JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
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Test – 2, April 2017, PhD – All Branches

Course Code: 10P1NGE201   Max Time: 1 Hr 30 mins
Course Name: Research Methodology and Computational Techniques
Course Credit: 3   Max Marks: 25

Answer all questions. Carrying of mobile phone will be treated as a case of unfairmeans. There are three sections, each section is of equal marks. Section A and B are common to all while Section C is department specific.

SECTION A

1. What do you understand by Research Design? What are its importance and its features? Briefly discuss different types of research design?   **[4]**

2. What do you understand by Validity in Experiment? What are different types of validity and what are their importance? Briefly discuss factors affecting validity also.   **[4]**

SECTION B

1. Solve the linear programming problem given below: **[4]**

$$Max\ Z = 3x_1 + 5x_2 + 4x_3$$
$$\text{s/t } 2x_1 + 3x_2 \leq 8$$
$$2x_2 + 5x_3 \leq 10$$
$$3x_1 + 2x_2 + 4x_3 \leq 15$$
$$x_1, x_2, x_3 \geq 0$$

2. Solve the assignment problem given below: **[5]**

Person/Job	A	B	C	D	E
1	5	3	4	7	1
2	2	3	7	6	5
3	4	1	5	2	4
4	6	8	1	2	3
5	4	2	5	7	1

SECTION C (Department Specific)

(For the students of CE only)

Tensile tests were carried out at two specimens. The test data are given below:
Specimen1:
Gauge length=40 mm, Diameter=7.42 mm, Fracture length=40.90 mm

Load (kN)	0	10	17	25	30	34	37.5	38.5	36
Elongation(mm)	0	0.05	0.08	0.11	0.14	0.20	0.40	0.60	0.90

P.T.O.

Specimen2:
Gauge length=75 mm, Diameter=11.28 mm

Load (kN)	0	2.0	6.5	11.5	13.6	16	18	19	20.5	19
Elongation(mm)	0	0.012	0.039	0.069	0.08	0.107	0.133	0.158	0.225	0.310

(a) Determine the important engineering parameters for both the specimen. [4]
(b) Discuss test results and give your specific comments. [2]
(c) Give a comparative statement of both the specimen materials with respect to their behavior in the test. [2]

(For the students of Physics only)

Q1. Differentiate a "Physics and Materials Science" research problem of your choice based on experimental and theoretical outlooks. Elaborate clearly each outlook, and try to correlate a way to couple the two in order to solve the chosen research problem in all respect. [5]

Q2. Briefly answer the following: [1×3=3]
  (a) On a scale of 0-10, how much would you assign for theoretical analysis and how much for experimental analysis of a particular research problem. Justify.
  (b) Is literature survey an essential criterion from the viewpoint of a research analyst?
  (c) On what parameters would you judge the significance of your chosen research problem?

(For the students of ECE only)

Explain the concept of efficient code compression and decompression techniques used for Bio-signal processor. [8]

OR

Elaborate the concept of segmentation. Explain how the following are used for Biomedical Image Segmentation – a) Region Growing; b) Splitting and Merging; c) Adaptive Thresholding Process; d) K means clustering; e) Fuzzy means segmentation [8]

(For the students of CSE only)

Q1. Differentiate engineering and science in terms of: Traditional View and More realistic view. [1]
Q2. Explain the role of followings in computer science research: a) Scientific method; b) Scientific Inquiry; c) Characteristics of Science; d) Strategies to overcome weaknesses [2]
Q3. What are the Myths about science? Explain in details with example. [1.5]
Q4. What will you accept as knowledge during research in computer science? [1.5]
Q5. Explain the various Meta-theories in computer science research. [2]

(For the students of BI/BT only)

Q1. Explain the following terms with reference to experimental research: Controls in experiment, Independent variables, Dependent variables, Extraneous variables. [2]
Q2. What are Quasi-Experimental designs? Highlights their advantages and limitations. [1.5]
Q3. List three important criteria for an experiment to be called True Experiment. [1.5]
Q4. Explain following experimental designs with their symbolic diagrams: a) Static group diagram; b) Solomon four group design [3]