Department of Computer Science & Engineering
and
Department of Information Technology
GITAM Institute of Technology
GITAM (DEEMED TO BE UNIVERSITY)
(Estd. u/s 3 of the UGC Act, 1956), NAAC Accredited with `A+' Grade
Gandhinagar Campus, Rushikonda, Visakhapatnam-530 045, A.P., India

Ph.D. Entrance Test - 2019-20 (Phase-II)

Part – A: Research Methodology

Syllabus:

What is Research; Objectives, Motivation, Types of Research. Literature Review and Technical Reading, Attributions and Citations, Building Intellectual Property Rights: Codes and Standards, Ethics in Engineering Research, Technical Writing and Publishing, Communicating Research Work: Presentation Skills, Assessing Research Quality.

Reference Books:

1. Dipankar Deb, Rajeeb Dey, Valentina E. Balas, Engineering Research Methodology, A Practical Insight for Researchers, Springer Publications, 2019
2. C. R. Kothari, Research Methodology – Methods and Techniques, New Age International Publishers, 2004.
3. David V. Thiel, Research Methods for Engineers, Cambridge University Press, 2014.

Part B: Common for Computer Science & Engineering and Information Technology

Syllabus:

COMPUTER ORGANIZATION:
Logic functions, minimization, design and synthesis of combinatorial and sequential circuits. Machine instructions and addressing modes, ALU and control, memory interface, I/O interface (cache, main and secondary storage. data path and hardwired), serial communication interface, cache, main and secondary storage.

DATA STRUCTURES AND ALGORITHMS:
stack, queue, list, set, string, tree, binary search tree, heap, graph, tree and graph traversals, connected components, spanning trees, shortest paths, hashing, sorting, searching, design techniques (greedy, dynamic, divide and conquer), asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds.

OPERATING SYSTEMS:
Classical concepts (concurrency, synchronization, deadlock), processes, threads and interprocess communication, CPU scheduling, memory management, file systems.

SOFTWARE ENGINEERING:
Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle.

DATABASE MANAGEMENT SYSTEMS:
Definition, relational model, database design, E-R diagrams, integrity constraints, normal forms, query languages (SQL).

DATA COMMUNICATION AND NETWORKS:
ISO/OSI stack, transmission media, data encoding, multiplexing, flow and error control, LAN technologies, network devices – switches, gateways, routers, ICMP, application layer protocols – SMTP, POP3, HTTP, DNS, FTP, Telnet.

THEORY OF COMPUTATION:
Finite automata, Regular expressions, Context-free grammars

REFERENCE BOOKS:

COMPUTER ORGANIZATION:
1. M. Morris Mono, Computer System Architecture, 3/e, Pearson education, 2008.

DATA STRUCTURES AND ALGORITHMS:
1. Data Structures, Algorithms and Applications in Java, Second Edition by SartajSahni, Universities Press.
2. Object Oriented Data Structures using Java, Nell Dale, Austin Daniel T Joyce, Chip Weems, Jones and Bartlett Publishers.

OPERATING SYSTEMS:
1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Concepts with Java, 9/e, John Wiley, 2016.

SOFTWARE ENGINEERING:
1. Roger S. Pressman, Software Engineering: A Practitioner's Approach,7/e, McGraw Hill, International Edition, 2009.

DATABASE MANAGEMENT SYSTEMS:
1. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke McGraw-Hill, 3rd Edition,2014.

DATA COMMUNICATION AND NETWORKS:
1.William Stallings, Data and Computer Communications, 8/e, PearsonEducation., 2013.

THEORY OF COMPUTATION:
1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, 3/e, Pearson, 2008.

Ph.D. Entrance Test - 2019-20 (Phase-II)
Model-Question paper

Duration: 2hours **Max Marks 70**

Part – A: Research Methodology

Section - A contains : 25 questions × 1 mark = 25 Marks
Section- B contains : 15 questions × 2 marks = 30 Marks
Section-C contains : 5 questions × 3 marks = 15 Marks

Section-A
Answer the following each question carries 1 Mark
25 questions × 1 mark = 25 Marks

1. Essence of both basic and applied research lies in
a)Market orientation b)scientific method
c) Performance monitoring research d) costing methods

2. Which of the following is the first step in starting the research process?
a) Searching sources of information to locate problem. b) Survey of related literature
c) Identification of problem d) Searching for solutions to the problem

3. Research involves all the following except
a)Promotion b)validation c) Control d) Testing

4. Statement of research problem is preceded by
a) Objectives b) Introduction c) Review of literature d) Methodology

5. The following are the features of a good research study except
a)Should be replicable b) Should be systematic and objective
c)Should be completed in 6 months d)Should be ethical and unbiased

6. Applied research is directed towards
a) Problem solving b)Action oriented research
b) Real time problems d) All of the above

7. The primary objective of ---------- is to provide insights into and an understanding of the problem confronting the researcher
a) Exploratory research b) Conclusive research
c) Casual research d) Descriptive research

8. Qualitative research is
a) is essentially same as the quantitative research
b) Employs rigorous mathematical analysis
c) is subjective in nature d) is objective in nature

9. In compare to the primary data, secondary data can be collected
a) Rapidly and easily b) At a relatively low cost
c) In a short time with less effort d) All of the above

10.Which of the following gives the measure of the consistency of data?
a) Mean b) Standard deviation c) Mode d) Median

11.Descriptive research is conducted for all the following reasons except
a)To describe the characteristics of the relevant groups , such as consumers, company personnel, organizations or territories
b)To determine the occurrence of study variables
c) To understand which variables are the cause and which variables are the effect of a phenomenon
d)To determine the perceptions of construction and their features

12. The practice of someone's work/idea/paper as one's without proper acknowledgement is termed as
a) Citation b) plagiarism c) Referencing d) none of the above

13. In the process of conducting research 'Formulation of Hypothesis" is followed by
a) Statement of Objectives b) Analysis of Data
c) Selection of Research Tools d) Collection of Data

14. A research paper is a brief report of research work based on
a) Primary Data only b) Secondary Data only
c) Both Primary and Secondary Data d) None of the above

15. Conference proceedings are considered as.....documents.
a) Conventional b) Primary c) Secondary d) Tertiary

16. Which of the following is not a "Graphic representation" ?
a) Pie Chart b) Bar Chart c) Table d) Histogram

17. One of the following search engine is exclusively meant for scientific information :
a) Google b) Yahoo c) SCIRUS d) Altavista

18. What is full form of IPR
a) Intellectual property rights b) Intelligent property right
c) Intellectual property right d) Intelligent property rotation

19. Protocol means..... .
a) Interchange of data between two devices b) Interchange of data between two computers
c) Linkage between two computers d) Linkage between two devices

20. Questionnaire is
a) Research method b) Measurement technique
c) Tool for data collection d) Data analysis technique

21. A Research Report is a formal statement of
a) Research process c) Data collection b) Research Problem d) Data Editing

22. A short summary of technical report is called
a) Article b) Research Abstract c) Publication d) Guide

23. Ethical Neutrality is a feature of
a) Deduction b) Scientific method c) Observation d) experience

24. Scientific method is committed to …….
a) Objectivity b) Ethics c) Proposition d) Neutrality

25. Research method is a part of ……..
a) Problem b) Experiment c) Research Techniques d) Research Methodology

Section-B
Answer the following each question carries 2 Marks
15 questions × 2 marks= 30 Marks

26. Before searching you should define the timeframe of your search. Why?
a) So you don't find the library busy b) So you find the most articles
c) So you work when you are most efficient d) So you do not incur unnecessary costs

27.Why is it important for a researcher to review the literature?
a) Because it is traditional b) Because it will find if anyone has done the work before
c) Because it identifies like-minded researchers d) Because it shows time has been spent on the subject

28. The literature review will examine:
a) all aspects of a topic b) only facts
c) only one side of the main argument d) only opinions

29. Writing your research objectives clearly helps to
a) Define the focus of your study b)Clearly identify variables to be measured
c) Indicate the various steps to be involved d)Establish the limits of the study
e) All of the above

30. The starting point for a literature search is
a) tertiary data b) secondary data c) primary data d) some other data

31. Researchers need to be cautious of some material, particularly material found online. Why?
a) It has been used before b) The quality is unknown
c) The authors name often does not appear d) It is too recent

32.What do you mean by citation
a) A citation allows authors to provide the source of any quotations, ideas, and information on the copyrighted works of other authors
b) A citation allows authors to provide the source of any quotations, ideas, and information on the copyrighted works of own work
c) Citation is not typically related to copy right works
d) none of the above

33. When you discover that an author has, (1) cited another author (2) it is good practice to:
a) not to use the work b) use the work and attribute it to author 1
c) use the work and attribute it to author 2 d) locate and read the original, then attribute it to author 2

34.What are the important things when giving a presentation
a) Introduce yourself by name b) Slow down when you are speaking
c) Make eye contact with the audience d)Ask for questions from the audience at the conclusion of presentation e) All of the above

35. The objective of the communication is
a) Specific b) Measurable c) Attainable
d) Results – oriented and Time-limited e) All of the above

36. A side bar is used to
a) Useful way of physically framing the text and giving shape to the document.
b) Highly necessary c) Used to provide extra information such as organization, or publication; copyright, contact information d) both a& b is correct e) both a&c is correct

37. Which is the major disadvantage of using peer-reviewed journals in literature reviews?
a) The information is too recent b) Humans control the quality
c) Subscription fees are high d) Information could be as old as four years

38 Which of these will NOT help you to decide whether a publication is reputable?
a) Advertising inside b) Citation rate
c) Audience d) Importance to peers

39. When you cite Internet resources, you do not need to find
a) date created b) date of birth of the author
c) date last updated d) date of access

40. Which of these is the most efficient way to locate relevant journals?
a) Searching using tertiary sources b) Browsing the shelves in the library
c) Browsing in a newsagents d) Following up references in articles

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Section- C
Answer the following each question carries 3 Marks
5 questions × 3 marks= 15 Marks

41. What do you think might happen if you started a research project, but hadn't written any clear research objectives?
a) Confusion about the limits of study b) Collection of data is unlimited c) identify barriers and concerns d) only a is correct e) both a &b is correct

42. Surveying the literature involves
a) Narrow the problem itself b) identify the gaps c) limited information about the existing theories d) b is correct e) both a& b is correct

43.The purpose of attribution is
a) similar to citation b) not similar to citation c) Used to quote (or paraphrase **all or a portion** of an openly licensed work d) both a &c e) none of the above

44. Who is responsible for plagiarism?

a) Lecturers and supervisors b)The participant c) Institution
d) The researcher e) All of the above

45. How do you prepare for presentation?
a) Writing main argument or conclusion b) Writing the main points as headings
c) Timing the presentation & discuss the main issue by clear opening and closing line remarks d) all of the above e) only a& b

Part B: Common for Computer Science & Engineering and Information Technology

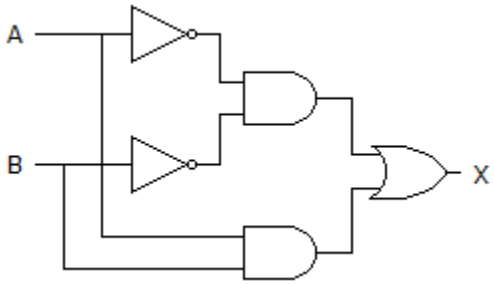
Section - A contains : 25 questions × 1 mark = 25 Marks
Section- B contains : 15 questions × 2 marks = 30 Marks
Section-C contains : 5 questions × 3 marks = 15 Marks

Section-A
Answer the following each question carries 1 Mark
25 questions × 1 mark = 25 Marks

1. The small extremely fast RAM is called _____.
a) Cache b) Static RAM c) Dynamic RAM d) SDRAM

2. What is the minimum number of two-input NAND gates used to perform the function of two- input OR gate?
a)Two b) Three c) Four d) Five

3. What is the logic expression of the following diagram?



a) X = A'B + AB b) X = AB' + AB c) X = A'B' + AB d) X = A'B'

4. The addressing mode, where one directly specify the operand value is
a)direct b) immediate c) indirect d) displacement

5. Process of inserting an element in stack is called
a)dequeue b) enqueue c) pop d) push
6. A data structure in which elements can be inserted or deleted at/from both the ends but not in the middle is _____
a)dequeue b) queue c) stack d) circular queue

7. What is the specialty about the inorder traversal of a binary search tree?
a) traverses in a decreasing order b) traverses in random order
c) traverses in an increasing order d) none of the above

8. What is the number of edges present in a complete graph having *n* vertices?
a) (n*(n-2))/2 b) (n*(n-1))/2 c) n*(n-1) d) n*(n-2)

9. Time complexity of running merge sort on an array of size *n* which is already sorted is_____.
a) Θ(log n) b) Θ(1) c) Θ(n) d) Θ(n log n)

10. The order of an algorithm that finds whether a given Boolean function of *n* variables produces a 1 is _____
a) exponential b) linear c) logarithmic d) constant

11. Which scheduling algorithm allocates the CPU first to the process that requests the CPU first?
a) shortest-job first b) round-robin c) first-come first-served d) priority based

12. A computer system has 6 tape drives, with *n* processes competing for them. Each process may need 3 tape drives. The maximum value of *n* for which the system is guaranteed to be deadlock free is _____.
a) 1 b) 2 c) 3 d) 4

13. Virtual Memory is _____.
a) An illusion of extremely large memory b) does not exist
c) RAM d) Cache memory

14._____ matches the start of the string in regular expressions.
a) '*' (asterick symbol) b) '&' (ampersand symbol)
c) '?' (question mark symbol) d) '^' (caret symbol)

15. The major difference between a Moore and Mealey machine is _____.
a) The Output of Moore machine only depends on the present state
b) The Output of Mealey machine only depends on the present state
c) both d) none

16. Let A, B and C be three languages. If A and C are regular and if AB = C, then what can one say about B?
a) B and C are same b) B need should be regular
c) B need not be regular d) B and A are same

17. The reliability of a program is 0.8. The reliability of an equivalent program (another program that servers the same purpose) is 0.9. The probability that both the programs give wrong output for the same input is _____.

a) 0 b) 0.02 c) 0.2 d) 0.1

18. Cohesion is a measure that defines _____.

a) the degree of intra-dependability among the elements of the module.
b) the degree of inter-dependability among the elements of the module.
c) both a and b d) none of them

19. What is the acronym for CASE in software engineering?

a) Computer Aided Software Engine b) Computer Algorithm Software Engineering
c) Computer Aided Sales Engineering d) Computer Aided Software Engineering

20. The program volume of a source code that has 10 operators including 6 unique operators, and 6 operands including 2 unique operands is _____.

a) 30 b) 40 c) 48 d) 50

21. The Normal Form which is considered to be adequate for relational database design is

a) Second Normal Form b) Third Normal Form
c) Fourth Normal Form d) Fifth Normal Form

22. The column of a table is referred to as _____.

a) Field b) Attribute c) Dimension d) All the above

23. One of the potential problem when a DBMS executes multiple transactions concurrently is _____.

a) Lost update b) dirty read c) both of them d) none of them

24. A computer network permits sharing of _____

a) Resources b) data c) both of them d) none of them

25. In _____ transmission mode, data can be sent in both directions but not at the same time.

a) Simplex b) Half-duplex c) Full-Duplex d) none of them

Section-B
Answer the following each question carries 2 Marks
15 questions × 2 marks= 30 Marks

1. Define Kleene Star for given alphabset Σ.

a) is the collection of all strings defined over Σ, including Λ
b) is the collection of all strings defined over Σ, excluding Λ

c) Universal set d) none of them

2. A connected planar graph having 6 vertices, 7 edges contains _____ regions.
a) 1 b) 2 c) 3 d) 4

3. Given an array that represents elements of arithmetic progression in order. It is also given that one element is missing in the progression, the worst case time complexity to find the missing element efficiently is _____.
a) Θ(n logn) b) Θ(logn) c) Θ(n) d) Θ(1)

4. A language for which there exists a Turing Machine T, that accepts every word in L and either rejects or loops for every word that is not in L, is said to be _____.
a) Recursively enumerable b) Recursively innumerable
c) enumerable d) None of them

5. Consider the grammar
$S \rightarrow PQ \mid SQ \mid PS, \quad P \rightarrow X, Q \rightarrow Y$
To get a string of *n* terminals, the number of productions to be used is _____
a) n + 1 b) n c) 2n d) 2n – 1

6. What are non-functional requirements in Software Engineering?
a) implicit b) performance c) cost d) all of them

7. Black box testing ____
a) checks if the desired outputs are produced when valid input values are given.
b) it does not verify the actual implementation of the program.
c) None of them d) both of them

8. Data dictionary _____
a) is referred to as meta-data.
b) is used to organize the names and their references used in system such as objects and files along with their naming conventions.
c) None of them d) both of them

9. Which of the following is the truth table of half-adder?
a) b)

X	Y	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

c)

X	Y	S	C
0	0	0	0
0	1	0	0
1	0	0	0
1	1	0	1

d)

X	Y	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	1	1

X	Y	S	C
0	0	0	0
0	1	1	0
1	0	1	1
1	1	1	1

10. Memory mapped I/O _____.
a) Uses different address space for both memory and I/O
b) does not use address space for memory and I/O
c) Uses of same address space for both memory and I/O
d) Uses address space for memory but not for I/O

11. Which of the following expression is reverse polish expression of the given expression.
(A + B) * [C * (D + E) + F]
a) AB + DE + C * F + * b)*+ AB +*+ DECF
c) ABDE ++ C * F + * d) +* AB +*+ DECF

12. In airline reservation system, the entities are date, flight number, place of departure, destination, type of plane and seats available. The primary key of this system is _____.
a) date b) flight number
c) date + flight number d) date + place of departure

13. A functional dependency of the form A → B is trivial if _____.
a) B is a subset of A b) A is a subset of B
c) A and B are disjoint d) None of the above

14. Which of the following is not among the seven layers in ISO / OSI reference model.
a) Physical layer b) Internet layer
c) Transport layer d) Network layer

15. In POP3 protocol, POP stands for _____
a) Port Of Protocol b) Post Office Port
c) Post Office Protocol d) Port Of Print

Section- C
Answer the following each question carries 3 Marks
5 questions × 3 marks= 15 Marks

1. Determine the number of page faults when references to pages occur in the order – 1, 2, 4, 5, 2, 1, 2, 4. Assume that the main memory can accommodate 3 pages and the main memory already has the pages 1 and 2, with page 1 having been bought earlier than page 2. Assume Least Recently Used algorithm is used.

a) 2 b)3 c) 4 d)5

2. Which of the following is not necessary and sufficient conditions for a deadlock to occur?

a) No mutual exclusion b) hold and wait
c) no preemption d) circular wait

3. Which of the follwing are anomalies in DBMS?

a) insertion b) deletion c)updation d) all of them

4. Assume data is 10110 and code generator is 1101. Which of the following is the Cyclic Redundancy Check (CRC) bits.

a) 101 b) 111 c) 100 d) 110

5. Consider a logical address space of 64 pages of 1024 words each, mapped onto a physical memory of 32 frames. How many bits are there in the logical address and physical address?

a) 16, 15 b) 16, 16 c) 15, 15 d) 15, 16