Computer Science and Computer Engineering

Introduction:

The course work for the doctoral research has been made mandatory by the UGC. Kadi Sarva VishwaVidyalaya has decided to implement this aspect on the immediate basis for the benefit of the students pursuing Ph.D. The course work is designed in such a way as to support, motivate and encourage quality research. By undergoing this course work, the student will get equipped with fundamentals of research methodology, scientific communication and also recent developments in the field of specialization. The course work has to be completed by the student in a satisfactory way before submission of his/her dissertation thesis.

Course Structure:

Paper	Title	**University Examination** Section A	**University Examination** Section B	**Total Marks**
Paper-I	Research Methodology	60	40	100
Paper-II	Scientific Communication	60	40	100
Paper-III	Specialization Paper	60	40	100

Paper-I Research Methodology

Section-A (Common to all faculty)

1) Introduction to Research Methodology : Meaning of Research, Objectives of Research, Motivations in Research, Types of Research, Research Approaches, Significance of Research, Research Methods v/s Methodology, Research and Scientific Methods, Research Process, Criteria of Good Research — 3

2) Defining the Research Problem : What is Research Problem?, Selecting the Problem, Necessity of and Techniques in defining the problem — 6

3) Research Design: Meaning, Need, Features of Good Design, Concepts, Types. Basic Principles of Experimental Design, Developing a Research Plan — 6

4) Sample Design: Implication, Steps. Criteria for selecting a sample procedure, Characteristics of Good sampling Procedure, Types of Sample Design, Selecting Random Samples, Complex random sampling Design. — 7

5) Measurement and Scaling Techniques: Measurement in Research, Measurement Scales, Sources of Errors in measurement, Tests of Second measurement, Technique of developing Measurement Tools, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques. — 10

6) Methods of Data Collection: Collection of Primary Data, Observation Method, Interview method, Collection of Data through questionnaire and Schedules, Other methods. Collection of Secondary Data, Selection of appropriate method for data collection, Case Study Method, Guidelines for developing questionnaire, successful interviewing. Survey v/s experiment. — 10

7) Processing and analysis of Data : Processing Operations (Meaning, Problems), Data Analysis (Elements), Statistics in Research, Measures of Central Tendency, Dispersion, Asymmetry, Relationship. Regression Analysis, Multiple correlation and Regression, Partial Correlation, Association in case of Attributes — 10

8) Sampling Fundamentals : Definition, Need, Important sampling Distribution, Central limit theorem Sampling Theory, Sandler's A-test, Concept of Standard Error, Estimation, Estimating population mean, proportion. Sample size and its determination, Determination of sample size Based on i) Precision Rate and Confidence level ii) Bayesian Statistics. — 12

9) Testing of Hypothesis: Meaning, Basic concepts, Flow diagram, Power of a hypothesis test, Important parametric tests, Hypothesis Testing of Means, Differences between Means, Comparing Two related samples, Testing of Proportion, Difference between proportions, Comparing variance to hypothesized population variance, Equality of variances of two normal populations, hypothesis testing of Correlation coefficients, Limitations of Tests of hypothesis. — 12

10) Chi- square test : Applications, Steps, characteristics, limitations — 3

11) Analysis of Variance and Covariance : Basic Principles, techniques, applications, Assumptions, limitations. — 7

12) Analysis of Non-parametric or distribution-free Tests : Sign Test, Fisher-Irwin Test, McNemer Test, Wilcoxon Matched pair Test (Signed Rank Test), Rank — 7

13) Sum Tests : a) Wilcoxon-Mann-Whitney Test b)Kruskal-Wallis Test, One sample Runs Test, Spearman's Rank Correlation, Kendall's Coefficient of Concordance, Multivariate Analysis Techniques: Characteristics, Application, Classification, Variables, Techniques, Factor Analysis (Methods, Rotation), Path Analysis. — 7

Reference Books: Latest Editions of following Books

1) Kothari, C.R., Research Methodology (Methods and Techniques), New Age Publisher

2) Fundamentals of modern statistical methods By *Rand R. Wilcox*

3) Power Analysis for Experimental Research A Practical Guide for the Biological, Medical and Social Sciences by *R. Barker Bausell, Yu-Fang Li* Cambridge University Press

4) Design of Experiments: Statistical Principles of Research Design and Analysis, by *Robert O. Kuehl* Brooks/Cole

Section-B (Faculty of Computer Sciences)

Research Areas:

Databases, Distributed Databases, Data warehouse, Data Mining, Operating Systems, Network Technologies, Processor Technologies, Mobile Computing, Software Engineering, Web Technologies, Virtual environments and Services, Wireless Networks, and related areas.

Exercise-1

- Select the area of research.
- Define a problem.
- Outline the Title
- Survey of Literature and its documentation
- Formulation of Research hypothesis with expected outcomes
- Research Plan
- Requirements Engineering
- Research Design : Model, Architecture, Prototyping
- Implementation of Prototype and data collection
- Data Analysis: Use of Software Tools like MATLAB, SPSS, etc.
- Testing
- Evaluation
- Future scope of research

Evaluation: [Based on university examination**,** 100 marks paper of 3hrs]

Section A will be having a weightage of 60 marks. Questions will be of objective types.

Section-B marks will be having a weightage of 40 marks. Answers to any question should not exceed more than five lines.

Kadi Sarva Vishwavidyalay
Ph. D Course Work
Paper-I Research Methodology

Duration 3 hrs. **Total Marks: 100**

Section A

Que 1: Answer the following objective questions **Marks[20]**

1.The research question "What is the meaning of the lived experience?" is used in:
A. Ethnography
B. Phenomenology

2. Data collection for phenomenological research is done through:
A. Questionnaires
B. Interviews and observation methods

3.A process whereby data are analyzed by comparing data with other data as they are acquired during research is called constant comparative analysis. This method is used in:
A. Grounded theory research
B. Historical research

4. The qualitative approach that considers an idea or issue from all perspectives through an extensive exploration of the literature is called:
A. Philosophical inquiry
B. Quantitative analysis

5. The approach of understanding the 'natives' view of their world as an outsider is called:
A. Emic
B. Etic

6. Parse and Watson used what type of method for their qualitative analysis?
A. Ethnography
B. Phenomenology

7. The outcome of grounded theory method is to arrive at theory.
A. True
B. False

8. Which research method compiles data and facts regarding people, events and occurrences of the past?
A. Historical
B. Ethnographic

9. People who have special knowledge about a culture and are willing to share with an ethnographer are called:
A. Informants
B. Participant/observers

10. The process of identifying meaning of human experiences through intensive discussion with persons who are living the experience is called:
A. Case study research
B. Phenomenological research

11. Phenomenological research may investigation "being in time."
A. True
B. False

12. Quantitative research uses
A. Inductive reasoning
B. Deductive reasoning

13. Qualitative research uses
A. Inductive reasoning
B. Deductive reasoning

14. A typical number of participants in a qualitative study is:
A. Large
B. Small

15. Which method of research focuses on descriptions of cultural groups?
A. Ethnography
B. Case study

16. An investigation of a phenomenon by a few participants to discover meaning is called:
A. Phenomenology
B. Philosophical Inquiry

17. Phenomenology has its philosophical basis in:
A. Science
B. Philosophy

18. Ethnography has its foundation in:
A. History
B. Anthropology

19. Grounded theory has its base in:
A. Symbolic Interaction theory
B. Heideggarian theory

20. List three research areas where you can apply qualitative research.

Que 2: Answer the following True/False **Marks[20]**

1. Simple random sampling is also known as chance sampling. T/F
2. Purposive sampling is not known as non probability sampling. T/F
3. The most practical way of systematic sampling is to select every n^{th} name. T/F
4. Multistage sampling may lead to cluster sampling. T/F
5. Research is much concerned with proper fact finding analysis and evaluation with conclusion. T/F
6. Defining a research problem properly and clearly is a crucial part involving a set of steps. T/F
7. Reframing the research problem is reshaping in the working proposition. T/F
8. Factorial design is classified under formal experimental design. T/F
9. All quantitative data is based upon qualitative judgments; and all qualitative data can be described and manipulated numerically/F
10. Z-test is a parametric test. T/S.
11. F-Test is non-parametric test. T/F.
12. Differential scale is associated with Thrust one type scale. T/F
13. Tabulation is an essential in the research study. T/F.

14. Mean is position based average, while median is value based average. T/F
15. Mode is least occurring value in the series. T/F.
16. Harmonic mean is reciprocal of the average of reciprocals of values. T/F.
17. Standard deviation is a measure expressed as square root of average of square' of reciprocal values. T/F.
18. Cross tabulation approach is not useful when data is in normal form. T/F
19. Sampling theory can be studied for sampling of attributes as well as sampling of variables. T/F.
20. The hypothesis are test on a predefined level of significance.. T/F

Que 3: Fill in the blanks **Marks[20]**

1. Hypothesis testing will result in either _____ or in _____ it.(Accepting/rejecting, throwing/picking)
2. At the end of the report appendices includes/end-list _____ data. (raw data, process data , technical data).
3. Good search is _____ and _____. (Systematic/Non Systematic, Logical/Descriptive)
4. Case Study is the popular form of _____. (Qualitative, Quantitative, Subjective)
5. Statistical Estimation means _____.
6. Multiple regression analysis is adopted when research has _____ variable, which is function of two or more independent variables.
7. Multivariate analysis of variance is an _____ of two way ANOVA. (extension, union, iteration)
8. A normal distribution a major of its skew-ness = _____. (-1, 0, +1)
9. _____ test is used in the context of analysis of variance. (ANOVA, Chi-Test, Z-Test)
10. For large size sample, the sample size is greater than _____. (30,50,100)
11. Maximum likely hood method is a method falling under the category of _____. (Factor analysis, Group analysis Regression analysis)
12. H0 is _____.
13. Ha is _____ hypothesis
14. Tabulation assembles _____ of data. (Mass, Group, Scattered)
15. Tabulation facilities the process of _____. (Comparison, data, value).
16. In the research data collection methods are _____ and _____.
17. Tme series analysis is used largely uin context of _____ and _____ researches. (technical, economic, business)
18. Irregular fluctuations are known as _____ fluctuations.(seasonal , random, predictable)
19. Secular trend is a _____ trend. (long term, short term)
20. Time series analysis is important in the context of _____ analysis. (long term, short term, both)

Section B

[Answers to any question should not exceed more than five lines]

Que 4: Attempt following question [any 4] **Marks[20]**

1. Assume that you have some text files and some image files from the web or from your own computer. Write the null hypothesis and alternative hypothesis for this experiment.
2. List steps to initiate the research,
3. List the different testing methods used to evaluate the computer science research?
4. List the features of functional model of the object modeling technique (OMT).
5. State the utility of M-file in MATLAB environment.

Que 5: Write a short note on [any 4] **Marks[20]**

1. List various techniques for research and analysis of algorithms.
2. What are the different OOAD Methods?
3. Justify the use of MATLAB in Computer Science research.
4. Outline testing methods used in computer science research.
5. List various data analysis techniques

Additional Question Bank

SECTION A

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20.List three research areas where you can apply qualitative research.

SECTION B

6. Briefly discuss domain of computer science research?
7. Outline the differences of computer research methods vs methodology.
8. List the various techniques suitable for data analysis.
9. Assume that you have some text files and some image files from the web or from your own computer. Answer the following question
    a. How you can determine whether the mean compression rate of your program is higher for text or images or whether there is no difference. ?
    b. Describe carefully the statistical tests and reasoning you use. ?
    c. What is the null hypothesis for this experiment?
    d. How much data are you basing your conclusions on?
    e. Characterize the differences, if any, in the variance of your program's compression rate between text and images.
10. When you plan to initiate the research, what questions arise for the research directions?
11. List three research techniques used for algorithms analysis.
12. Outline the different testing methods used to evaluate the computer science research?
13. Define case study research method in computer science and give two examples.
14. Differentiate quantitative and qualitative computer science research methods.
15. What care is to be taken while writing a research paper?
16. State the importance of references in scientific research.
17. Explain the basic functions of system software tools.
18. Asynchronous communication.
19. What are terminal emulators? How they are useful to research?
20. Briefly discuss concurrency control in database environment.
21. List issues of window management.
22. List issues of keyboard management.
23. List out the various OOAD methods to design the application.
24. Outline the features of functional model of the OMT.
25. Outline the features of dynamic model of the OMT.
26. List the toolbox support in MATLAB
27. Tabulate function name, method, brief description for ODE(ordinary distinguished Equation) solvers
28. Use MATLAB to perform five operations on complex numbers.
29. Illustrate the use of MATLAB function to determine relative correlation between the two variables.
30. Illustrate the use of MATLAB plot function of MATLAB to draw 2D plot
31. Illustrate the use of MATLAB polyfit function to fit a curve
32. Justify the utility of M-file in MATLAB environment.
33. Write steps with MATLAB function/commands to obtain inverse of a matrix square
34. Write steps using MATLAB functions/command to obtain differentiation and integration of symbolic objects
35. Illustrate the use of ezplot function of MATLAB

Paper-II

Scientific Communication

Section-A (Common for all faculties)

1. Basics of Communication skill.
2. English Grammar
   a) Word Choice, Sentence Structure, paragraph structure
3. Types of Scientific Communication.
4. Importance of publishing research paper
5. Publishing paper :
   a) Preliemnaries, Format, Choosing Journal
   b) Title, Running Title
   c) Authors: Single and Multi authorship
   d) Writing Abstract
   e) Selecting Keywords
   f) Introduction section
   g) Materials and Methods Section
   h) Result Section
   i) Figures : Design Principles, Legends, Table components, Graphs: Types, Style, Tables v/s Graph
   j) Discussion Section: Format, Grammar Style, Content.
   k) Acknowledgements
   l) References : Different Styles
   m) Communication with the Editor, Handling Referees' Comments, Galey Proofs
6. Writing Review Articles
7. Preparing Posters for Scientific Presentation
8. Preparing and Delivering of Oral Presentation
9. Writing Practical Reports.
10. Avoiding Plagiarism
11. Research Grant funding Agencies, Preparing for application to grant providing Agencies.
12. Patent drafting and submission
13. IUPAC symbols and Terminology for physicochemical quantities and Units, SI prefixes, Fundamental Constants, Standard Abbreviations and Symbols
14. Preparing documents for Technology Transfers, MoUs, Confidentiality Agreements

Reference Books:

1) Study and Communication Skills for the Biosciences by *Stuart Johnson and Jon Scott,* Oxford University Press
2) Write and Publish a Scientific Paper by *Robert A. Day* Oryx Press
3) Scientific Easy when you know how by *Jennifer Peat* BMJ Books
4) Research Projects and Research Proposals A Guide for Scientists Seeking Funding by *Paul G. Chapin* Cambridge University Press

Section – B (Faculty of Computer Science)

Exposure on

- Study of general guidelines for authors in journals
- Study of research papers in the area of interest
- Analysis of studied research papers
- Planning for research paper
- Components of the planned research paper
- Critical parameters of each component
- Compilation of manuscript
- Preparation of Hardcopy and Softcopy version of manuscript
- Selection of Journal
- Submission of manuscript
- Final Submission of paper after review comments
- Select an area from emerging technologies
- Plan for an innovative project
- Plan for project proposal
- Compilation of proposal with data
- Selection of funding agency (UGC, AICTE, GUJCOST, DST, IT Ministry, CSIR, etc.
- Submission proposal to the agency.
- Use of MS-VISIO, MATLAB, LABVIEW for scientific visualization of data.

Evaluation:

Evaluation: [Based on university examination**,** 100 marks paper of 3hrs]

Section A will be having a weightage of 60 marks. Questions will be of objective types.

Section-B marks will be having a weightage of 40 marks. Answers to any question should not exceed more than five lines.

Model Question Paper:

Kadi Sarva Vishwavidyalay

Ph. D Course Work

Paper-II Scientific Communication

Duration 3 hrs. Total Marks: 100

Section A

Que 1: Answer the following objective questions **Marks[20]**

(1) The order of research papers would be :
   (a) title, topic , plan
   (b) redraft , review, analyse
   (c) report , result ,discussion

(2) The standard format of scientific paper is :
   a. title , abstract ,introduction
   b. acknowledgement, result, keywords
   c. statistics , printing ,calculations

(3) The three main ways of presenting statistical data are :
   (a)text ,table , graphs
   (b)images ,check list , discussion
   (c) Histograms , result , reference

(4) The characteristics of effective presentation :
   (a)relevant , informative, well structured
   (b) objective , discussion ,graph
   (c) title, calculation, reference

(5) It is used to separate distinct phrases
   (a) comma
   (b) full-stop
   (c) Apostrophe

(6) Abbreviations are generally put into
   (a) Brackets ( )
   (b) Punctuations
   (c)Box

(7) A paragraph is usually made up of
   (a) Several sentences
   (b) Idiom phrases
   (c) Prepositional phrases

(8) A paragraph development has following components
   (a) Topic, coherence, unity, development
   (b) Topic, repetition, summary

(9) Deliberate plagiarism is
   (a) Copying, collaborating,
   (b) Ignorance, poor planning

(10) In the research paper following terms should be avoided
   (a) Contrast (but, yet, still)
   (b) Conjunctions (and, punctuations)

(11) The scientific writing commonly involves
   (a) Active voice
   (b) Passive voice

(12) What should be use to introduce a quotation or list of an example
   (a) Semi-colon;
   (b) Colon:

(13) Which of the following is used to depict the clarity in diagram
(a) Legends
(b) Pictures
(14) Representation of the reference should be in
(a) Ascending order
(b) Descending order
(15) "Et alli" is a Latin tern which means
(a) And others
(b) Followed by others
(16) A scientific presentation should be
(a) Precise
(b) Lengthy
(17) Plagiarism destroys
(a) Independent thinking
(b) Dependent thinking
(18) Understanding while listening is known as
(a) Engage listening
(b) Evaluating
(19) To display data related to frequency we use
(a) Histrograms
(b) Holograms
(c) Scattered graph
(20) Which of the following tool is used to manage the tabular data?
(a) Spreadsheets
(b) Word processors

Que 2: Answer the following True/False **Marks[20]**

1) Lecturers are merely about information from the lecture to the audience.
2) Plagiarism of content should not be avoided.
3) Plagiarism is used to make copy from one source to another.
4) Commas can be used to separate items in a list.
5) The colon is used to link two similar statements.
6) While writing an essay emphasize should be given to diagrams or other forms of illustration.
7) Textbooks are often written by large team of authors.
8) In a research paper the result section contains quantitative data analyzed by statistical techniques.
9) Abbreviations are used to write lengthy terms.
10) A title should not be given to the illustration.
11) Referencing should be omitted at end of the academic writing.
12) Appropriate strategy should not be adopted for your research work.
13) When searching for specialist scientific information, then academic journals should be main (primary) source of information.
14) The major web search engines can be used to scan literary pages of information for your research paper.
15) Citation are the specific acknowledgement to other people, these will the name of the person and the date.
16) The writing up your practical work is the initial stage of the process.
17) During the experiment record your result carefully, clearly, identifying numerical values and the unit in which they are measured.
18) The abstract should not give essential information to the reader.
19) The concussion of research should be related back to the initial aim.
20) The title should be lengthy and less informative.

Que 3: Fill in the blanks **Marks [20]**

(1)A_____ is for producing list of key headings, subheadings and specifis details.
(Visual plan, Linear plan)

(2)_____ is a common problem in all universities. (plagiarism, collaboration)

(3)_____ are used at the end of your research papers. (Introduction, bibliography)

(4)_____ is the process of acknowledging any form of idea, information , illustrations , experimental methods , computer programmes etc. (referencing, citations)

(5)_____ section describes the way in which research was undertaken. (discussion , methods)

(6)_____ is the short descriptor of the paper.(title , abstract)

(7)_____ provide unpublished information. (lectures , course)

(8) A bigger class makes individuals within the class more _____ .(anonymous , relationship)

(9) _____ are used to denote short forms.(abbreviations , title)

(10) _____ indicates the end of a sentence. (colon , full stop)

(10)_____ should be written at the end of writings .(referencing, introduction)

(11)_____ may be seen a little harsh and deliberate.(self plagiarism , aacidental plagiarism)

(12)_____ should provide the essential information to the reader. (abstract , discussion)

(13) _____ are lees frequently used than commas .(semi colon ,full stop)

(14)Describe is often used to mean the same as _____. (compare , discuss)

(15) _____ are used to expand knowledge and understand the topic.(text book, lecture notes)

(16) _____ is the online encyclopedia.(wikipedia , google)

(17)_____ and _____ are important stages of writing essays.(reviewing and redrafting ,rereading and reanalyzing)

(18) _____ is very important part of learning process.(feedback , essay)

(19) _____ section is the core of the report.(result , text book)

(20)_____ are very useful for presenting data in an organized form.(table , graph)

Section B

[Answers to any question should not exceed more than five lines]

Que 3: Attempt following question [any 4] **Marks[20]**

1. List care taking features while writing an algorithm..
2. Select a tool to represent data model and list its features.
3. List components of research paper to be published in journal.
4. Illustrate reference writing in a thesis.
5. Write elegant to extract data in interview process from a prominent person.

Que 4: Write a short note on [any 4] **Marks[20]**

1. List funding agencies for the computer science research.
2. List current areas of research for research project proposal
3. Steps to be considered for submitting the proposal to funding agencies
4. List standards used for software development.
5. Justify the need of functional decomposition diagram.
6. enlist the utility of CASE tools.

1. Question paper can have objective/short question (as per the subject wise weight age) etc.
2. Internal options to be given in each question.

Additional Question Bank

Scientific Communication

SECTION A

1. How can a Word Template be designed for any reputed Site? Give technical format.
2. How can the sections be distinguished in journal writing?
3. What will be the effective factors for a good report generation?
4. During a lecture session , how can a priority be set up in preparing notes and listening?
5. Give some general guidelines for authors in journals
6. On what strategies can analysis be done while studying research papers?
7. List out the components of the planned research paper
8. What are the areas to be considered while compiling manuscript?
9. How is effective planning done for project proposal?
10. The reader should be intrigued within the first 5 minutes of reading; excited within 15 minutes; satisfied after 45 minutes. Rationalize your ideas.
11. If your research paper has been rejected, how will you analyze the lapses?
12. How can the different types of publications be referred? Give technical details.
13. What is the good structured paragraph mean/
14. What are the points to be remembered while referring to a figure?
15. List some skills required in designing knowledge of dissertation?
16. How can research work be defined?
17. After a paper is written, what factors should be considered before presentation?
18. What are the two options considered for preparing a good , effective notes after attending planning for a research paper?
19. “Plagiarism of a content should be avoided” Justify the statement
20. What is the difference between citing and referencing?
21. What is the standard format for scientific paper?
22. Explain the structure of representing a research paper?
23. Give a brief description of note making strategies?
24. Distinguish verbatim notes and outline notes.
25. What are the factors involved for producing a good presentation?
26. Explain the characteristics of effective scientific presentation?
27. What is the planning required for overcoming anxiety in spoken presentation?
28. What are the different types of visual aids used in presentation?
29. What goes in the reference depends on the type of publication? (give the format)
30. “Don’t overuse typographic tools” Justify the statement.

SECTION B

6. While writing an algorithm what you should take care? Give an example.
7. What tool do you use to represent data model to represent the conceptual schema which shows association among the data clearly and give the important features to use that tool.
8. How you can write H_0 hypothesis for the research problem?
9. List different steps in writing research report?
10. For the data collection for your research study from prominent person in firm (i.e VP), how do you frame interview set of questions?
11. List out the three names of funding agencies for the computer science research.
12. What are the steps to be considered for submitting the proposal to funding agencies?
13. Write the standards to be followed while documenting KAPs for level 3-(defined)?
14. What is the purpose of Functional Decomposition Diagram?
15. What is purpose of the CASE tools for documentation?

PAPER III (Faculty of Computer Science)

RECENT TRENDS IN COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

DATA MINING AND DATA WAREHOUSING (25%)

Advanced Database Technologies
Fundamentals of data warehousing and data mining
Data Warehousing Architectures
Data mining Techniques

WEB TECHNOLOGIES AND SERVICES (25%)

Web Application Architectures
E-Payments Gateways and Mechanism
E-Governance Systems
E-Learning Systems

SOFTWARE TECHNOLOGIES (25%)

Programming Paradigms and Platforms
Service Oriented Architectures
Software Quality Assurance
Software Testing
Knowledge Management and Intelligent Systems
Enterprise Application Integration: ERP Applications

HARDWARE AND NETWORKING TECHNOLOGIES (25%)

Processor Architectures
Operating Systems
Embedded Systems
Networking Technologies
Next Generation Heterogeneous Networks

Evaluation: [Based on university examination**,** 100 marks paper of 3hrs]

Section A will be having a weightage of 60 marks. Questions will be of objective types.

Section-B marks will be having a weightage of 40 marks. Answers to any question should not exceed more than five lines.

Model Question Paper:

Kadi Sarva Vishwavidyalay

Ph. D Course Work

Paper-III Recent Trends In Computer Science And Information Technology

Duration 3 hrs. Total Marks: 100

Section A

Que 1: Answer the following objective questions **Marks [20]**

1. Which of the following is true in the context of Inter-process communication:

    a. It is like a user defined procedure call.

    b. It is like user defined a function call.

    c. It is a system call.

2. For IPC communication the OS employs an internally defined data-structure which is defined:

    a. In user space

    b. As a separate area which is neither in user space nor in kernel space

    c. In kernel space

3. Which of the following are characteristics of an RDBMS?

    a) It cannot use SQL.
    b) Queries are possible on individual or groups of tables.
    c) Data are organized in a series of two-dimensional tables each of which contains records for one entity.
    d) Keys may be unique or have multiple occurrences in the database.
    e) Tables are linked by common data known as keys.

4. With SQL, how can you return the number of records in the "Persons" table?

    a) SELECT COLUMNS(*) FROM Persons
    b) SELECT COUNT() FROM Persons
    c) SELECT COUNT(*) FROM Persons
    d) SELECT COLUMNS() FROM Persons

5. Which of the following is not an example of spatial data?

    a) Points showing location of discrete objects.
    b) Lines showing the route of linear objects.
    c) Times of particular events.
    d) Polygons showing the area occupied by a particular land use or variable.

6. A transaction processing system is concerned with

    a) Operational day-to-day activities.
    b) Strategic decision-making support.
    c) A large database of specialised knowledge.
    d) Support for an organisation’s management needs

7. Which of the following is not a component of an information system?

    a) Equipment
    b) End-user
    c) Organisational goals
    d) Procedures

8. Web-based solution has been developed and needs to be tested. Which attributes should be tested?

    a) Useability, functionality, spelling.
    b) Useability, spelling, presentation.
    c) Useability, functionality, presentation.
    d) Spelling, functionality, presentation.

9. What is the result of 16>>2?

    a) 4
    b) 8
    c) 3
    d) 0

10. Consider a linked list implemented of a queue with two pointers: front and rear. What is the time needed to insert element in a queue of length of n?

    a) O(log2n)
    b) O(n).
    c) O(1).
    d) O(n log2n).

11. Fetching past the last row of a cursor

    a) Raises the NO_DATA_FOUND Exception
    b) Raises the VALUE_ERROR Exception
    c) Raises the CURSOR_NOT_FOUND Exception
    d) Does not raise an exception

12. What is the correct syntax of the declaration which defines the XML version?:

    a) <xml version="1.0" />
    b) <?xml version="1.0"?>
    c) . <?xml version="1.0" />
    d) None of the above

13. Pick up the odd one out of the following:

```
a) data flow design
b) object identification
c) structural decomposition
```

14. The Internet was orginally a
    a. LAN at MIT
    b. Code-cracking network during World War II by the U.S. Defense Department
    c. A network cooperatively created by several large hardware and software companies
    d. A small experimental research network called ARPANET
    e. A Microsoft product that quickly became too big for the company to control

15. Specialized servers are used on the Internet to
    a. Function like email post offices
    b. Accept FTP requests to upload the download files
    c. Store applications that are rented or leased by large corporations
    d. Store and send Web pages
    e. All of the above

16. Quicktime, RealOne, and Shockwave are among the most popular Web browser
    a. Plug-ins
    b. Cookies
    c. Cascading stylesheets
    d. Search engines
    e. Security tools

17. Which of the following is the formof push technology that has been embraced by most Internet users?
    a. Peer-to-peer sharing
    b. Web searching
    c. FTP
    d. email
    e. grid computing

18. Which of these types of Internet connections is typically the slowest?
    a. Direct connection through T1 lines
    b. Dial-up modem connections through phone lines
    c. DSL connections through phone lines
    d. Cable modem connections through cable TV lines
    e. Satellite connections through satellite dishes

19. An online shopping catalog for a large outdoor outfitter is almost certainly
    a. A data-driven Web site that seperates site content from design
    b. Carefully hand-coded in pure HTML to minimize errors
    c. Designed to work without cookies
    d. Limited to work with a single type of Web browser for consistency
    e. All of the above

20. Telephone systems may be classified as:
    a). simplex and asymmetrical
    b). duplex and asymmetrical.
    c). duplex and symmetrical.
    d). simplex and symmetrical

Que 2: Answer the following True/False **Marks[20]**

1. As a function fork evaluates to true in parent.
2. Redundancy is minimized with a computer based database approach.
3. A row in a database can also be called a domain.
4. In a networked web based GIS all communications must go through an internet map server.
5. Human factors influence the success of GIS as a decision support tool.
6. Unicode characters can be represented by hexadecimal numbers.
7. No column of a Non-key preserved table can be modified through a view.
8. Windows.h is a master include file that includes other Windows header files.
9. The Unicode character and a wide character are same.
10. Windows directly places the keyboard messages into the application's message queue, when a key is pressed and released.
11. Windows maintains a system message queue for the keyboard messages.
12. When packets collide on an Ethernet network, the packet with highest address goes first.
13. When two simultaneous transactions are running, one is reading a value and another is writing a value this situation is known as conflict.
14. Data warehouse is an essential to carry out data mining.
15. HTTP is connectionless protocol.
16. A MIDI sequences as digital recording of a human speech.
17. Wave form audio is analogues to bit map graphics, MIDI music is analogues to vector graphics.
18. The file extensions of .wmf indicate vector graphics format.
19. a 256 gray scale graphics requires 8 bits of each pixel.
20. Router device is used as the part of network layer of the standard OSI network model.

Que 3: Fill in the blanks **Marks [20]**

1. To print the message along with the variable ew use the package _____ .
2. To select data from a range of values _____ operator is used.
3. A _____ expression returns either TRUE or FALSE.
4. _____ number of columns can be used in an ORDER BY clause.
5. Just as the entry point to a C program is the function main (), the entry point to a Windows program is _____. (WinMain(), Win32())
6. The three main Windows libraries are _____, _____ & _____. (Kernel.32, User32, GDI32,)
7. The size of Unicode character is ___ bits.(16,32,64)
8. _____ twisted pair cabling can you use for 10baseT networks with transmission speeds of up to 10 mbps?
9. Files send to a network printer are placed in _____. (Spooler, buffer)
10. A _____ is a small circuit board design to plug-in to in expansion slot on a computer main board. (NIC, MAC)
11. SOA stands for_____.
12. To run a program on a remote hot you can use internet service called _____. (Telnet, vi)
13. _____ is a method for transferring files from one computer to another.
14. Each web page has unique address that is called a _____. (URL, WRL)
15. A video is composed of a series of _____. (frames, slides)
16. Middleware means _____.
17. Video is displayed with _____ per second.
18. When two transactions are waiting for each other to release the data , this situation is known as _____.
19. Compressing a file is called _____, uncompressing a file is called _____.
20. Tuple is know as _____.

Section B

[Answers to any question should not exceed more than five lines]

Que 4: Attempt following question [any 4] **Marks[20]**

1. Normalisation is the process to reduce the redundancy and inconstancy" Justify your answer.
2. Illustrate multi-dimensional angles data cube.
3. List the steps for payment gateway process?
4. Outline the major benefits of e-Learning.
5. List out the major benefits of e-Learning.

Que 5: Write a short note on [any 4] **Marks[20]**

1. Give some examples of tag based programming and OOP.
2. List the components of cloud computing.
3. Differentiate between static and dynamic web services
4. What is the purpose of context switching between processors fulfill?
5. Illustrate sub-Netting mask and its features

1. Question paper can have objective/short question(as per the subject wise weight age) etc.
2. Internal options to be given in each question.

DATA MINING AND DATA WAREHOUSING (25%)

Advanced Database Technologies

1. How is snapshot agent responsible in the database management?
2. Discuss the architecture of the RDBS. (Any ORACLE, Sequel Server etc).
3. Discuss the concept of RMAN in ORACLE
4. Normalisation is the process to reduce the redundancy and inconstancy" Justify your answer.
5. Differentiate the use of ER – Model and Relationship diagram for developing the conceptual data design.
6. "Data is assets for the corporate" Justify your answer.
7. Discuss the use of privileges in the database system.
8. Explain the Backup and Recovery mechanism in DBMS.
9. Discuss the mapping between conceptual schema , logical schema and physical schema for the database architecture.
10. Discuss the concurrency control in DDBMS.

Fundamentals of data warehousing and data mining

11. Is Data Warehousing a pros or a con for an ideal manger?
12. Does OLTP has an advantage over OLAP? Justify your answer,
13. Data cubes deal in multi-dimensional angles. How can computations be performed on Data Cubes?
14. How does Data Mining impact Social sphere in a company?
15. Why is it important to trace outliners?
16. What are fundamental stages of Data Warehousing? Offline Operational Databases
17. Distinguish between OLTP, OLAP and Data Mining.
18. Discuss the key success factor to implement DW project.
19. What are the different users for the DW environment.
20. Explain information cube in DW.

Data Warehousing Architectures

21. Selecting server architecture is a key decision. Rationalize this statement.
22. How does Data repository affect our database?
23. Mark the importance of middleware?
24. Compare and contrast Virtual data warehouse and Distributed Data Warehouse.
25. How do you develop your fresh Data Warehouse increment when your architecture is new and fresh?
26. Data Warehouse is an iterative process that follows a spiral pattern. Substantiate your ideas.
27. What Data integration and transformation?
28. Explain data transformation?
29. Explain E, T, L in terms of DW.
30. Explain Virtual DW.

Data mining Techniques

31. Explain data mining query language?
32. Explain visualization of discovered patterns?
33. Explain association rule mining?
34. Explain issues regarding classification and prediction?
35. Explain Bayesian classification?
36. Explain types of data in cluster analysis?
37. Explain partition-based methods?
38. Explain hierarchical based methods?
39. Explain data mining system products and research prototypes?
40. Explain data mining and intelligent?

WEB TECHNOLOGIES AND SERVICES (25%)

Web Application Architectures

41. Can virtual company emerge over internet?
42. How does proactive intrusion prevent the flow information?
43. How to create web services in .Net?
44. Give the difference between HTML and XML?

45. write about web gardening and web farming.
46. explain in brief about generic HTTP and HTTP servelets?
47. Explain various components of web application architectures.
48. What would be the impact of AJAX in Web application?
49. Discuss the application of middleware in web based application.
50. Name the few difference between .net application and Java application.

E-Payments Gateways and Mechanism , E-Governance System and E-Learning System

51. List the various collaborative facilities available in e-learning?
52. What are the steps for payment gateway process?
53. Difference between notify URL and return URL in PayPal payment gateway.
54. Explain the major benefits of e-Learning.
55. How e-learning system works?
56. Discuss the application of e-learning system.
57. Discuss the application of e-governance.
58. Identify the best software technology which can be used to develop the e-learning system.
59. E-commerce has replaced the brick and mortar approach of business: give your view.
60. What are other mechanisms (like interfaces, security aspect etc) is used in e-governance?

SOFTWARE TECHNOLOGIES (25%)

Programming Paradigms and Platforms

61. Can we hide a form during execution using Hide property? Give reasons.
62. What is the term that describes methods that execute using synchronous processing?
63. Compare and contrast tab and stacked canvases?
64. Compare of servelet and CGI.
65. Give some examples of tag based programming and OOP.
66. List the components of cloud computing.
67. Does schema emerge over DTD(document type definition)? If yes, justify
68. Discuss an another r way for not overwriting servelet?
69. How to handle garbage collector in .Net?
70. What is daemon thread in JAVA?

Service Oriented Architectures

71. Compare agent based an d component based Architecture
72. What is the role of web services adapters in SOA.
73. Differentiate between static and dynamic web services
74. What are the factors involved in designing SOA?
75. How you can achieve lose coupling in a SOA?
76. Discuss the common pitfalls of SOA.
77. What is important to adopt: a technical skill or cultural? Justify your answer.
78. What is difference between services and components?
79. What is the impact of SOA in development of IS?
80. For service identification which approach is better top-down Or bottom-up encourages re-use and maintenance.

Software Quality Assurance

81. During the parallel run is implemented in implementation phase, what are the activities to be considered?
82. If SQA(software quality assurance) is carried at end of the project, How does software implementation gets affected?
83. list out a live tool used in s/w testing.
84. Differentiate validation and verification with an example.
85. “Quality audit is required in the system development” Justify the answer.
86. Give your opinion for automated software quality will improve the software quality.
87. What are the quality management factors are required to establish better quality system?
88. Distinguish between QA and Software testing.
89. Define the term quality policy for the quality system.
90. What is quality circle?

Software Testing

91. Explain about a live software testing technology?
92. Does “demolition squad” fulfill the requirements of clients? Justify your answer.
93. “The perfect software Is a myth.” Justify in technical terms.
94. Debate “ Testing should be conducted by a third party”.
95. How does Path coverage Criteria benefit over Edge Coverage Criteria?
96. In which situation you can plan for applying the agile testing?
97. Give one of the situation in which we need to you boundary analysis in testing.
98. Give the test case for any of the program logic of your choice.
99. How you can define the degree to which a system or component facilitates the establishment of test criteria and the performance of the tests to determine whether those criteria have been met?
100. Distinguish debugging and testing.

Knowledge Management and Intelligent Systems

101. How is knowledge management and Management information systems differed?
102. Explain the features of knowledge portal?
103. Discuss the various designing goals for KM system.
104. Discuss the impact of KM in business problem solving.
105. “Organization process and technology are vital components of KM system”. Justify your answer
106. Give your opinion for the statement “KMS is encouraging knowledge sharing”
107. How you can say that Information Technology is an enabler for the KM?
108. Differentiate tacit knowledge and explicit knowledge.
109. Give the skeleton of KMS architecture for any hypothetical organization.
110. Explain the term intellectual capital.

Enterprise Application Integration: ERP Applications

111. How is conventional application package and ERP package differed?
112. Is it advantage for a company to develop its own ERP or use ERP from
113. Application service provider?
114. What are the few features of SAP application?
115. How does business affect by using e-business value chain?
116. Discuss the external and internal constraints in the development of ERP system.
117. Discuss the various aspect of the ERP system failure in an organization.
118. ERP systems provide information integration ! give your comments on it.
119. How the change management is affecting the ERP?
120. Give the one ERP application tool available and list out its features.

HARDWARE AND NETWORKING TECHNOLOGIES (25%)

Processor Architectures

121. What are the ideal conditions for instruction pipelining?
122. How does a microprocessor response to an interrupt with respect to a pin configuration?
123. What is the purpose of context switching between processors fulfill?
124. Explain the functioning of a graphic card board memory of 1MB?
125. What is the technique of virtual memory system with FIFO page replacement policy?
126. What is disk mirroring?

Operating Systems

127. What are the factors options for monitoring a system performance?
128. What does the functioning of TSR(terminate and stay resident) program affect the system performance?
129. List out the technical differences between spooling and buffering?
130. We have to create a lab of 50 computers with the following hardware configurations. On Client side we have 256 MB RAM,P-4 processor,20 GB HHDD, On server side : 4GB RAM, kaud core processor, 400 GB HDD. Which OS can be suggested at both sides for maximum utilization of HDD? Give technical reasons.
131. Compare GFS with other file systems.
132. When segmentation fault error does arise?

133. Registry is not used in LINUX. Justify

Embedded Systems

134. Explain arm processors and arm micro controller?
135. How does RTOS work?
136. Describe the working of ES and GIS.

Networking Technologies

137. Why is MAC address of a network adapter generated?
138. Why should we have a printer configured in a gateway?
139. What are the concerned layers of DOD model?
140. If your network is segmented into three parts. How is the list of resources from each segment replicated to all other segments?
141. What are the attributes of a software-based stripe set with parity on Windows NT Server?
142. Explain sub-Netting?
143. Compare IGRP, E-IGRP routing protocols?
144. How is SAMP used in windows platform?
145. Differentiate IP tables and TCP wrappers?
146. Write about encryption standards?

Next Generation Heterogeneous Networks

147. "Technology enabled retail learning centers can be open to both students and non students" Justify this statement.
148. Describe Fuzzy logic strategy over Artificial Intelligence?
149. What is multiprotocol packet label switching (MPLS) and resilient packet ring (RPR)?
150. What is message oriented middleware (MOM)?