L-13

R-23

Code: 23ES11T2

B.TECH. DEGREE EXAMINATION, JANUARY 2024

I B.Tech. I Semester

BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to CSE, CSE (DS), CSE (AIML) & IT)

Time: 3Hrs

Max. Marks: 70

PART – I
(BASIC CIVIL ENGINEERING)

Note: i) Question Paper consists of Two parts (Part-A and Part-B)
ii) Answer All the questions in Part-A and Part - B

PART – A
(Compulsory Questions)

1. ***Answer all the following short answer Questions*** ***(5x1=5 M)***

(a) State any two types of cement and concrete.

(b) What are the raw materials required to manufacture the cement

(c) What are the primary types of surveying?

(d) Write the arithmetic equation used in rise and fall method of levelling

(e) What is the principle of hydrograph?

PART – B

Answer THREE Questions,
Choosing ONE Question from each Unit

(3 x 10 =30 M)

UNIT – I

2. (a) State the composition of brick earth to make good quality bricks.

(b) List the types of cement and the various tests carried out on ordinary portland cement.

(OR)

3. (a) What are the ingredients of concrete? What do you understand by 1:3:3 concrete Mix?

(b) Discuss the components of a residential building with a neat figure.

UNIT - II

4. (a) What do you understand by reciprocal leveling? Explain.

(b) Discuss the objectives of surveying.

(OR)

5. (a) Explain the various types of surveying.

(b) State the different leveling instruments used for leveling. Explain any one in detail.

UNIT - III

6. (a) Discuss the structural components of flexible pavement.

(b) What is super elevation and how does it keep roads safer?

(OR)

7. (a) What are the different elements of the geometric design of highways? Explain any one in detail.

(b) Discuss the different sources of water.

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PART – II
(BASIC MECHANICAL ENGINEERING)

Note: i) Question Paper consists of Two parts (Part-A and Part-B)
ii) Answer All the questions in Part-A and Part - B

PART – A
(Compulsory Questions)

1. ***Answer all the following short answer Questions*** ***(5x1=5 M)***

   (a) Define ductility.

   (b) List the types of casting.

   (c) Define Air conditioning.

   (d) What is the function of generator in diesel power plant?

   (e) Define link.

PART – B

Answer THREE Questions,
Choosing ONE Question from each Unit

(3 x 10 =30 M)

UNIT – I

2. (a) List the technological developments in manufacturing sector? Discuss in detail about any two.

   (b) Explain briefly about various technological developments in energy sector.

(OR)

3. Describe the evolution of electric vehicles (EVs) and their potentiality to revolutionize the automotive industry.

UNIT - II

4. (a) What is 3D printing? Explain about it.

   (b) What are the advantages of CNC machining?

(OR)

5. Distinguish between SI and CI engines.

UNIT - III

6. (a) Explain the working principle of hydroelectric power plant with a neat sketch.

   (b) What is the necessity of radioactive waste management? Explain with an example.

(OR)

7. (a) Explain about Cartesian coordinate configuration with a neat sketch.

   (b) Write the applications of robotics.

R-23 **Code: 23BS11T2**

B.TECH. DEGREE EXAMINATION, JANUARY 2024

I B.Tech. I Semester

CHEMISTRY

(Common to CSE, CSE (DS), CSE (AIML) & IT)

Time: 3Hrs Max. Marks: 70

PART - A
(Compulsory Questions)

* * *

1. **Answer the following (10x2=20 Marks)**

   (a) List three rules for the linear combination of atomic orbitals.

   (b) What is meant by Bond Order? Give terms involved.

   (c) What is an impurity? Give significance of impurity in semiconductors.

   (d) How nanomaterials are classified?

   (e) Define Electrode potential with an example.

   (f) What is meant by Specific conductance? Write its units.

   (g) What is meant by Plastic? Give few examples

   (h) What is difference between elastomers and plastics?

   (i) Define electromagnetic spectrum.

   (j) What is meant by Chromatography? Give few examples.

PART – B

*(Answer **ONE** question from each Unit 5 x 10 =50 Marks)*

UNIT – I

2. (a) What is meant by Schrodinger Wave equation? Write particle in one dimensional box.

   (b) Draw the molecular orbital diagrams of Carbon monoxide molecule (CO) and Explain their magnetic nature and bond order.

(OR)

3. (a) Write energy level diagram of π-molecular orbitals of benzene.

   (b) What are the differences between bonding and anti-bonding orbitals?

UNIT – II

4. (a) Use energy level diagrams and the band theory to explain the difference between conductors, insulators and semiconductors.

   (b) Write short notes on Graphene nanoparticles.

(OR)

5. (a) Describe the n-type and p-type semiconductors.

   (b) How Supercapacitors are classified? Write their applications.

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UNIT – III

6. (a) Discuss the principle involved in conductometric titrations. Discuss the titration curve obtained in the titration of strong acid and strong base by this method.

   (b) Write short notes on hydrogen-oxygen fuel cell.

(OR)

7. (a) What are Electrochemical sensors? Explain amperometric sensor with examples.

   (b) What is meant by cell constant of a conductivity cell? How is it measured? What are its units?

UNIT – IV

8. (a) Give an account of preparation, properties and uses of PVC.

   (b) What are Conducting Polymers? Write the preparation, properties and applications of polyacetylene.

(OR)

9. (a) Give an account of preparation, properties and uses of Fluon.

   (b) Explain the preparation, properties and applications of Buna-S Rubber.

UNIT – V

10. (a) What is meant by UV-Visible Spectroscopy? Explain the basic principle and Instrumentation of UV-Visible Spectroscopy.

    (b) Explain the basic concept, Instrumentation and applications of IRSpectroscopy.

(OR)

11. (a) What are electronic transition in UV-Visible Spectroscopy? Explain the Beer-Lambert's Law.

    (b) What is Chromatography? Explain basic concept of Chromatography. How it is classified?

R-23 **Code: 23ES11T3**

B.TECH. DEGREE EXAMINATION, JANUARY 2024

I B.Tech. I Semester

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to CE, EEE, ME, ECE & AI&DS)

Time: 3Hrs Max. Marks: 70

PART – I
(BASIC ELECTRICAL ENGINEERING)

Note: i) Question Paper consists of Two parts (Part-A and Part-B)
ii) Answer All the questions in Part-A and Part - B

PART – A
(Compulsory Questions)

1. ***Answer all the following short answer Questions*** ***(5x1=5 M)***

   (a) Define the average value of a Sine wave.

   (b) Draw phasor diagram of series R-L Circuit.

   (c) What is function of carbon brushes in a DC generator?

   (d) List out the non-conventional energy resources

   (e) Mention various types of earthing systems.

PART – B

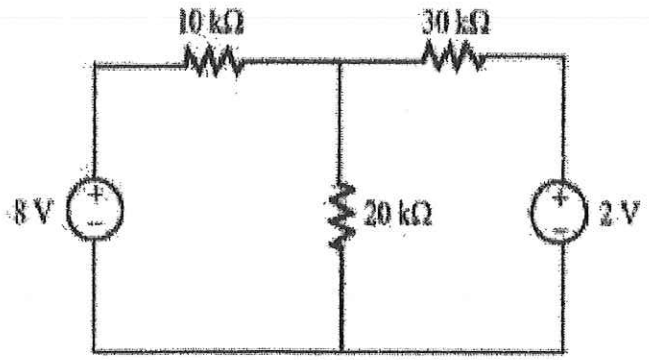
Answer THREE Questions,
Choosing ONE Question from each Unit

(3 x 10 =30 M)

UNIT – I

2. (a) State and explain the kirchhoff's laws.

   (b) Find the current through the resistor 20 KΩ resistor in the circuit shown in figure using Super Position theorem.



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(OR)

3. (a) Give the definition and expression for the following terms
   (i) Inductive Reactance (ii) Capacitive Reactance
   (iii) Impedance (iv) Power Factor

   (b) A coil of resistance 10 Ω and 0.1 H is connected in series, across 230 V, 50 Hz ac supply. Calculate impedance, current, power factor and power consumed by the circuit.

UNIT - II

4. Explain construction and working principle of three phase induction motor.

(OR)

5. Describe the construction and working of an attraction type moving iron Instrument.

UNIT - III

6. Draw a neat schematic diagram of a Nuclear power generating plant and explain the functions of various components.

(OR)

7. (a) Write short notes on calculation of electricity bill for domestic consumers.

   (b) What is meant by electrical shock? What are Precautions against shock?

PART – II
(BASIC ELECTRONICS ENGINEERING)

Note: i) Question Paper consists of Two parts (Part-A and Part-B)
ii) Answer All the questions in Part-A and Part - B

PART – A
(Compulsory Questions)

1. ***Answer all the following short answer Questions*** ***(5x1=5 M)***

   (a) Draw the symbols of diode and transistor.
   (b) What is zener breakdown?
   (c) What is rectifier?
   (d) What is flip flop
   (e) State De Morgan's theorem

PART – B

Answer THREE Questions,
Choosing ONE Question from each Unit

(3 x 10 =30 M)

UNIT – I

2. (a) Discuss about the V-I characteristics of a p-n junction diode
   (b) Illustrate how BJT is used as a switch.

(OR)

3. (a) Describe the working of Zener diode
   (b) Explain the input and output characteristics of common emitter configuration.

UNIT - II

4. (a) With neat block diagram summarize the working of DC power supply.
   (b) Explain the working of Zener voltage regulator.

(OR)

5. (a) Explain the block diagram of an electronic instrumentation system.
   (b) Write short notes on Public Address system.

UNIT - III

6. (a) What is logic family? Give the classification of logic family.
   (b) What do you mean by half adder and full adder? How will you implement full adder using half adder? Draw the circuit diagram.

(OR)

7. (a) Define the following terms related to flip-flops.
   i) set-up time ii) hold time iii) propagation delay
   (b) Write the difference between combinational circuit and sequential circuit

R-23 **Code: 23BS11T3**

B.TECH. DEGREE EXAMINATION, JANUARY 2024

I B.Tech. I Semester

LINEAR ALGEBRA & CALCULUS

(Common to All Branches)

Time : 3Hrs Max. Marks: 70

PART - A
(Compulsory Questions)

* * *

1. **Answer the following (10x02=20 Marks)**

(a) Define the rank of a matrix. What is the minimum rank of a non-zero matrix?

(b) How do you find the solution of AX=B by Gauss elimination method?

(c) If λ is the Eigen value of a matrix A, then prove that $\frac{1}{\lambda}$ is the Eigen value of A^{-1}.

(d) Write the real symmetric matrix corresponding to the quadratic form $x^2 + 2y^2 - 3z^2 + 4xy - 6yz + 4zx$.

(e) Write the geometrical interpretation of Rolle's theorem.

(f) Write Taylor's theorem with Lagrange's form of remainder.

(g) Find first and second order derivatives of the function $f(x, y) = x^3 + y^3 - 3axy$

(h) Find the Jacobian of x, y with respect to r *and* θ where $x = rcos\theta, y = rsin\theta$.

(i) Evaluate $\int_0^1 \int_1^2 (x+y)^2 dxdy$.

(j) Transform $\int_0^a \int_0^{\sqrt{a^2-x^2}} \int_0^{\sqrt{a^2-x^2-y^2}} dxdydz$ into spherical polar coordinates.

PART - B

*(Answer **ONE** question from each Unit 5 x 10 =50 Marks)*

UNIT - I

2. (a) Reduce the following matrix into its normal form and hence find its rank.

$$\begin{pmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & 7 \end{pmatrix}$$

(b) Use Gauss-Jordan method to find the inverse of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$.

(OR)

3. (a) Solve the equations $x-y+z+w=2,\ x+y-z+w=-4,\ x+y+z-w=4,\ x+y+z+w=0.$

(b) Solve $x+2y+3z=0, 3x+4y+4z=0, 7x+10y+12z=0.$

UNIT - II

4. Find the characteristic equation of the matrix and hence find its inverse by Cayley-Hamilton theorem. Also find the matrix represented by $A^8-5A^7+7A^6-3A^5+A^4-5A^3+8A^2-2A+I$, Where $A=\begin{pmatrix}2&1&1\\0&1&0\\1&1&2\end{pmatrix}$.

(OR)

5. Find the matrix P which transforms the matrix $A=\begin{pmatrix}1&1&3\\1&5&1\\3&1&1\end{pmatrix}$ to its diagonal form and hence A^4.

UNIT - III

6. (a) State Lagrange's mean value theorem and give its geometrical interpretation.

(b) Prove that $\log(1+x)=\frac{x}{1+\theta x}$ where $0<\theta<1$ and hence deduce that $\frac{x}{1+x}<\log(1+x)<x, x>0.$

(OR)

7. (a) Verify Cauchy's mean value theorem for the functions log_e^x and $\frac{1}{x}$ in the interval $[1,e]$.

(b) Find Maclaurin's theorem with Lagrange's form of remainder for $f(x)=cosx.$

UNIT - IV

8. (a) Find $\frac{du}{dt}$ as a total derivative if $u=x^2+y^2+z^2,\ x=e^{2t}, y=e^{2t}cos3t, z=e^{2t}sin3t$ and verify the result by direct substitution.

(b) If $u=x+3y^2-z^3, v=4x^2yz, w=2z^2-xy$, evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at $(1,-1,0)$.

(OR)

9. (a) If $z=e^{ax+by}f(ax-by)$ prove that $b\frac{\partial z}{\partial x}+a\frac{\partial z}{\partial y}=2abz.$

(b) Discuss the maxima and minima of $f(x,y)=x^3y^2(1-x-y).$

UNIT - V

10. Change the order of integration and hence evaluate $I=\int_0^{4a}\int_{\frac{x^2}{4a}}^{2\sqrt{ax}}dydx$

(OR)

11. Evaluate $\int_1^e\int_1^{\log y}\int_1^{e^x}\log z\,dzdxdy.$

R-23 Code: 23BS11T1

B.TECH. DEGREE EXAMINATION, JANUARY 2024

I B.Tech. I Semester

ENGINEERING PHYSICS

(Common to CE, EEE, ME, ECE & AI&DS)

Time: 3Hrs Max. Marks: 70

PART - A

(Compulsory Questions)

* * *

1. **Answer the following (10x2=20 Marks)**

   (a) What is the principle of superposition?

   (b) What are the methods of polarizing light?

   (c) Sketch (001) and (120) planes in a cubic cell.

   (d) State Braggs law.

   (e) What is Heisenberg's Uncertainty Principle?

   (f) Write the demerits of classical free electron theory.

   (g) What is Fermi level? How it varies with temperature?

   (h) What are the applications of Hall effect?

   (i) Obtain the relation between dielectric susceptibility and dielectric constant.

   (j) Define intensity of magnetization and intensity of magnetic field.

PART - B

*(Answer **ONE** question from each Unit 5 x 10 =50 Marks)*

UNIT - I

2. (a) Deduce expressions for the diameters of bright dark newton's rings.

   (b) In Newton's rings experiment, diameter of 15^{th} ring was found to be 0.59 cm and that of 5^{th} ring was 0.336 cm. If the radius of plano-convex lens is 100cm, calculate the wavelength of light used.

(OR)

3. (a) Explain the construction and working of Nicol's prism.

   (b) Differentiate ordinary and extraordinary rays.

UNIT - II

4. (a) Describe Bragg's X-ray diffractometer with a neat sketch.

   (b) The Bragg's angle in the first order for (220) reflection from nickel (FCC) is 38.2^0. When X-rays of wavelength 1.54 A^0 are employed in a diffraction experiment determine the lattice parameter of nickel.

(OR)

5. (a) Derive an expression for the interplanar separation between two planes.

   (b) The Bragg's angle in the first order for (220) reflection from nickel (FCC) is 38.2^0. When X-rays of wavelength $1.54A^0$ are employed in a diffraction experiments, determine the lattice parameter of nickel.

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UNIT - III

6. (a) Derive an expression for the density of holes in the valence band of an intrinsic semiconductor.

   (b) Differentiate intrinsic and extrinsic semiconductors.

(OR)

7. (a) Distinguish metals, semiconductors and insulators.

   (b) Find the resistivity of an intrinsic semiconductor with intrinsic concentration of $0^{19}/m^3$. The mobilities of electrons and holes are $0.40 m^2/V\text{-}s$ and $0.20\ m^2/V\text{-}s$.

UNIT - IV

8. (a) Derive time-independent Schrodinger's wave equation for a free particle.

   (b) Find the least energy of an electron moving in one –dimensional potential box of width 0.05 nm.

(OR)

9. (a) Discuss the motion of electron in a periodic potential.

   (b) What are Brillouin zones?

UNIT - V

10. (a) Obtain Clausius-Mosotti equation in dielectric materials.

    (b) A solid elemental dielectric with $3x10^{28}$ atoms/m^3 shows an electronic polarizability of 109^{-40} Fm^2. Assuming the internal electric filed to be a Lorentz field, calculate the dielectric constant of the material.

(OR)

11. (a) Explain in detail the origin of magnetism in magnetic materials.

    (b) The magnetic field strength of silicon is 1000A/m. If the magnetic susceptibility is $-0.25x10^{-5,}$ calculate the magnetization and flux density in silicon.

R-23 **Code: 23ES11T1**

B.TECH. DEGREE EXAMINATION, JANUARY 2024

I B.Tech. I Semester

INTRODUCTION TO PROGRAMMING

(Common to all Branches)

Time: 3Hrs Max. Marks: 70

PART - A
(Compulsory Questions)

* * *

1. **Answer the following (10X02=20 Marks)**
   (a) Define Computer.
   (b) What is the purpose of variable in C?
   (c) Write the syntax of *if...else* statement.
   (d) Write about *for* statement.
   (e) How to access the elements of the array?
   (f) Write about *strlen()* and *strcpy()*.
   (g) Define structure.
   (h) Write about dereferencing in pointers.
   (i) What is local variable?
   (j) Write any two file input functions.

PART - B
*(Answer **ONE** question from each Unit 5 x 10 =50 Marks)*

UNIT – I

2. (a) What is flowchart? Draw the various symbols and its uses of flow chart.
   (b) Explain about type conversion and type casting.

(OR)

3. (a) Write the procedure to compile and execute a C program in detail.
   (b) List and explain various input and output operations in C.

UNIT – II

4. (a) Write about Switch statement with a suitable program.
   (b) Differentiate break and continue statements in C with an example.

(OR)

5. (a) What is Control Statements? List and explain various types of statements in C.
   (b) Write a C program to find the sum of 10 natural numbers using *for* loop.

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UNIT – III

6. What is Array? Explain different types of arrays with suitable example.

(OR)

7. (a) Write a C Program to reverse the elements of an array.

   (b) Write a C Program to perform addition of two matrices using 2D arrays.

UNIT – IV

8. (a) Write about array manipulation using pointers.

   (b) Differentiate Structure and Union? Write an example programs

(OR)

9. (a) Write a C program to add two numbers using pointer variables.

   (b) How to declare, initialize and access members of structure? explain with an example.

UNIT – V

10. Explain about scope of a variable in C with an example each.

(OR)

11. What is file? List and explain various kinds of operations can perform on files with an example.

R-23 **Code: 23BS11T4**

B.TECH. DEGREE EXAMINATION, JANUARY 2024

I B.Tech. I Semester

COMMUNICATIVE ENGLISH

(Common to CSE, CSE (DS), CSE (AIML) & IT)

Time: 3Hrs Max. Marks: 70

PART - A

(Compulsory Questions)

1. **Answer the following (10x02=20 Marks)**

(a) Define countable and countable nouns. Give examples.

(b) Define prefixes and Suffixes with examples.

(c) Punctuate the following.
Who's the Indian teams captain
John said I am going to market

(d) What is Elon Musk Known for?

(e) Identify the parts of speech of the underlined words given in the sentences below.
The Nile is the **longest** river in the world
Rani visits the school **very** often

(f) Identify the tense of the underlined word:
The students **were playing** in the ground.
The sun **rises** in the East.

(g) What are compound words? Give examples.

(h) Rewrite the following sentences in indirect speech.
i) Venu said, "I was studying B.Tech. last year."
ii) Mother said to me, "Milk is white."

(i) Correct the following sentences.
i) Recent studies on global warming show a steady increase in atmospheric temperature.
ii) I went to a central zoo

(j) What are the strategies to cultivate effective intrapersonal communication skills?

PART – B

(Answer ONE question from each Unit 5 x 10 = 50 Marks)

UNIT – I

2 (a) The author O. Henry compares Jim and Della to the Magi in *The Gift of the Magi* - Elaborate.

(b) Explain types of sentences with examples.

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(OR)

3 (a) Give a note on the parts of speech.

(b) Rewrite the jumbled sentences in the correct order

i) In the city tall buildings are ii) Library is the first floor on

iii) The platform is on the train iv) At seven O'clock the rose moon evening this

v) They a movie last night watched

UNIT – II

4 (a) Explain the usage of indefinite and definite articles with examples.

(b) What does Alfred Tennyson want to convey through the poem *The Brook?*

(OR)

5 (a) Compose a paragraph on "challenges of urbanization."

(b) Give a note on Homonyms, homophones, and homographs with examples.

UNIT – III

6 (a) Summarize the following paragraph.

Very often we begin something with a lot of enthusiasm, but we lose our sense of purpose and direction along the way and end up leaving things incomplete or poorly done. Motivation is that which propels us towards a goal.it is the reason why we do something, and, indeed, do it well. It is therefore very important to keep oneself motivated.

How does one become motivated – or, more importantly, stay motivated through the course of something? Choose goals, tasks, projects, and occupations that interest you, and that you are passionate about. If you are interested in your job, in your field, in your goal, then you will do whatever it takes to be excellent at it. You won't think twice about putting in extra effort and longer hours, or about making necessary sacrifices if you love what you do.

What if a goal or a task has been thrust upon you, and is not of your choosing? If you can find even one thing about your situation in life, be it at the workplace or home, to be excited about, then you will find dealing with that situation easier and you will be able to execute necessary tasks to the best of your abilities. Connect the goal or ideals. This will help you stay motivated. Break up larger goals or tasks into smaller ones. Track your progress, and celebrate each milestone. All this will feed your desire to achieve your goal, and thus keep you motivated.

Remember that failures are inevitable. View setbacks, obstacles, and failures as opportunities that teach you how to progress in a better manner. This kind of positive attitude is essential to motivation.

(b) Discuss in what way Elon Musk has proved to be a visionary leader of cutting-edge technology.

(OR)

7 (a) Explain the three essential steps to effective note-making.

(b) Rewrite the following sentences in the tense suggested in brackets.

i) Shyam is preparing for the GATE exam. (Change into the present perfect tense)

ii) We shall attend the conference tomorrow (Change into future perfect tense)

iii)The chairman has been working for three years (Changeinto past perfect progress tense)

iv) The police have registered a case (Present progressive tense)

v) Prasanth will be working as a software engineer in 2027. (Change into past perfect tense)

UNIT – IV

8 (a) Rewrite the following in Passive Voice.

i) Rekha has washed my clothes.

ii) I was teaching grammar now.

iii) Everybody knows that God is great.

iv) Raman discovered the Raman effect in 1929.

v) Children will play cricket on Sundays.

(b) Write a letter of requisition to the head of the department, seeking permission to use the computer lab beyond college hours.

(OR)

9 (a) Prepare a resume for the following job advertisement. Assume you are a recent graduate in computer science engineering from IIT Mumbai. Apply for the post of project engineer at a well-known software company. Computer knowledge and communication skills are necessary.

(b) In the story *The Toys of Peace* Eric and Bertie's mother Eleanor believe that it is possible to curb boys' natural enthusiasm for violent games by giving them "peace toys". Did she succeed? Explain.

UNIT – V

10 (a) Describe the different ways in which intrapersonal communication helps to improve everyday life.

(b) Write a note on the various elements of presentation skills.

(OR)

11 (a) Write an essay on the impact of COVID on education

(b) Explain skimming, scanning, and close reading in detail.

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