

10

***Practice
Sets***

**COMPUTER
SCIENCE & IT**

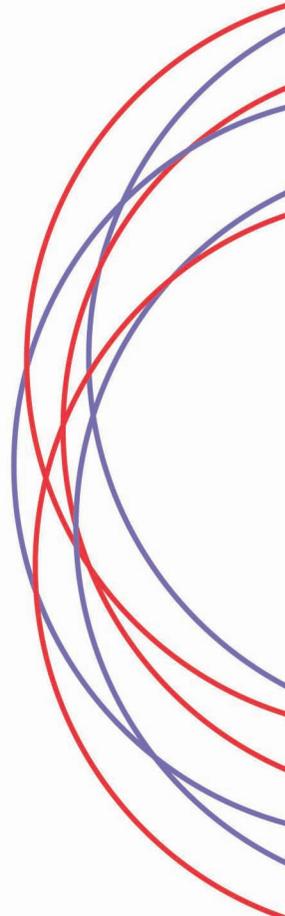
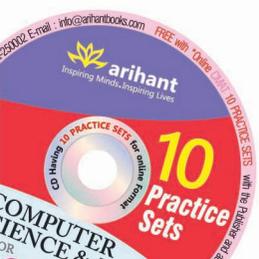
FOR

GATE 2015

Containing **Solved Papers 2011-2014**

With CD

having 10 Practice Sets as per Online Format



10 *Practice
Sets*

COMPUTER SCIENCE
& INFORMATION
TECHNOLOGY
FOR
GATE 2015

10 *Practice Sets*

COMPUTER SCIENCE & INFORMATION TECHNOLOGY FOR GATE 2015

Ranshu Dwivedi

 **arihant**
Inspiring Minds. Inspiring Lives

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☞ Administrative & Production Offices

Corporate Office: 4577/15, Agarwal Road, Darya Ganj, New Delhi -110002
Tele: 011- 47630600, 23280316; Fax: 011- 23280316

Head Office: Kalindi, TP Nagar, Meerut (UP) - 250002
Tele: 0121-2401479, 2512970, 4004199; Fax: 0121-2401648

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A STEP TOWARDS **Success** *in* GATE 2015

Graduate Aptitude Test in Engineering (GATE) is an all India examination that primarily tests the comprehensive understanding of various undergraduate subjects in Engineering and Technology. The GATE score of a candidate reflects his/her relative performance in respective discipline. The score is used for admissions to **Post-Graduate Engineering Programs** (e.g., M.E., M.Tech, direct Ph.D.) in Indian higher education institutes with financial assistance provided by MHRD and other **Government agencies**. The score may also be used by **Public Sector Units** for employment screening purposes.

Most of the PSUs are looking for GATE qualified. IOCL was the first PSU which successfully tested out the system and was allowed that GATE qualified seekers only can apply and their percentile was also defined for ranking in recruitment process, two years later it had been followed by NTPC, BHEL, BEL & Power Grid. Usually these companies release their recruitment notifications right after GATE notification, indicating that candidates have to take GATE to be considered for a job in their organizations.

So making a great score in GATE is very considerable for availing all these opportunities. Keeping the above point of view and after exhaustive research, I have come up with **Practice Sets of Computer Science & IT for GATE 2015** which contains 10 Practice Sets and Previous Years Solved Papers (2011-2014) with their authentic solutions which will help you to get higher score in the exam.

5 *Winning Features of this Practice Sets are*

1. **10 Practice Sets** which are designed according to the newly introduced online pattern from **GATE 2015**.
2. **Stepwise solutions** of each question enable you to know about all the concepts related to respective problems.
3. **Numerical answer type questions** are also given as per Latest Online Pattern.
4. Previous Years Solved Papers (2011-2014) with their detailed and authentic solutions to know about the pattern of the examination.
5. **Free CD** provided with this book contains 10 Practice Sets based exactly on the **Online Format** of GATE.

For the completion of this book, I am thankful to **Arihant Publications (India) Limited** for giving me this opportunity to make such book which will help you to get 100% success in GATE exam.

Valuable suggestions are most welcome for further improvement.

Author

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GATE

Graduate Aptitude Test in Engineering

Graduate Aptitude Test in Engineering is an all India level examination, conducted and controlled by the Indian Institute of Science in cooperation with seven Indian Institutes of Technology on behalf of the National Coordination Board – GATE, Department of Higher Education, Ministry of Human Resource Development (MHRD), and Government of India. The GATE committee which consists of representatives from the governing institutes is the sole authority for conducting the examination and declaring the results.

GATE Eligibility Criteria

The following categories of candidates are eligible to appear in GATE

- Candidates with Bachelor Degree in Engineering/Technology/Architecture (4 years after 10+2) and those who are in the final of such programme.
- Candidates with Master Degree in any branch of Science/Mathematics/Statistics/ Computer Applications or its equivalent and those who are in the final year of such programme.
- Candidates in the second/third/higher year of the Four-year Integrated Master Degree Programme (Post B.Sc.) in Engineering/Technology, or 4th/5th year of Five-year Integrated Master Degree Programme and Dual Degree Programme in Engineering/ Technology
- Candidates with qualifications obtained through examinations conducted by professional societies recognized by UPSC/AICTE (e.g., AMIE by IE (I), AMICE (I) by the Institute of Civil Engineers (India) - ICE (I)) as equivalent to B.E. / B. Tech. The students who have completed his/ her bachelor degree in Engineering (4 years after 10+2) or equivalent of such professional courses are also eligible.

Examination Pattern

The GATE consists of a single paper of 3 hours duration, which contains 65 questions carrying maximum of 100 marks. The question paper is divided into three sections.

First section consists of 25 questions of ONE MARK each.

Second section consists of 30 questions (26 to 55) of TWO MARKS each.

Third section consists of 10 questions (56 to 65) of ONE MARK (56 to 60) and TWO MARKS (61 to 65) each.

Multiple Choice and Numerical Answer Type Questions

The question paper consist of multiple choice and numerical answer type questions. In multiple choice type question, each question has four choices for the answer. In numerical answer type questions, there will be no responses to mark at all. To enter a number as your answer, use the virtual numerical keyboard displayed on the monitor.

Zones and Institutes for GATE

The GATE is conducted and controlled through eight zones which are as follows.

Zone 1 IISC, Bangalore

Zone 2 IIT, Bombay

Zone 3 IIT, Delhi

Zone 4 IIT, Guwahati

Zone 5 IIT, Kanpur

Zone 6 IIT, Kharagpur

Zone 7 IIT, Madras

Zone 8 IIT, Roorkee

GATE 2014 exam was conducted by IIT, Kharagpur.

Common Data and Linked Answer Questions

The 2 marks questions also include two pairs of common data questions and two pairs of linked answer questions. The answer to the second question of the linked answer questions depends on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is not attempted, then the answer to the second question in the pair will not be evaluated. Although, there were no any question of common data and linked answer in GATE 2014.

Negative Marking in GATE Exam

Incorrect answer carry negative marks i.e., 0.33 for one mark questions and 0.66 for two marks questions. However, in the case of the linked answer question pair, there will be negative marks only for wrong answer to the first question and no negative marks for wrong answer to the second question. There is no negative marking for questions of numerical answer type.

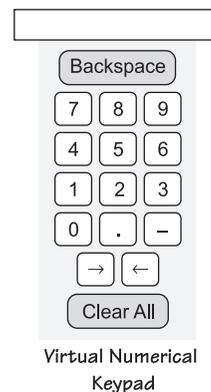
Answering a Question in Online Test

Procedure for answering a multiple choice type questions are as follows

- To select your answer, click on the button of one of the options.
- To deselect your chosen answer, click on the button of the chosen option again or click on the Clear Response button.
- To change your chosen answer, click on the button of another option, and to save your answer, you must click on the Save and Next button.
- To mark the question for review, click on the Mark for Review and Next button.

Procedure for answering a numerical answer type questions are as follows

- To enter a number as your answer, use the virtual numerical keypad displayed on the monitor.
- A fraction (e.g., -0.3 or -.3) can be entered as an answer with or without '0' before the decimal point.
- To clear your answer, click on the Clear Response button and to save your answer, you MUST click on the Save and Next button.
- To mark the question for review, click on the Mark for Review and Next button.



If an answer is entered for a question that is Marked for Review, that answer will be considered in the evaluation.

Formula for GATE Score of CE, CS, EC, EE and ME Papers

After the evaluation of the answer normalised marks based on the formula given below was calculated corresponding to the raw marks obtained by a candidate for CE, CS, EC, EE and ME papers. Normalised mark of j^{th} candidate in i^{th} session \hat{M}_{ij} in given by

$$\hat{M}_{ij} = \frac{\bar{M}_i^g - M_q^g}{\bar{M}_{ii} - M_{iq}^g} (M_{ij} - M_{iq}^g) + M_q^g$$

where,

- M_{ij} = the actual marks obtained by the j^{th} candidate in i^{th} session
- \bar{M}_i^g = the average marks of the top 0.1% of the candidates considering all sessions
- M_q^g = the sum of mean and standard deviation marks of the candidates in the paper considering all sessions
- \bar{M}_{ii} = the average marks of the top 0.1% of the candidates in the i^{th} session
- M_{iq}^g = the sum of mean marks and standard deviation i^{th} session

Formula for GATE Score of all Papers

The formula for GATE score of all papers is given below

$$S = S_q + (S_t - S_q) \frac{M - M_q}{\bar{M}_t - M_q}$$

where,

- S = the GATE Score of the candidate,
- M = the marks obtained by the candidate in the paper appeared by the candidate in GATE 2014,
- M_q = the qualifying mark for general category candidates in the paper,
- \bar{M}_t = the mean of marks of top 0.1% or top 10 (whichever is larger) of the candidates who appeared in the paper,
- S_t = 900 is the Score assigned to \bar{M}_t ,
- S_q = 350 is the Score assigned to M_q .

M_q is usually 25 marks (out of 100) or $\mu + \sigma$, whichever is larger. Here μ is the mean and s is the standard deviation of marks of all the candidates who appeared in the paper.

GATE 2014 Cut-off Marks for Some Branches & Category wise

BRANCH	GENERAL	SC/ST/PD	OBC (Non-Creamy)	Total Appeared
Computer Science & IT	25.0	16.67	22.50	1,55,190
Chemical Engineering	35.14	23.43	31.62	15,844
Civil Engineering	26.57	17.71	23.91	90,872
Electronics & Communication Engineering	25.56	17.04	23.01	2,16,367
Electrical Engineering	25.0	16.67	22.50	1,41,799
Instrumentation Engineering	25.0	16.67	22.50	22,367
Mechanical Engineering	28.86	19.24	25.97	1,85,578

Paper Codes *for* GATE

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Aeronautical/Aerospace Engineering (AE) • Agricultural Engineering (AG) • Architecture and Planning (AR) • Biotechnology (BT) • Civil Engineering (CE) • Chemical Engineering (CH) • Computer Science and Information Technology (CS) • Chemistry (CY) • Electronics and Communication Engineering (EC) • Electrical Engineering (EE) | <ul style="list-style-type: none"> • Geology and Geophysics (GG) • Instrumentation Engineering (IN) • Mathematics (MA) • Mechanical Engineering (ME) • Mining Engineering (MN) • Metallurgical Engineering (MT) • Physics (PH) • Production and Industrial Engineering (PI) • Textile Engineering and Fibre Science (TF) • Engineering Science (XE) • Life Science (XL) • Ecology and Evolution (EY) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Recent Changes *in* GATE

- | | |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2014 | <ul style="list-style-type: none"> ▪ A new paper Ecology and Evolution is introduced in GATE 2014. ▪ Examinations for all the 22 papers will be conducted by an ONLINE Computer Based Test (CBT). ▪ GATE 2014 examination was held during forenoon and afternoon session on alternate weekends (Saturday and Sunday) between 1st February 2014 and 2nd March 2014. Examination for some of the papers in GATE 2014 was held in multiple sessions. ▪ Application Fee has been revised again. It is ₹1500 for Male Candidates (General/OBC), ₹750 for Women Candidates of any category, ₹1500 for Other Candidates (General/OBC) and ₹750 SC/ST/PwD* Category Candidates |
| 2013 | <ul style="list-style-type: none"> ▪ Female candidates are exempted from paying the application fee. ▪ Candidates are required to upload scanned copy of Photograph and Signature. ▪ The Application fee was increased from ₹1000 to ₹1200. |
| 2012 | <ul style="list-style-type: none"> ▪ Only final year students and passout students were eligible to write GATE exam. ▪ The application process was made completely online, candidates could view their responses of the ORS and also GATE Office released official solutions for GATE papers. |
| 2011 | <ul style="list-style-type: none"> ▪ From 2011 onwards, four of the GATE papers can be attempted using computers through online mode. The four papers are Aerospace Engineering (paper code AE), Geology and Geophysics (paper code GG), Mining Engineering (paper code MN) and Textile Engineering (paper code TF) and Fibre Science. ▪ From 2011 onwards, the GATE will be held in the morning (9 - 12) and afternoon (2 - 5) session. Also the computer based tests will be held on different dates. |

Strategies to Crack **GATE**

1. Planning your study by taking the analysis of previous years' papers

You must plan your study after taking the analysis of previous years' GATE papers. This will give you the idea i.e., which subject usually have the highest weightage in GATE exam and about the topics asked from the particular subject most. After the analysis of previous years papers of Electronics and Communication Engineering, you will be able to make the list of topics to be studied on the priority basis. You also will be able to prepare time schedule to study individual topics.

2. Prefer standard books for GATE

Make an extensive search for standard books in the library and go for the best ones. Try to cover complete syllabus within the time you have (5 or 6 months). If it isn't possible, get expertise in the topics you have studied.

3. Group study is a great comrade

Group study is one of the best ways for preparation of GATE. Assign a few sections/topics to your friend and you focus on the remaining. Then have a brief session and discussion and exchange what both of you have studied/gained. This not only saves your time and efforts but also enhances understanding on the topics/concepts.

4. Solve the previous years' GATE papers

Solve previous years' GATE papers to understand what the actual paper would be like. It also brushes up your mind and tells you the weaknesses in the subject knowledge. So try to solve as many test papers as you can. This is the best way to prepare and get through the GATE.

5. Practice Sets is a great platform to check yourself

Attempt all the 65 questions given in a practice set and then check yourself step by step by considering the answer with solutions given along with each practice set. Because, the practice sets are designed based exactly on the latest exam pattern, hence you will find your strongest and weakest points related to all sections i.e., Aptitude, Mathematics and Engineering disciplines in a particular topic. So, keep practicing and secure your success in GATE.

6. Analyse your results

Analysing the results from your solved questions from the practice sets and solved papers is very significant. If you do not analyse, it does not add value to your performance. You should check and find out where you have mistaken and could have scored more. Know your accuracy rates in various topics and prepare a topic wise datasheet to make record of your performance in different solved papers and practice sets.

7. Keep the time for Revision

As time management is an important factor to crack the exam. Hence, give the appropriate time to each subject and complete that subject within your time schedule. After completion of the whole syllabus, you must have time for the quick revision.

9 Tips *for a* **Successful** Attempt

1. READ CAREFULLY

Make it a habit of always reading the instructions on the front page carefully. Also, before attempting the questions always read and understand the directions given to attempt a question so that scope for blunders is reduced.

2. SOLVE THE EASY QUESTIONS FIRST

Try to bifurcate the questions according to the difficulty level. Always try and attempt the easy questions first as this saves a lot of time. Time management plays a vital part in achieving success.

3. STRIKE OFF THE WRONG OPTIONS

Try to strike off the wrong options. The options which cannot be the answer even a slightest bit and for which you are cent percent sure, should be separated from the probable answer so that you are able to concentrate on the remaining options and hence you find out the answer easily.

4. DON'T WASTE EXCESSIVE TIME ON ONE QUESTION

If you are not able to strike off the wrong options and are unsure of the correct answer then don't waste excessive time as doing so, will lead to a decrease in remaining time and hence other question will suffer.

5. USE SCRIBBLE PAD

You can use the scribble pad provided for rough work. You can jot down the points, ideas etc so that least number of mistakes are made while framing the final answer.

6. TRY TO ATTEMPT THE LEFTOVER QUESTIONS ONCE MORE

After completing all the question go back to the leftover question and try to give it a shot and solve it once more.

7. KEEP A TIME CHECK

During the examination do keep an eye on the time. Try to save time so that you are left with some time to attempt the leftover questions. Try to finish the exam early so that you are left with some amount of time to revise the whole paper once.

8. USE THE OPTION OF MARK FOR REVIEW

The answer will be considered in the evaluation if an answer is entered for a question that is marked for review.

9. USE VIRTUAL NUMERICAL KEYPAD

Although, there is no negative marking for numerical answer type questions, but entered a number as your answer if you are sure about that because, these type of questions containing a particular numerical value.

GATE 2015 Syllabus *for* Computer Science & IT

Engineering Mathematics

Linear Algebra

Matrix Algebra, Systems of linear equations, Eigen values and Eigen vectors.

Calculus

Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial derivatives, Maxima and minima, Multiple integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss's and Green's theorems.

Differential Equations

First order equation (linear and non-linear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Euler's equations, Initial and boundary value problems, Partial Differential Equations and variable separable method.

Complex Variables

Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent' series, Residue theorem, Solution integrals.

Probability and Statistics

Sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.

Numerical Methods

Solutions of non-linear algebraic equations, single and multi-step methods for differential equations.

Transform Theory

Fourier transform, Laplace transform, Z-transform.

Computer Science and Information Technology

Digital Logic

Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point).

Computer Organization and Architecture

Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

Programming and Data Structures

Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

Algorithms

Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, Upper and lower bounds, Basic concepts of complexity classes P, NP, NP-hard, NP-complete.

Theory of Computation

Regular languages and finite automata, Context-free languages and Push-down automata, Recursively enumerable sets and turing machines, Undecidability.

Compiler Design

Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization.

Operating System

Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

Databases

ER model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Sequential Query Languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Theory of Computation

Regular languages and finite automata, Context-free languages and Push-down automata, Recursively enumerable sets and turing machines, Undecidability.

Information Systems and Software Engineering

Information gathering, requirement and feasibility analysis, Data flow diagrams, Process specifications, Input/Output design, Process life cycle, Planning and managing the project, Design, Coding, Testing, Implementation, Maintenance.

Computer Networks

ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, Switches, Gateways, and routers. Network security, Basic concepts of public key and private key cryptography, Digital signature, Firewalls.

Web Technologies

HTML, XML, Basic concepts of client-server computing.

GATE 2014

an *Elaboration*

Computer Science & IT

The Graduate Aptitude Test in Engineering (GATE-2014) Computer Science & IT papers were conducted successfully on 1st and 2nd March, 2014 across India. The exam threw no surprises on the candidates and was in accordance with the pattern specified in the exam prospectus except common data and linked answer questions because there were no coverage of these types of questions in GATE 2014. This paper consists of 65 questions with a maximum score of 100 marks in each.

In GATE 2014, there was a stronger emphasis on **Engineering Mathematics** and **Data Structures** and **Algorithms** and the difficulty level is easy as compared to last year paper. Computer Science & Information Technology papers require students to be strong in fundamentals to do well and this year the same trend was followed.

Computer Science & IT

Subject	Marking Scheme	Total Mark	Focused Area
Data Structures and Algorithms	$5 \times 1 + 5 \times 2$	15	C-programs, Time complexity, NP complete, Quick sort and Analyzing algorithms
DBMS	$2 \times 1 + 3 \times 2$	8	Finding candidate keys, Normal forms, Minimal cover, SQL and Conflict serializability
Theory of Computation	$2 \times 1 + 2 \times 2$	6	Regular expression, Finite automata and Closure properties
Compiler Design	$1 \times 1 + 1 \times 2$	3	SR & RR conflicts and Code optimization
Computer Organization	$1 \times 1 + 3 \times 2$	7	Addressing mode and Cache organization
Computer Networks	$2 \times 1 + 3 \times 2$	8	Network security, Routing protocols and Efficiency of SR protocol
Digital Logic	$2 \times 1 + 1 \times 2$	4	Multiplexer, SOP and Radix
Operating Systems	$2 \times 1 + 3 \times 2$	8	SRTF, Optimal page replacement and Multi-threading
SEWT	2×1	2	Software models
Engineering Mathematics and Discrete Mathematics	$6 \times 1 + 9 \times 2$	24	Distribution, Matrix, Limit, Numerical analysis
English	$4 \times 1 + 1 \times 2$	6	Sentence correction, fill in the blank, Synonym, Reading comprehension
General Aptitude	$1 \times 1 + 4 \times 2$	9	Number Series, Time & Distance, Probability, Work and Wages
Total Marks		100	

GATE 2013

an *Elaboration*

Computer Science & IT

The Graduate Aptitude Test in Engineering (GATE-2013) was conducted successfully on 10 Feb, 2013 across India. The exam threw no surprises on the candidates and was in accordance with the pattern specified in the exam prospectus. This paper consists of 65 questions with a maximum score of 100 marks.

In GATE 2013, there was a stronger emphasis on Computer Organization and the difficulty level is easy as compared to last year paper. Computer Science & Information Technology paper requires students to be strong in fundamentals to do well and this year the same trend was followed.

Computer Science & IT

Subject	Marking Scheme	Total Mark	Focused Area
Programming in C	2 + 2 × 2 (Common Data)	6	Function, Array, Pointer
Data Structure	2 × 2	4	Time complexity, Tree
Algorithm Analysis & Design	3 × 1 + 2 × 2	7	Sorting, Tree, Graph, Queue
Computer Network	3 × 1 + 2 × 2	7	Transport Layer, Symmetric key cryptography, Network layer, Ethernet LAN, Datagram format
Operating System	2 × 1 + 2 × 2	6	CPU Scheduling, Process synchronization
DBMS	1 × 1 + 1 × 2 + 2 × 2 (Linked Question)	7	File indexing, Relation algebra query, Functional Dependency & Normalization
Digital Logic	3 × 1 + 1 × 2	5	Number representation, Combinational circuit, Boolean Algebra
TOC	3 × 1 + 3 × 2	9	Regular language, Turing machine, Undesidability, Context free language, Finite automata
Compiler Design	1 × 1 + 1 × 2 + 2 × 2 (Common Data)	7	Bottom up parser, LR, LALR parser, Intermediate code generation
Computer Organization	1 × 1 + 3 × 2 + 2 × 2 (Linked Question)	11	Memory mapping, Micro operation, Secondary storage device, Pipelining.
Software Engg. & Web Technolog	1 × 1 + 1 × 2	3	Inter process communication (Technology), Cohesion and Coupling
Discrete Mathematics	3 × 1 + 3 × 2	9	Groups, Graph Inference rules
Engineering Mathematics	4 × 1	4	Distribution, Matrix, Limit, Numerical analysis
English	4 × 1 + 1 × 2	6	Sentence correction, fill in the blank, Synonym, Reading comprehension
General Aptitude	1 × 1 + 4 × 2	9	Number Series, Time & Distance, Probability, Work and Wages
Total Marks		100	

GATE 2012

an *Elaboration*

Computer Science & IT

In GATE 2012, the weightage allotted to Computer Networks increased from 6% to 13% while the weightage allotted to Computer Organization decreased from 16% to 3% as compared to last year. There was very little change in the weightage of subjects like Mathematics, Compiler Design & Digital Logic Design.

Engineering Mathematics

Subject	1 Mark Questions	2 Marks Questions
Mathematical Logic	1 × 1	0
Probability & Statistics	1 × 1	1 × 2
Sets	0	1 × 2
Graph Theory	1 × 1	2 × 2
Linear Algebra	1 × 1	0
Numerical Methods	1 × 1	1 × 2
Calculus	1 × 1	0
Total Marks	6	10

General Aptitude

Verbal Ability	4 × 1	1 × 2
Numerical Ability	1 × 1	4 × 2
Total Marks	5	10

Computer Science & IT

Subject	1 Mark Questions	2 Marks Questions	Focused Areas
Digital Logic Design	2 × 1	1 × 2	Truth Table, ROM
Computer Organization	1 × 1	2 × 2	Cache memory mapping techniques, Floating point representation
Programming & Data Structure	1 × 1	4 × 2	Storage classes, Memory allocation, Height of a tree
Algorithms	4 × 1	3 × 2	Time complexities, Dijkstras algorithm
Theory of Computation	3 × 1	1 × 2	Decidability, DFA
Compiler Design	1 × 1	3 × 2	Implementation of top-down passing, activation records
Operating systems	1 × 1	4 × 2	Mintcal exclusion, Page replacement polices
Databases	3 × 1	4 × 2	Basic SQL operations, Conflit serializability & interleaving of transactions
Computer Networks	3 × 1	3 × 2	Mathematical Logic, Linear algebra, Calculus, Graph theory, Probability & statics
Total Marks	19	50	

GATE

Computer Science & IT

10 **Practice**
Sets

GATE

CS&IT : COMPUTER SCIENCE & IT

Duration: Three Hours

Maximum Marks: 100

Read the Following Instructions Carefully

1. There is a total of 65 questions carrying 100 marks.
2. Questions 1 to 25 will carry 1 mark each and questions 26 to 55 will carry 2 marks each.
3. Questions 48 to 51 (2 pairs) are **common data questions** and questions pairs 52-53 and 54-55 are **linked answer type questions**. The answer to the second question of the linked answer type questions depend on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is unattempted, then the answer to the second question in the pair will not be evaluated.
4. Questions 56 to 65 belong to **General Aptitude (GA) type**. Questions 56 to 60 will carry 1 mark each and questions 61 to 65 will carry 2 marks each.
5. Unattempted questions will carry zero marks.
6. Wrong answers will carry negative marks. For questions 1 to 25 and 56 to 60, 1/3 mark will be deducted for each wrong answer. For questions 26 to 51 and 61 to 65, 2/3 mark will be deducted for each wrong answer. The question pairs (questions 52 and 53) and (questions 54 and 55) are questions with linked answer. There will be negative marks only for wrong answer to the first question of the linked answer type question pair *i.e.*, for questions 52 and 54, 2/3 mark will be deducted for each wrong answer. There is no negative marking for questions 53 and 55.
7. *Procedure for answering a **multiple choice type** question.*
 - To select your answer, click on the button of one of the options.
 - To deselect your chosen answer, click on the button of the chosen option again or click on the **Clear Response** button.
 - To change your chosen answer, click on the button of another option.
 - To save your answer, you must click on the **Save and Next** button.
 - To mark the question for review, click on the **Mark for Review** and **Next** button. *If an answer is selected for a question that is marked for Review, that answer will be considered in the evaluation.*
8. *Procedure for answering a **numerical answer type** question.*
 - To enter a number as your answer, use the **virtual numerical keypad**.
 - A fraction (*e.g.*, -0.3 or -.3) can be entered as an answer with or without '0' before the decimal point.
 - To clear your answer, click on the **Clear Response** button.
 - To save your answer, you must click on the **Save and Next** Button.
 - To mark the question for review, click on the **Mark for Review** and **Next** button. *If an answer is entered for a question that is marked for Review, that answer will be considered in the evaluation.*
 - There is no negative marking for numerical answer type questions.

Practice Set 1

Question Number 1 to 25 carry 1 mark each

1. The poset $\{2,3,5,30,60,120,180,360\};/$ is

(a) a join semilattice	(b) a meet semilattice
(c) lattice	(d) not a semilattice

2. Find the error by using Simpson's one third rule $h = \frac{1}{4}$ for the definite integral $\int_0^1 \frac{dx}{1+x}$.

(a) $\left -2 \frac{1}{(4)^7} \right $	(b) $\left -2^{-15} \right $
(c) $\left -\left(\frac{1}{4}\right)^5 \right $	(d) $\left \frac{-1}{2} \cdot 2^{14} \right $

3. Evaluate $\lim_{x \rightarrow 0} \sqrt[2x]{1+5x}$.

(a) e^2	(b) e^{10}
(c) $e^{2.5}$	(d) None of these

4. Consider a disk pack with 16 surfaces, 128 tracks per surface and 256 sectors per track. 512 bytes of data are stored in a bit serial manner in a sector. The capacity of the disk pack and the number of bits required to specify a particular sector in the disk are respectively.

(a) 256 Mbyte, 19 bit	(b) 256 Mbyte, 28 bit
(c) 512 Mbyte, 20 bit	(d) 64 Gbyte, 28 bit

5. The minimum number of 2 input NAND gates required for realizing the expression $f = AB + CDE$ is _____.

6. If X and Y are two decision problems such that X is polynomial time reducible to Y , then which of the following is true?

(a) If X is NP-complete then so is Y .
(b) If Y is NP-complete and X is in NP then X is NP-complete.
(c) If X is NP-complete and Y is in NP then Y is NP-complete.
(d) Both (b) and (c)

7. Express the following recurrence relation in asymptotic notation.

$$T(n) = 4T(n/4) + \sqrt{n}$$

(a) $\theta(\sqrt{n})$	(b) $\theta(n)$
(c) $\theta(n^{3/2})$	(d) $\theta(n^2)$

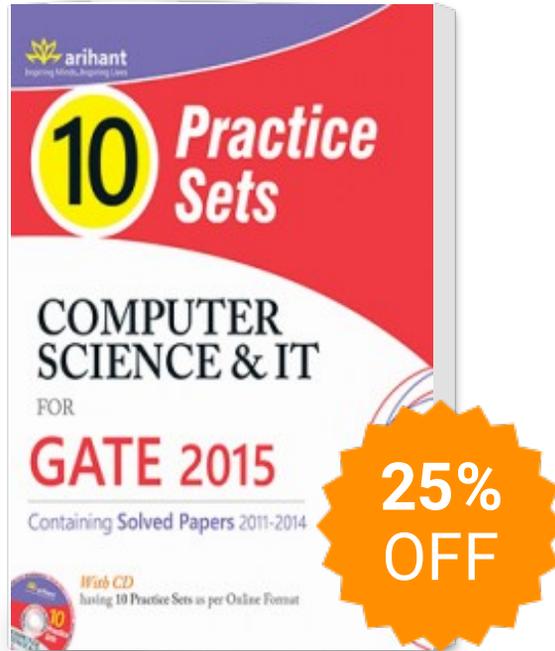
8. Consider the following laws

$L_1: (L^*)^* = L^*$
$L_2: \phi^* = \phi$
$L_3: \epsilon^* = \epsilon$
$L_4: L^+ = L^* + \epsilon$
$L_5: L^* = \epsilon + L^+$

 Which of the above laws hold for regular expression?

(a) L_1, L_2 and L_3	(b) L_1, L_3 and L_5
(c) L_2, L_4 and L_5	(d) L_1, L_3 and L_4

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Author : Ranshu Dwivedi

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