it in the space provided below each question next to the word Answer:
- Questions 21 & 22 are open-ended questions. Please answer them in the space provided.
- You will be provided blank paper for rough work. Please write your name and submit these.

Marking:
Questions 1-20:
- Each question will be awarded 4 marks if the answer is correct.
- No marks will be allotted if the question is not attempted.
- No partial credit shall be given for any answer.
- 1 mark will be deducted if the answer is wrong.

Question 21:
- Q21carries 20 marks.
- Partial credit may be awarded.

Question 22:
- Q22 carries no marks for the written test.
- However if you are shortlisted for the interview, you will be asked questions based on your response to Q22 and evaluated on its basis.

REGISTRATION NUMBER: _____

NAME: _____

SIGNATURE:

SIGNATURE OF INVIGILATOR:

Q1. You toss two regular unbiased 1-rupee coins one after another. Which of the following is the most likely outcome?

    a) Two heads
    b) Two tails
    c) One head and one tail
    d) Each of 1, 2, 3 above is equally likely

Q2. Students in two sections of a sixth standard class take a Maths test. Both sections contain 40 students each. Two students in section A score very low compared to others in the section. Your goal is to judge which section performed better on the test.
Which of the following central tendencies: mean, median or mode, is most likely to lead to a reasonable judgment?

    a) Mode is preferable than mean or median
    b) Either mean or median but mean is preferable
    c) Either mean or median but median is preferable
    d) Any of the three central tendencies would lead the same judgment

Q3. When modern IQ tests are constructed, the mean IQ score of a sample in a certain age group is set to 100 and the standard deviation to 15. This means that 95% of the scores would lie between:

    a) 85 and 115
    b) 70 and 130
    c) 15 and 185
    d) Depends on sample size

Q4. An educational technology researcher is conducting a study on the effect of technology on writing essays. She has one group write essays using paper and pen, while another group uses a word processor to write an essay on the same topic. The researcher found that the quality of the essays was equal regardless of whether they used paper and pencil or a word processor. Further, high achieving students performed better than low achieving students while using paper, but this effect was not seen while using word processor.
In this experiment, what is the independent variable (IV) and the dependent variable (DV)?

    a) IV - The quality of the essays; DV - the achievement level of students
    b) IV - The quality of the essays; DV - the medium for writing
    c) IV - The medium for writing; DV - the quality of essays
    d) IV - The medium for writing; DV - the achievement level of students

Q5. An educational technology researcher is using a new testing instrument to measure behavior. He administers the same test to a same participant three times, a day apart. The participant does not do any additional work to prepare for the test in those three days. The first time the participant takes the test, he receives a score of 15. The second time he takes the test, he scores 38. The researcher administers the test a third time and the participant receives a score of 28.
Based on these scores, what is the most reasonable conclusion that can be drawn about the new testing instrument?

    a) The instrument has low validity
    b) The instrument has low reliability
    c) The validity of the instrument changed over the three days
    d) The reliability of the instrument changed over the three days

Q6. Which of the following hypotheses on educational video games can be tested by conducting an experiment?
   a) One should use educational video games since games are motivating for students.
   b) Educational video games lead to higher motivation and learning outcomes than textbooks.
   c) Video games are bad for small children due to the addictive nature of games.
   d) All the choices above are testable hypotheses.

Q7. Blogging has become a popular activity among students. A researcher is interested in exploring if blogging about academic activities is associated with exam grades. The researcher designed a questionnaire and collected the data shown in the table below. Which statistical analysis should the researcher apply?

Participant	Time spent blogging per week (in mins)	Final exam score
Akash	80	25
Bina	30	10
Chitra	20	15
Donald	60	20
Eki	50	35

a) Correlation
b) Regression
c) Independent sample t-test
d) Paired sample t-test

Q8. According to an article in a career magazine, owning a smartphone significantly increases the chances of getting into IIT. The article refers to a study that found that students who owned a smartphone were twice as likely to be get into IIT as people who did not.
Which of the following, if true, most weakens the above argument in the magazine article?
   a) Students surveyed in the above study reported owning no other technology gadgets than a smartphone.
   b) A different study found that students who owned a laptop were more than four times more likely to get into IIT than those who did not.
   c) Another study found that the students who owned a smartphone were more likely to attend JEE coaching classes than those who did not own a smartphone
   d) In another experiment, students who owned a smartphone were no more likely to graduate from IIT in four years than students who did not.

Q9. After thousands of miles of use, the tread on many bike tires wears down. One common theory about why tires wear down contends that the perpetual friction and heat generated by the contact between the tire and pavement erode the material on the surface of the tire. However, a local scientist who is also an avid cyclist proposed a new theory for why bike tires wear down. This scientist contended that chemicals from the road's composition and chemicals from rain residue wore down the surface of the tire.
Which of the following would best evaluate whether the scientist's proposed theory is true?
   a) Place chemicals from rain water and pavement on a bike's idle tires.
   b) Ascertain whether the bike's frame is made of rust-resistant components.
   c) Ascertain whether chemicals from the road's composition also reside within the bike's frame.
   d) Determine the number of miles that a bike tire can be used on a wet road before wearing down.

Q10. Which of the following is a characteristic of constructivist teaching-learning approaches?
   a) Students repeatedly practice exercises given by the teacher, to improve their skills.
   b) Students add new information to their memory by listening to well-structured presentations.
   c) Students follow a set of step-by-step directed instructions to arrive at the correct final answer.
   d) Students generate their own knowledge through experiences based on real-life situations.

Q11. A learning objective indicates the specific, measurable performance outcome of a learner. Which of the following is a valid learning objective?
   a) Understand isosceles triangles properly.
   b) Classify a given triangle as equilateral, isosceles or scalene.
   c) Show interest in learning about real life applications of triangle properties.
   d) All of a), b), c) are valid learning objectives.

Q12. According to Jerome Bruner (1915-), students are more likely to understand concepts if they discover them as part of their own exploration. Bruner recommended that teachers should provide *discovery learning environments* that would let students explore relationships between different concepts in real-world scenarios. A teacher decides to teach genetics based on Bruner's discovery learning principles. Which of the following educational technology tools and strategies is most in line with these principles?
a) Allowing students to pair different animals in a simulation to determine the genetics characteristics of the offspring.
b) Providing students repetitive practice of the rules of genetic pairing using an educational video game.
c) Showing a video on the life history of Mendel (scientist regarded as the founder of genetics) to motivate students.
d) Explaining the laws of genetics by demonstrating genetic pairing in pea plants via an animated movie.

Q13. The average marks of 30 boys in a class is 50 and that of the 20 girls is 60, out of a total of 80 marks. What is the average marks of all the students in the class?
a) 51
b) 52
c) 54
d) 58

Q14. A certain straight corridor has four doors, A, B, C and D (in that order) leading off from the same side. You are asked to determine exactly how far apart are doors B and C. Additional statements are given below that may help you calculate your answer.
Statement 1: The distance between doors B and D is 10 meters.
Statement 2: The distance between A and C is 12 meters.
Which of the statements above make it possible to answer this question?
   a) Statement 1 alone is sufficient, but statement 2 alone is not sufficient to answer the question.
   b) Statement 2 alone is sufficient, but statement 1 alone is not sufficient to answer the question.
   c) Both statements taken together are sufficient to answer the question, but neither statement alone is sufficient.
   d) Statements 1 and 2 together are not sufficient, and additional data is needed to answer the question.

Q15. Ali, Babu and Charmi are expert logicians; they always tell the truth. They all sit in a row, as illustrated. Their friend Xena puts a red or blue hat on each of their heads. Ali can see Babu's and Charmi's hats, but not his own; Babu can see only Charmi's hat in front but not Ali's; Charmi can see none of the hats since she faces away from the others. All three of them are aware of this arrangement.


Ali   Babu   Charmi
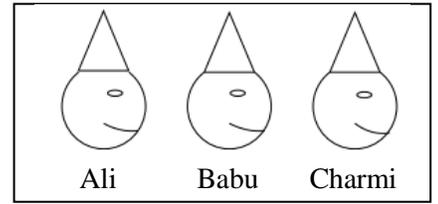
Xena puts a hat on each of their heads and says: "Each of your hats is either red or blue. At least one of you has a red hat." Ali then says "I know the colour of my hat." What colour is each person's hat?

a) Ali – blue; Babu – blue; Charmi – red
b) Ali – red; Babu – blue; Charmi – red
c) Ali – red; Babu – blue; Charmi – blue
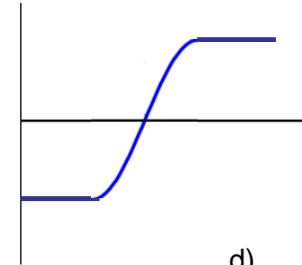d) Ali – red; Babu – red; Charmi – blue

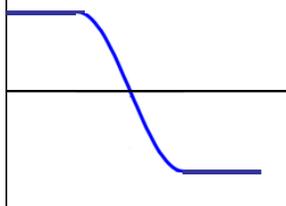**Q18.** Which graph shown in a) – d) best represents the derivative of the graph shown below?
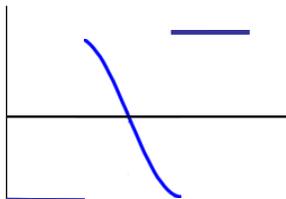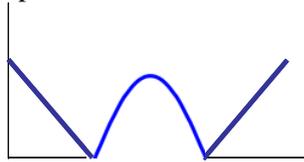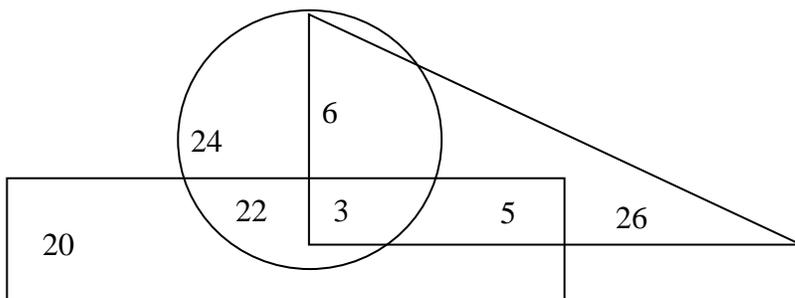

a)
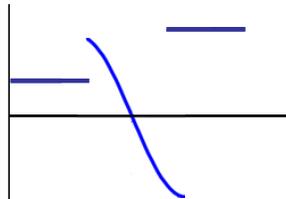
b)   c)   d)

Q17 & 18 are based on the following diagram

In the above diagram, the rectangle represents artists, the circle represents players and the triangle represents teachers. The numbers in the figure represent the number of people in each category.

Q17 What percent of total artists are also players?

    a) 60%
    b) 50%
    c) 40%
    d) 25%

Q18. N1 represents the number of teachers who are artists but not players and N2 represents the number of teachers who are players but not artists. Which is greater, N1 or N2?

a) N1 < N2
b) N1 > N2
c) N1 = N2
d) Not possible to determine with given figure

Questions 19 and 20 are based on the following passage

Guano – or bird excrement – has long been business in Peru due to the presence of large populations of seabirds. Even though some consider guano to be dirty, it is prized as a natural fertilizer and an ingredient in gunpowder since guano contains high concentrations of phosphorus and nitrogen.

    Guano has been highly regarded since the Inca Empire in the 13th century, and it became a commodity in the 19th century. By the 1840s, guano represented Peru's main source of income, and was exported to Europe and the United States. Guano extraction was carried out by indentured labourers and contributed to several wars. In latter part of the 19th century, however, the guano industry declined following the discovery of nitrogen fixation, an industrial process extensively used today, in which nitrogen gas is converted into ammonia fertilizer.

    Today the Peruvian guano industry is thriving again. Approximately 23,000 tons of guano are exported annually as organic fertilizer. Yet problems remain. Extraction remains backbreaking manual labour, as machinery frightens birds away. Poachers kill thousands of birds each year. Overfishing and climate change are the guano's industry's main threats, as seabirds depend on rich stocks of fish in the sea.

Q19. According to the passage, which of the following statements about the role of guano in Peru is true?

    a) Guano is a threat to Peru since it is bird excrement and considered to be dirty.
    b) Guano has been valued in Peru since many centuries and an important economic resource for 200 years.
    c) Guano is the cause of wars by Peru against indentured labourers and poachers.
    d) Guano industry was important in Peru in the 19th century, but it declined and never recovered.

Q20. Which of the following was NOT a problem for the guano industry at some time or the other?

    a) Discovery of nitrogen fixation process leading to production of industrial ammonia fertilizer.
    b) Difficulty in extraction of guano due to its highly labour-intensive process.
    c) Use of guano in gunpowder, leading to several wars which destroyed the Peruvian economy.
    d) The decrease in the population of guano-producing birds due to poaching and overfishing.

Turn over for Q21 & Q22

Q21. Read the following study. Then identify the major threats to validity, that is, how might the researchers have gone wrong in their claim? Please limit your answers to the box given below.

Study:

A school institutes a new technology-based curriculum for maths and wishes to evaluate its effects. As part of the new curriculum, teachers show animations on relevant maths concepts every week. At the end of each week, students take a multiple-choice test on a computer that gives them immediate automatic feedback on their responses.

  The new curriculum is implemented for a year. After a year, student achievement is measured on the maths concepts present in the curriculum, using a test. Educational technology researchers working with the school find that students perform well on the achievement test. Their conclusion is the

Answer:

Q22. If you are admitted to the Ph.D program in Educational Technology, what research problem would you like to work on? Clearly describe:

  a) The specific teaching-learning problem you plan to address
  b) Your solution idea
  c) Any educational theory which forms the basis of your solution
  d) The specific treatment (how you will implement your solution idea)
  e) The method you will use to evaluate your solution. Include details of your educational study:
    o Who will be your sample?
    o What will you measure to gather scientific evidence?
    o What instruments will you use to measure it?
    o What procedure will you use to conduct your educational study?

Begin answer below. If you need more space, please attach a blank sheet.