

Roll No.

3014

**B. Tech 1st Semester
(Common for all Branches)
Examination – December, 2019**

ENGLISH

Paper : HSMC-ENG-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all. Question Number 1 is compulsory. All questions carry equal marks.

1. Answer the following questions : $2.5 \times 6 = 15$

- (a) Use the following foreign words in sentences of your own : in memorium, via
- (b) Give one word substitutes :
Study of human mind, a word no longer in use
- (c) What are monophthongs ? Give example.
- (d) Justify the title 'An outline of intellectual Rubbish' by Bertrand Russell.

3014-7100-(P-4)(Q-9)(19)

P. T. O.

(e) Correct the following sentences :

One should respect his parents.
He works on less salary

(f) Transcribe : book, paper, thief

2. (a) Rewrite the following sentences after correcting the agreement errors. 10

(i) It was worth ten and half rupees.

(ii) He goes to Delhi often.

(iii) He asked me where was I going.

(iv) My friend who lives with his aunt come to meet daily.

(v) Three miles are not a long distance.

(b) Make sentences for the given verb patterns : 5

(i) S + V

(ii) S + V + C

(iii) S + V + O

(iv) S + V + O + C

(v) S + V + O + O

3. What do you mean by verb patterns ? Describe any five verb patterns in detail giving two examples of each. 15

4. (a) Use the following foreign words in sentences of your own. 10

alma mater, viva voce, alumini, in camera bonafide

(b) Change the voice : 5

(i) Close the window.

(ii) He was chasing the street dogs.

(iii) Its rude to call a blind person, blind on face.

(iv) The players won runners up trophy for their university.

(v) She arranged a well managed party on my birthday.

5. (a) Write one word substitutes : 5

(i) One who is present everywhere

(ii) One who loves one's own country

(iii) One who is indifferent to pain and pleasure

(iv) A government by king or queen.

(v) A speech made to oneself

(b) Use the following idioms in sentences of your own : 10

an axe to grind, by hook or crook,

icing on the cake, eye for eye, crocodile tears

6. Transcribe the following words : 15

father, pull, village, dish, eye, machine, door, hand, glass, furniture, mountain, pencil, thin, flower, number

7. Define the following : 5 × 3 = 15
phoneme, syllable, vowel sounds
8. Throw some light on 'The secret of work' by Swami Vivekananda. 15
9. Write a letter to the Vice-chancellor of your university giving a proposal to start cultural clubs and sports club for the students of B. Tech. 15
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Roll No.

3014

**B. Tech. 1st Semester
(Common for All Branches)
Examination – March, 2021**

ENGLISH

Paper : HSMC-ENG-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Answer the following question briefly : $2.5 \times 6 = 15$

(a) Why did Mother Teresa have a special interest in the dying ?

(b) How, according to Swami Vivekananda, can people be made completely free of misery ?

3014-3350-(P-7)(Q-9)(21)

P. T. O.

- (c) Differentiate between "Break" and "Brake".
- (d) Make words using suffixes – -en, -able, -ish, -ly, -ness.
- (e) What are diphthongs ?
- (f) Use the following idioms in your own sentences.
Break into, Fall out.

UNIT – I

2. (a) Make sentences based on the following verb patterns. $1 \times 5 = 5$
- (i) Subject + Verb + Direct Object.
- (ii) Subject + Verb + Subject Complement.
- (iii) Subject + Verb + Gerund.
- (iv) Subject + Verb + Noun/Pronoun + Plain Infinitive.
- (v) Subject + Verb + Interrogative + To-infinitive.
- (b) Correct the following sentences : $1 \times 5 = 5$
- (i) What are the news ?

- (ii) I am reading times of India.
- (iii) The Police has caught the thief.
- (iv) He is playing for two hours.
- (v) Economics are difficult subject.

(c) Do as directed : $1 \times 5 = 5$

- (i) We (wait) for two hours. (Use correct form of verb)
- (ii) I saw one-eyed man. (Insert article)
- (iii) My grandfather fought the country in World War II. (Insert Preposition)
- (iv) Something is better than (Insert indefinite pronoun)
- (v) This is the bridge. It was built in a month. (Join the sentences using pronoun)

3. Use the following pairs in your own sentences so as to make the meanings of the individual words clear. $3 \times 5 = 15$

- (i) Little, a little

- (ii) Week, weak
- (iii) Yolk, yoke
- (iv) Adopt, adapt
- (v) Pray, prey

UNIT – II

4. (a) Supply one-word substitutions : 7.5
- (i) A hater of mankind.
 - (ii) A Muslim place of worship.
 - (iii) One who writes novels ?
 - (iv) One who believes in a single God ?
 - (v) The study of human mind.
- (b) Supply the meanings of the following foreign words and make sentences : 7.5
- (i) en masse
 - (ii) Prima donna
 - (iii) Status quo
 - (iv) Faux Pas
 - (v) Quid pro quo

3014-3350-(P-7)(Q-9)(21) (4)

5. (a) Make sentences with the following idioms : 7.5
- (i) Stand by
 - (ii) Long for
 - (iii) Good Books
 - (iv) On the right side
 - (v) Bread and Butter
- (b) Change into passive voice : 7.5
- (i) Who teaches you English ?
 - (ii) They are playing Kabaddi near the pond.
 - (iii) He is doing his duty.
 - (iv) Why are they whitewashing the house ?
 - (v) Please, help me.

UNIT – III

6. Write short notes (any two) : 7.5 × 2 = 15
- (a) Voiced and voiceless consonants.
 - (b) Bilabial consonants.

3014-3350-(P-7)(Q-9)(21) (5)

P. T. O.

- (c) Transcribe – Love, Watch, Ice, You, Break, Ghost, Heart, Nation, Light, Export, Human, Write, Cheese, Year, Whole.

OR

Discuss in detail the role of active and passive articulators in the production of speech. 15

7. List all the consonants with their use in transcribed words. 15

UNIT – IV

8. Discuss the central theme of the essay "An outline of Intellectual Rubbish." 15

OR

Attempt a character sketch of Mother Teresa as described by Khushwant Singh. 15

9. You have been absent from college/institution for a long time. So you have been fined heavily. Write an application to the Director of your college/institution requesting him to remit your fine. 15

OR

Write an essay on any topic of the following : 15

(About 300 words)

- (i) Pollution
(ii) Hostel life

Roll No.

3014

**B. Tech (Common for All Branches)
1st Sem. Examination – February, 2022**

ENGLISH

Paper : HSMC-ENG-101-G

Time : Three hours] [Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* question all. Selecting *one* question from each Unit. Question No. 1 is *compulsory*, All question carry equal marks.

1. Answer the following questions briefly : $2.5 \times 6 = 15$
- (a) What is true liberation in 'The Secret of Work' ?
 - (b) What is Speech Mechanism ?
 - (c) Differentiate between 'wide' and 'vide'.
 - (d) Make words using the prefixes -in, -ex, -pre, -mal, -uni.
 - (e) Describe A spring balance.
 - (f) What are Monophthong ?

UNIT – I

2. (a) Make sentences based on following verb patterns :
 $5 \times 3 = 15$
- (i) Sub + Verb + Indirect Object + Direct Object

3014-4100-(P-4)(Q-9)(22)

P. T. O.

- (ii) Sub + Verb + Noun Complement
 - (iii) Noun Phrase + Helping Verb + Adjective + Noun
 - (iv) Subject + Verb + Subject Complement
 - (v) Sub + Verb + Infinitive
- (b) Correct the following sentences :
- (i) Each of the boys have done homework.
 - (ii) Sandals and towels are essential gear for beach.
 - (iii) Either Ram or Shyam pay the employees.
 - (iv) He returned back yesterday.
 - (v) I am couldn't but laughing.
- (c) Do as directed :
- (i) He prefers cigar cigarette.
(insert preposition)
 - (ii) He is poor. He is honest. (make compound)
 - (iii) Honesty is MLA. (insert article)
 - (iv) There's who likes to be poor.
(neither/none)
 - (v) With who do you live ? (correct pronoun)
3. Use the following pairs in your sentences so as to make the meanings of the individual words clear : $3 \times 5 = 15$
- (i) Momentary, Momentous
 - (ii) Elder, Older
 - (iii) Flour, Floor
 - (iv) Literary, Literal
 - (v) Loose, Lose

UNIT – II

4. (a) Supply One-word Substitutes : $7.5 \times 2 = 15$
- (i) A place for keeping birds
 - (ii) Fear of books
 - (iii) Government by officials
 - (iv) Study of human being
 - (v) Soldiers on foot
- (b) Supply meanings of the following foreign words and make sentences :
- (i) Alumni
 - (ii) Bon Voyage
 - (iii) En route
 - (iv) De jure
 - (v) Ex-officio
5. (a) Make sentences with the following idioms : $7.5 \times 2 = 15$
- (i) Dark horse
 - (ii) Break the ice
 - (iii) Run into
 - (iv) Turn down
 - (v) Watch out
- (b) Change into passive voice :
- (i) I am hitting this rod.
 - (ii) Thank you.
 - (iii) Who is removed my chair ?
 - (iv) She has asked for apples.
 - (v) The caravan shall destroy our crops.

UNIT – III

6. Write short notes on any *two* : $15 \times 1 = 15$
(a) Phonemes
(b) Friction Consonants
(c) Semi Vowels

OR

Draw a neat diagram of Speech Mechanism and mark all speech organs.

7. Define Affricates, Bilabials and Labio dentals. List all of them. $15 \times 1 = 15$

UNIT – IV

8. Discuss the main idea of Khushwant Singh's essay '*Mother Teresa*'. $15 \times 1 = 15$

OR

Develop a paragraph on 'Digital Economy'.

9. Write an essay on Swami Vivekananda's idea of work and its nature. $15 \times 1 = 15$

OR

Write an application to the Director of your institute/ college seeking permission and requesting logistical arrangements for an educational trip of your batch.

OR

Record your impressions of Bertrand Russel's views on Intellectual Rubbish.

Roll No.

3013

**B. Tech 1st Semester (Common for All
Branches) Examination – December, 2019**

WORKSHOP TECHNOLOGY

Paper : ESC-ME-102-G

Time : Three Hours]

[Maximum Marks : 75

*Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.*

*Note : Question No. 1 is compulsory having, ten parts and
each part is of 2.5 marks total of 25 marks and
remaining questions is of 12.5 marks. And attempt
one question from each Unit.*

1. (a) Name any *two* Machining Process.

(b) What is joining process ?

3013-3850-(P-3)(Q-9)(19)

P. T. O.

- (c) What are important material first aid box should have ?
- (d) Define hot working.
- (e) What is piercing ?
- (f) Draw Skelton piece pattern.
- (g) Name the parts of shaper machine.
- (h) Write the definition of welding.
- (i) What is a shift defect in casting ?
- (j) What is knurling ? 2.5 × 10 = 25

UNIT – I

- 2. Explain the various methods of preventing the accidents. 12.5
- 3. What is Plant Layout and discuss the various types of Plant Layout ?

UNIT – II

- 4. Explain Hot rolling and also explain various types of rolling. 12.5
- 5. Explain the various Sheet Metal Operations. 12.5

UNIT – III

- 6. Discuss the various parts of lathe machine. 12.5
- 7. Discuss the working of Cupola Furnace. 12.5

UNIT – IV

- 8. Explain the welding process and classify the various types Welding Processes. 12.5
- 9. Discuss the difference between Soldering & Brazing. 12.5

Roll No.

3013

**B. Tech. 1st Semester (Common for All
Branches) Examination – March, 2021**

WORKSHOP TECHNOLOGY

Paper : ESC-ME-102-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any five questions. All questions carry equal marks.

1. (a) Name the parts of Lathe Machine.
(b) Give the name of any 10 tools used in workshop.
(c) Explain the objective of Plant Layout.
(d) Define Welding with classification.
2. Explain the common source of Industrial accident and how we can overcome it.
3. Explain Plant Layout with types and their advantages.

4. Explain the basic principle of Hot & Cold Working process. List different processes and explain any *one* of them.
5. (a) Differentiate Punching, Blanking and Piercing process.
(b) Explain types of timber with advantages and defects.
6. Explain Cupola Furnace with neat sketch.
7. What is Casting and discuss the various steps in casting process ?
8. Discuss the reason of various welding defects with remedies.
9. Explain :
 - (a) MIG & TIG welding
 - (b) Resistance Welding
 - (c) Soldering & Brazing

Roll No.

3013

**B. Tech. 2nd Semester (Common for All
Branches) Examination – July, 2021**

WORKSHOP TECHNOLOGY

Paper : ESC-ME-102G

Time : Three hours]

[Maximum Marks : 75

*Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.*

*Note : Attempt any five questions. All questions carry
equal marks.*

1. (a) Explain sources of accidents in a workshop.
- (b) Explain the types of Pattern in casting process.
- (c) Explain the necessary item of First Aid Kit.
- (d) Explain the casting allowances.

3013-2200-(P-3)(Q-9)(21)

P. T. O.

2. What is accident ? Explain the various methods of preventing the accidents.
3. What are the objectives of different types of plant layout, explain.
4. Explain the process of Rolling, Extrusion, Forging, Drawing and Wire Drawing.
5. (a) Differentiate Punching, Blanking and Piercing process.
(b) Explain fitting operation.
6. Explain Sand Casting, Sand Properties, Constituents and Preparation of it.
7. Explain Cupola Furnace with neat sketch.
8. Explain the welding process and classify the various types.

3013-2200-(P-3)(Q-9)(21) (2)

9. Differentiate :

- (a) MIG & TIG Welding
- (b) Seam & Spot Welding
- (c) Soldering & Brazing

3013-2200-(P-3)(Q-9)(21) (3)

**B.Tech. (Common for All Branches) 2nd Semester
(G Scheme) Examination, July-2022
WORKSHOP TECHNOLOGY
Paper- ESC-ME-102-G**

Time allowed : 3 hours] [Maximum marks : 75

Note: Attempt five questions in all selecting one question from each unit. Question no. 1 is compulsory. All questions carry equal marks.

1. (i) What are the desirable properties of moulding sand?
- (ii) Types of Pattern
- (iii) Working principle of TIG
- (iv) Casting Defects
- (v) CNC machining
- (vi) Plastic moulding 6×2.5=15

Unit-I

2. Elaborate the factor governing the selection of plant location. What are the different types of plant layout, explain in detail? 15
3. Define industrial safety. Explain various methods of Safety. Explain the procedure of First Aid against electric shock. 15

Unit-II

4. Explain with neat sketch the basic principle of Extrusion. Describe its application in industry. 15
5. With neat sketch define the following operation: 15
 - (i) Rolling
 - (ii) Forging
 - (iii) Drawing

Unit-III

6. What are the different foundry equipment, explain cupola furnace and its operation. Also explain different zone of cupola furnace with neat sketch. 15
7. Draw a labelled diagram of lathe machine. List various operation performed on the lathe. 15

Unit-IV

8. What do you understand by classification of welding process? What is the principle of gas welding? Explain all types of flame produced during gas welding. 15
9. Differentiate between welding soldering and brazing. Explain the purpose and uses of flux in gas welding. 15

Roll No.

3012

**B. Tech 1st Semester (Common for all
Branches except CSE, ECE, IT, CS & IT
& EEE) Examination – December, 2019**

PROGRAMMING FOR PROBLEM SOLVING

Paper : ESC-CSE-102-G

Time : Three Hours]

[Maximum Marks : 75

*Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all, selecting one from
each Unit. Question No. 1 is compulsory.*

1. (a) Define RAM. $6 \times 2.5 = 15$
- (b) What do you understand by Pseudo code ? Give
example.
- (c) Discuss header files used in C-language.

3012-2150-(P-4)(Q-9)(19)

P. T. O.

- (d) Explain conditional operators with the help of example.
- (e) Differentiate between actual and formal parameters.
- (f) Find 2's complement of 111001100000.

UNIT - I

2. Define computer and discuss in detail its functional units. 15

3. Perform the following : $5 \times 3 = 15$

(i) $(BC8)_{16} \rightarrow (?)_2$

(ii) $(853)_8 \rightarrow (?)_{10}$

(iii) $(1110010)_2 \rightarrow (?)_8$

(iv) $(0110111)_2 + (1101110)_2 = (?)_2$

(v) $(11001)_2 \div (101)_2 = (?)_2$

3012-2150-(P-4)(Q-9)(19) (2)

UNIT - II

4. (a) What is a flow-chart ? Draw a flow-chart to check if a number is even or odd. 8

(b) Define Algorithm. Write an algorithm to find the factorial of a number. 7

5. (a) Write short note on : $4 \times 2 = 8$

(i) Header files

(ii) Data types

(b) Discuss syntax & logical errors in C language with example. 7

UNIT - III

6. (a) What are conditional statements ? Write a program to read a year & determine if it is a leap year or not using conditional statements. 8

(b) Write a program to print all even numbers between 2 to 20 using 'for' loop. 7

3012-2150-(P-4)(Q-9)(19) (3) P. T. O.

7. (a) Write a program to find if a number is prime or not. 7
- (b) Differentiate between 'while' & 'do while' loop using example. 8

UNIT – IV

8. (a) Define functions. Differentiate between user defined & built in functions using example. 8
- (b) What do you mean by Recursion ? Explain with example. 7
9. (a) Differentiate between call by value and call by reference with example. 8
- (b) Write a program to find transpose of a matrix. 7
-

Roll No.

3012

**B. Tech. 1st Semester (Common For All
Branches Except CSE, ECE, IT, CS & IT
& EEE)**

Examination – March, 2021

PROGRAMMING FOR PROBLEM SOLVING

Paper : ESC-CSE-102-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Write short note on the following : 15

- (a) Number system
- (b) Header files
- (c) Looping
- (d) 2-D Array

3012-~~850~~-(P-3)(Q-9)(21)

P. T. O.

UNIT - I

2. Describe the functional units of computers. 15
3. Calculate the following : 15
- (i) $(11001.1101)_2$ Binary to Decimal
 - (ii) $(0.8125)_{10}$ Decimal to Binary
 - (iii) $(35.216)_8$ Octal to Binary

UNIT - II

4. Explain the following : 15
- (i) Programming
 - (ii) Flow Chart
5. Define 'C' Language and explain the following : 15
- (i) Basic Input and Output functions
 - (ii) Syntax and Logical errors in compilation

UNIT - III

6. Give a complete description about conditional statements. 15
7. What do you mean by Iteration and Loops ? Explain. 15

UNIT - IV

8. Describe the following : 15
- (i) Parameters passing in functions
 - (ii) Character arrays and things
9. Define Recursion and explain the statement "Recursion, as a different way of solving problems." 15

Roll No.

3011

**B. Tech. 2nd Semester (CSE)
Examination – July, 2021**

PROGRAMMING FOR PROBLEM SOLVING

Paper : ESC-CSE-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Answer the following questions : $6 \times 2.5 = 15$

- (a) Explain data types in 'C'.
- (b) What are storage classes ?
- (c) Explain Pseudo code with an example.
- (d) Explain arithmetic expression & their Precedence.

3011-1800-(P-3)(Q-9)(21)

P. T. O.

(e) What are strings ?

(f) Differentiate between do-while & while loop in C language.

UNIT - I

2. Define flowchart. Draw a flowchart to check whether a number is even or odd. 15

3. What is an algorithm ? Write an algorithm to Add three numbers. 15

UNIT - II

4. Explain the following : $3 \times 5 = 15$

(a) Syntax & logical error

(b) Variables & keywords

(c) Input & output functions

5. What are conditional statements explain with any example ? 15

3011-1800-(P-3)(Q-9)(21) (2)

UNIT - III

6. Write a program to calculate factorial of a number using for loop. 15

7. What are arrays ? Write a program to add *two* matrix. 15

UNIT - IV

8. Explain call by value and call by reference method in detail. 15

9. Write short notes on :

(a) Structures 7

(b) Pointers 8

3011-1800-(P-3)(Q-9)(21) (3)

Roll No.

3012

**B. Tech. 2nd Semester (Common for All
Branches Except CSE, ECE, CSE,-AI &
MLE, Data Science, CSE, ITCSE, IT, CS
& IT, CS & T and EEE)
Examination – July, 2021**

PROGRAMMING FOR PROBLEM SOLVING

Paper : ESC-CSE-102-G

Time : Three Hours]

[Maximum Marks : 75

*Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.*

*Note : Question No. 1 is compulsory. Attempt any five
questions by selecting any one question from each
Section.*

1. Answer the following questions : $5 \times 3 = 15$

(a) Explain data types used in C.

(b) What are loops ? Explain their usage in
programming.

3012-1002(P-3)(Q-9)(21)

P. T. O.

- (c) Find 2's complement of 111001 10000.
- (d) Explain functional units of a computer system.
- (e) Explain character codes used in computer system.

SECTION - A

- 2. What are the various operators used in C ? Explain them with their precedence. 15
- 3. (a) What is a flowchart ? Draw flowchart to check number is odd or even. 7
- (b) Define algorithm with their advantages and disadvantages. Write algorithm to find the factorial of a number. 8

SECTION - B

- 4. Explain various conditional and branching statements used in C programming with example. 15
- 5. Write note on : 15
 - (i) Data types in C
 - (ii) Header files in C
 - (iii) Conditional statements in C

SECTION - C

- 6. (a) Difference between do while and while do loop in C. 7
- (b) Write a program to check if a number is palindrome or not. 8
- 7. (a) Explain call by value & call by reference with example. 7
- (b) Write a program in C to generate Fibonacci series. 8

SECTION - D

- 8. (a) Define functions. Difference between user defined functions and built in functions in C with examples. 10
- (b) Explain recursion with help of example in C. 5
- 9. (a) Dynamic memory allocation. 7
- (b) File handling. 8

Roll No.

3010

**B. Tech 1st Semester
(Common for All Branches)
Examination.– December, 2019**

BASIC ELECTRICAL ENGINEERING

Paper : ESC-EE-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question Number 1 is compulsory. All questions carry equal marks.

1. (a) State and explain superposition theorem. 2.5×6
- (b) Three resistance R_1 , R_2 and R_3 are connected in delta. Obtain their equivalent in star connection.
- (c) What are the features of an ideal transformer ?
- (d) What are the losses occurring in a transformer ?

3010-4550-(P-4)(Q-9)(19)

P. T. O.

- (e) What are the methods of providing damping torque in indicating instruments ?
- (f) What are the necessary conditions for torque production in electrical machines ?

UNIT - I

2. (a) Explain the nodal method of analysing an electrical circuit. 7.5
- (b) Find the current through 25Ω by using Norton's theorem, as in fig. 1. 7.5

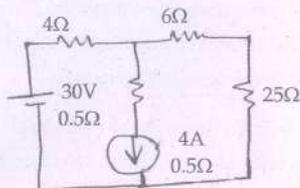


Fig. 1

3. (a) Derive expression to find the rms. value of voltage of a sinusoidal full wave a.c. 7.5
- (b) An inductor of resistance 10Ω and inductance $0.5H$ is in series with a capacitance of $10\mu F$. If a voltage of $200V$ is applied and the frequency is adjusted for resonance then find the current and voltage across the inductor and capacitor. 7.5

UNIT - II

4. (a) A 40 KVA transformer has an iron loss of 400W and full load copper loss of 800W. Find the load at which maximum efficiency is achieved at unity power factor. 7.5
- (b) Write the applications of an autotransformer. State how it is different from a conventional transformer. 7.5
5. (a) State and explain the method to measure the power in a three phase circuit using two watt meters. 7.5
- (b) A 220/440 V transformer has a primary resistance of 0.1Ω and reactance of 0.4Ω and secondary resistance and reactance are 0.75Ω and 1.5Ω respectively. Find the percentage regulation if it is supplying a load of 10A at 0.8 Pf lagging. 7.5

UNIT - III

6. (a) Explain the principle of operation of three phase induction motor. 7.5
- (b) How is synchronous machine different than an induction motor in its principle of working? 7.5

7. Draw and explain the construction, working and torque-speed characteristics of d.c. motor. 15

UNIT – IV

8. Write detailed notes on : 15

- (i) Earthing and its importance
- (ii) MCCB
- (iii) Characteristics of batteries

9. Write technical notes on : 15

- (i) PMMI instruments
 - (ii) Single phase induction type energy meter
 - (iii) Power factor improvement
-

Roll No.

3010

**B. Tech. 1st Semester (Common
for All Branches)**

Examination – March, 2021

BASIC ELECTRICAL ENGINEERING

Paper : ESC-EE-101-G

Time : Three Hours]

[Maximum Marks : 75

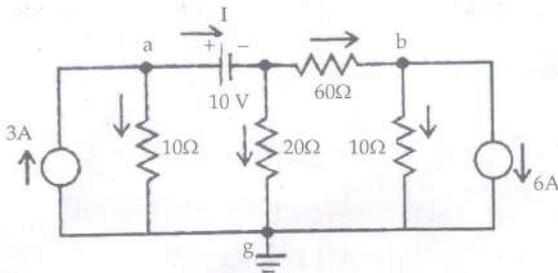
Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any five questions. All questions carry equal marks.

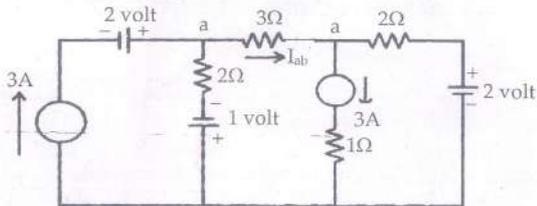
1. (a) State Ohm's law and its significance.
(b) Explain various types of losses in transformer.
(c) Discuss the principle of DC motor.
(d) Explain ELCB.
2. Find the value of current (I) flowing through the battery using "node voltage method".

3010-2,500-(P-3)(Q-9)(21)

P. T. O.



3. Calculate the current I_{ab} flowing through the resistor 3Ω using superposition theorem.



4. Explain how open circuit/short circuit tests separate out the core loss and copper loss.

5. (a) Explain the construction and working of an Auto transformer.

(b) Derive the relation between voltage and current in delta connection.

6. Draw and explain the various speed control methods of DC motor.

7. Explain construction, principle, working of synchronous generator. Also draw the suitable diagram.

8. Explain the construction and operating principle of moving iron type instruments.

9. Write short note on :

(a) Methods of power factor improvement

(b) Types of Batteries

Roll No.

3010

**B. Tech. 2nd Semester (Common for All
Branches) Examination – July, 2021**

BASIC ELECTRICAL ENGINEERING

Paper : ESC-EE-101-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry
equal marks.

1. (a) Explain KCL with suitable example.
- (b) What are the advantages of polyphase systems ?
- (c) Discuss the principle of three phase Induction
motor.
- (d) Explain MCCB.

3010-2100-(P-3)(Q-9)(21)

P. T. O.

2. State and prove Norton theorem with suitable example in detail.
3. Explain power factor. What are the importances of power factor in electrical circuits?
4. Explain the power measurement by *two* wattmeter method in three phase for unbalanced condition in detail.
5. Define voltage regulation. Derive the equation for voltage regulation of single phase transformer at inductive load.
6. Draw and explain the various starting methods of single phase induction motor.
7. Explain construction, principle, working of DC motor. Also draw the suitable diagram.
8. Explain the construction and operating principle of moving coil type instruments.

3010-2100-(P-3)(Q-9)(21) (2)

9. Write short note on :

- (a) ELCB
- (b) Types of cables

3010-2100-(P-3)(Q-9)(21) (3)

Roll No.

3010

B. Tech. (Common For All Branches)

1st Semester

Examination – February, 2022

BASIC ELECTRICAL ENGG.

Paper : ESC-EE-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) State and explain Kirchhoff's Laws. 3
- (b) Define the following terms phase, frequency and time period. 3
- (c) Derive equation of EMF for single phase transformer. 3
- (d) Differentiate between phase voltage and line voltage of three phase circuits. 3

3010-3000-(P-3)(Q-9)(22)

P. T. O.

- (e) What do you understand by deflecting torque in measuring instrument? 3

UNIT - I

2. State and explain Thevenin's theorem with the help of some example. 15
3. (a) What do you understand by : 7.5
- (i) Real power
 - (ii) Reactive power
 - (iii) Apparent power
- (b) What do you understand by resonance ? Derive the mathematical expression of resonance frequency for a series RLC circuit. 7.5

UNIT - II

4. What is transformer ? Explain its working principle and construction. Draw and explain phasor of an ideal transformer. 15
5. Write down the relationship between line voltage and line current with phase voltage and phase current in 3 phase balanced star connected circuit. 15

UNIT - III

6. Explain working principle and construction of a single phase induction motor. 15

3010-3000-(P-3)(Q-9)(22) (2)

7. What do you understand by rotating magnetic field ? Explain construction and working of three phase induction motor. 15

UNIT - IV

8. What is the working principle of moving iron type and moving coil type measuring instrument ? Explain construction of both. 15
9. Write a short note on :
- (a) Types of wires and cables 7.5
 - (b) Earthing 7.5

3010-3000-(P-3)(Q-9)(22) (3)

3010

B.Tech. (Common for All Branches) 2nd Semester
(G-Scheme)

Examination, July-2022

BASIC ELECTRICAL ENGINEERING

Paper- ESC-EE-101 G

Time allowed : 3 hours] [Maximum marks : 75

Note : Question No. 1 is compulsory. Attempt five questions in all, selecting at least one question from each section.

1. (a) Distinguish between loop and mesh 3
- (b) What do you understand by Resonance? 3
- (c) Define Electromagnetic induction. 3
- (d) What is 'Earthing' why it is required? 3
- (e) What do you understand by phasor 3

Section - A

2. State and explain Norton's Theorem with the help of some example. 15

or

3. (a) Derive the relationship between voltage and current of a series RLC circuit. 7.5

3010-P-3-Q-9 (22)

[P.T.O.]

(2)

3010

- (b) What do you understand by Average value and RMS value? Derive the mathematical expression of Average value and RMS value for a sinusoidal wave form. 7.5

Section- B

4. What is working principle of Transformer? Explain its construction, draw the phasor diagram and equivalent circuit of a single phase transformer. 15

or

5. (a) How the power is measured by two-wattmeter in a 3-phase balanced load? 7.5
(b) A balanced 3-phase star connected load draws power from a 440V supply. The two wattmeter connected indicate $W_1 = 4.2 \text{ kW}$ and $W_2 = 0.8 \text{ kW}$. Calculate power factor and current in the circuit. 7.5

Section- C

6. Explain working principle and construction of three phase induction motor. 15

or

7. Name the various parts of a synchronous machine. Write the function of each part in detail. 15

3010

(3)

3010

Section- D

8. Write a short note on
(a) Type of wires and cables. 7.5
(b) What is earthing? What is purpose of earthing 7.5

or

9. Describe with a neat sketch working of a moving iron type instrument. 15

3010

Roll No.

3015

B. Tech. 2nd Semester (ME)
Examination – July, 2021

MATH-II(Multivariable Calculus, Differential Equations &
Complex Analysis)

Paper : BSC-MATH-102-G

Time : Three hours] [Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *mandatory*. All questions carry equal marks.

1. (a) Evaluate the following integral :

$$\left(\int_1^2 \int_1^3 xy^2 dx dy \right)$$

- (b) State the result of Green's Theorem.
(c) Find the complementary function of differential equation :

$$\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 5y = 0$$

3015-2150-(P-4)(Q-9)(21)

P. T. O.

(d) Solve the following Clairaut's equation :

$$p = \log(px - y)$$

(e) Separate real and imaginary parts of :

$$e^{(4+2i)^2}$$

(f) Find the constant 'p' such that

$$f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \left(\frac{px}{y} \right) \text{ is analytic.}$$

$$6 \times 2.5 = 15$$

UNIT - I

2. (a) Evaluate :

7.5

$$\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$$

by change of order of integration.

(b) Using triple integral, find the volume of sphere :

7.5

$$x^2 + y^2 + z^2 = a^2$$

3. (a) Verify Stoke's theorem for $\vec{f} = (x^2 + y^2)\hat{i} - 2xy\hat{j}$ taken around the rectangle bounded by $x = \pm a$, $y = 0$, $y = b$.

7.5

(b) Verify divergence theorem for $\vec{f} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$ taken over the cube $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$.

7.5

3015-2150-(P-4)(Q-9)(21) (2)

UNIT - II

4. (a) Solve the differential equation : 7.5

$$(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$$

(b) Solve by method of variation of parameters : 7.5

$$\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$$

5. (a) Solve the differential equation : 7.5

$$p(p + y) = x(x + y)$$

(b) Solve the differential equation : 7.5

$$y - 2px = \tan^{-1}(xp)^2$$

UNIT - III

6. (a) Prove that $f(z) = \sin z$ is analytic and find its derivative. 7.5

(b) Find an analytic function whose real part is : 7.5

$$u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$$

7. (a) Show that the function $f(z)$ defined by :

$$f(z) = \frac{x^2y^3(x + iy)}{x^6 + y^{10}}; z \neq 0, f(0) = 0$$

is not analytic at origin although C-R equations are satisfied at origin. 7.5

3015-2150-(P-4)(Q-9)(21) (3)

P. T. O.

- (b) Define bilinear transformation. Find that bilinear transformation which maps the points $z = 1, i, -1$ onto the points $w = i, 0, -i$. 7.5

UNIT - IV

8. (a) Evaluate the integral $\oint_C \frac{z}{(z-1)(z-3)} dz$; where C is the circle $|z| = \frac{z}{2}$. 7.5

- (b) Expand $f(z) = \cos z$ in a Taylor series about the point $z = \frac{\pi}{4}$. 7.5

9. (a) Evaluate $\oint_C \frac{2z-1}{z(z+1)(z-3)} dz$, where C is the circle $|z| = 2$; using Residue Theorem. 7.5

- (b) Evaluate: 7.5

$$\int_0^{2\pi} \frac{d\theta}{5-3\cos\theta}$$

3015

B.Tech. (ME) 2nd Semester (G-Scheme)

Examination, July-2022

MATH-II

Multivariable Calculus, Differential equations and
Complex Analysis

Paper- BSC-(Math-102-G)

Time allowed : 3 hours]

[Maximum marks : 75

Note : Question number 1 is compulsory. Attempt five questions in total by selecting one from each unit. All questions carry equal marks.

1. (a) Evaluate $\int_3^4 \left[\int_1^2 (xy + e^y) dy \right] dx$
- (b) Solve $(2xy + y - \tan x) dx + (x^2 - x \tan^2 y + \sec^2 y) dy = 0$
- (c) Define Mobius transformation and its determinant.
- (d) If $Z = x + iy$, show that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) = 4 \frac{\partial^2}{\partial z \partial \bar{z}}$
- (e) Evaluate $\oint_C \frac{dz}{z-a}$, where C is circle $|z - a| = r$.
- (f) If $f(z) = \frac{1 + e^z}{\sin z + z \cos z}$, find residue at $z = 0$

2.5 × 6 = 15

3015-P-4-Q-9 (22)

[P. T. O.]

(2)

3015

Unit-I

2. (a) By changing the order, solve the integral

$$\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx \quad 7.5$$

- (b) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dy dx$ by changing to polar co-ordinate. Hence deduce that

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2} \quad 7.5$$

3. Verify Green's theorem in the plane for $\oint_C (xy + y^2) dx + x^2 dy$, where C is the closed curve of the region bounded by $y = x$ and $y = x^2$. 15

Unit-II

4. (a) Solve $y'' - 2y' + 2y = e^x \tan x$ by using method of variation of parameters. 7.5

- (b) Solve the Cauchy-Euler equation. 7.5

$$x^2 \frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} - 20y = (x+1)^2.$$

5. (a) Express $4x^3 - 2x^2 - 3x + 8$ in the terms of Legendre's polynomial. 7.5

- (b) Find the power series solution of $\frac{d^2 y}{dx^2} + x^2 y = 0$ 7.5

3015

(3)

3015

Unit-III

6. (a) Find the values of A and B such that the function $f(z) = x^2 + Ay^2 - 2xy + i(Bx^2 - y^2 + 2xy)$. 7.5

- (b) Determine the analytic function whose real part is $e^{2x} \times \cos 2y - e^{2x} y \sin 2y$. 7.5

7. (a) Show that the function $u = e^{-xy} \sin(x^2 - y^2)$ is harmonic. Find the conjugate function v and express $u + iv$ as an analytic function of z . 7.5

- (b) Find the Mobius transformation that maps the points $z = -1, 0, 1$ in the z -plane onto the points $w = 0, i, 3i$ in the w -Plane. 7.5

Unit-IV

8. (a) Evaluate $\oint_C \frac{3z(Z + 1/3)}{(z^2 - 1)(z + 2)} dz$, where C is the circle $|z - 1| = 1$. 8

- (b) Verify Cauchy's integral theorem by integrating e^{iz} along the boundary of the triangle with vertices at the points $1 + i, -1 + i$ and $-1 - i$. 7

3015

P.T.O

9. (a) Evaluate

10

(b) Expand $f(z) = \frac{z}{(z+1)(z+2)}$ as Laurent's series about $z = -2$.

5

Roll No.

3016

**B. Tech. 2nd Semester (CSE)
Examination – July, 2021**

MATH-II (PROBABILITY & STATISTICS)

Paper : BSC-MATH-104-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) Define continuous random variable and probability measure.
- (b) Explain probability mass function.
- (c) Explain properties of continuous distribution function.

3016-2650-(P-4)(Q-9)(21)

P. T. O.

- (d) Evaluate mean of Poisson's distributio
- (e) The mortality rate for a certain disease is 6 per 1000. What is the probability for just four death from that disease in a group of 400.
- (f) Explain measures of Kurtosis.

UNIT - I

2. (a) Let x and y be random variable such that :

$$f(x, y) = \begin{cases} k(2x+y) & \text{for } 0 < x < 1, 0 < y < 2 \\ 0 & \text{elsewhere} \end{cases}$$

be a joint probability density function. Find the value of k .

- (b) Explain Bernoulli trials.

3. State and prove Chebyshev's Inequality.

UNIT - II

4. (a) Show that the function $f(x) = \begin{cases} e^{-x} & \text{for } x \geq 0 \\ 0 & \text{for } x < 0 \end{cases}$ a probability density function and find :
- (i) $P[1 \leq x \leq 2]$ (ii) $F(2)$

3016-2650-(P-4)(Q-9)(21) (2)

- (b) A bag X contains 2 white, 3 red balls and bag Y contains 4 white, 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from bag Y.

5. State and prove Distribution of Quotient of two random variables.

UNIT - III

6. (a) The following table shows the marks obtained by 100 candidates in an examination. Calculate the mean, median and standard deviation :

Marks obtained	1-10	11-20	21-30	31-40	41-50	51-60
No. of candidates	3	16	26	31	16	8

- (b) A bag contains five white, seven black and eight red balls. A ball is drawn at random. What is the probability that it is a red ball or a white ball ?

7. (a) A coin is tossed five times. What is the probability of getting at least three heads.

- (b) Fit a Poisson distribution of the following data :

x	0	1	2	3	4
f	122	60	15	2	1

3016-2650-(P-4)(Q-9)(21) (3)

P. T. O.

UNIT - IV

8. (a) In two large populations, there are 30% and 25% respectively, of fair-haired people. In this difference likely to be hidden in samples of 1200 and 900 respectively, from the two populations.

(b) A sample of 100 electric bulbs produce by a manufacture A showed a mean life time of 1190 hours and a standard deviation of 90 hours. A sample of 75 bulbs produced by manufacturer B showed a mean life time of 1230 hours with a standard deviation of 120 hours. Is there a difference between the mean life time of the two brands at significance levels of 5% and 1%.

9. Fit a binomial distribution to the data :

$x:$	0	1	2	3	4	5
$y:$	38	144	342	287	164	25

and test for goodness-of-fit at the level of significance 0.05.

B.Tech. (CSE) 2nd Semester (G-Scheme)

Examination, July-2022

MATH-II (Probability and Statistics)

Paper- B.S.C.-Math-104-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt five questions in total, first being compulsory and selecting one from each unit.

1. (a) Write a short note on
 - (i) Probability spaces
 - (ii) Independent random variables
- (b) A Community consists of 50 percent Hindus, 30 percent Muslims and 20 percent Sikhs. If a sample of six individuals is selected at random, what is the probability that two are Hindus, three are Muslims and one is a Sikh?
- (c) The response time of a certain computer system in seconds has an exponential distribution with a mean of 3 seconds what is the probability that response time exceeds 5 seconds?
- (d) Determine the mean of a Binomial distribution
- (e) The two regression equations of the variables x and y are $x = 19.13 - 0.87y$ and $y = 11.64 - 0.5x$. Find \bar{x} and \bar{y} .
- (f) A random sample of 15 paired observations from a bivariate normal population gives a correlation coefficient of 0.5. Does this signify the existence of correlation in the sampled population? 15

Unit-I

2. (a) A purse contains 2 silver and 4 copper coins and a second purse contains 4 silver and 4 copper coins. If a coin is selected at random from one of the two purses, what is the probability that it is a silver coin?
- (b) A variate X has the probability distribution

$x :$	-3	6	9
$P\{x = x\} :$	1/6	1/2	1/3

Evaluate (i) $E(2x + 1)^2$ (ii) $\text{Var}(4x + 5)$

3. (a) State and prove Chebyshev's inequality 15
- (b) A manufacturer knows that the condensers he makes contains on the average 1% defective. He packs them in the boxes of 100. What is the probability that a box picked at random will contain 3 or more faulty condensers? 15

Unit-II

4. (a) If X is a continuous random variable with p.d.f. given by

$$f(x) = \begin{cases} kx, & 0 \leq x < 1 \\ k, & 1 \leq x < 2 \\ -kx + 3k, & 2 \leq x < 3 \\ 0 & \text{otherwise} \end{cases}$$

- Determine (i) The constant k
(ii) c.d.f. $f(x)$

- (b) The mean and standard deviation of the marks obtained by 1000 students in an examination are respectively 34.4 and 16.5. Assuming the normality of the distribution, find the approximate number of students expected to obtain marks between 30 and 60. 15
5. (a) If X and Y are two independent continuous random variables, then determine the p.d.f. of the random variable $U = X + Y$.
- (b) The joint p.d.f. of a two-dimensional random variable (x, y) is given by
- $$f(x, y) = \begin{cases} 2; & 0 < x < 1, \quad 0 < y < x \\ 0 & \text{elsewhere} \end{cases} \quad 15$$

Find the conditional density function of Y given $X = x$ and conditional density function of X given $Y = y$.

Unit-III

6. (a) Calculate mean of the following data

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency (f)	14	17	22	26	23	18

- (b) The first four moments about the working mean 28.5 of a distribution are 0.294, 7.144, 42.409 and 454.98. Calculate the moments about the mean. Also comment upon the skewness and Kurtosis of the distribution. 15
7. (a) Find correlation coefficient between X and Y from the given data

X	55	56	58	59	60	60	62
Y	35	38	38	39	44	43	45

- (b) Fit a second degree parabola to the following data. 15

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

Unit-IV

8. (a) A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.
- (b) A simple sample of heights of 6400 Englishmen has a mean of 170cm and a s.d. of 6.4cm. While a simple sample of heights of 1600 Americans has a mean of 172cm and a s.d. of 6.3cm Does the data indicates that American are, on the average, taller than Englishmen? 15
9. (a) Two random samples gave the following results

Sample	Size	Sample Mean	Sum of squares of deviations from mean
1	10	15	90
2	12	14	108

Test whether the sample came form the sample normal population.

- (b) 200 digits are chosen at random from a set of tables. The frequencies of the digits are as follows.

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Using X^2 - test to assess the correctness of hypothesis that digits were distributed in equal number in tables from where they are chosen. 15

Roll No.

3007

**B. Tech 1st Semester (ME)
Examination – December, 2019**

MATHEMATICS – I (CALCULUS & MATRICES)

Paper : BSC-MATH-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. 1 is compulsory. Attempt one question from each Unit.

1. (a) Determine Rank of Matrix $6 \times 2.5 = 15$

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 1 & 6 & 5 \end{bmatrix}$$

- (b) Define Orthogonal Transformation and its properties.

3007- 4,900-(P-4)(Q-9)(19)

P. T. O.

(c) If $z = \tan^{-1} \left[\frac{x^2 + y^2}{x + y} \right]$ then determine $\left(\frac{\partial z}{\partial x} \right)$.

(d) State the result of Rolle's Theorem.

(e) Compute :

$$B \left(\frac{9}{2}, \frac{7}{2} \right)$$

(f) Evaluate Divergence $[3x^2\hat{i} + 5xy^2\hat{j} + xyz^3\hat{k}]$ at the point (1, 2, -3).

UNIT - I

2. (a) Evaluate 8

(i) $\lim_{x \rightarrow 0} \frac{xe^x - \log(1+x)}{x^2}$

(ii) $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\tan x}$

(b) Find the evolute of the Parabola $y^2 = 4ax$. 7

3. (a) Find the volume of the solid generated by revolving the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about x-axis. 7

(b) Prove that : 8

$$\int_0^{\frac{\pi}{2}} \sin^p x \cos^q x dx = \frac{\left(\frac{p-1}{2}\right)! \left(\frac{q-1}{2}\right)!}{2 \left(\frac{p+q-1}{2}\right)!}$$

UNIT - II

4. (a) Test the convergence of the following series 7.5
 $\frac{1}{\sqrt[2]{1}} + \frac{x^2}{\sqrt[3]{2}} + \frac{x^4}{\sqrt[4]{3}} + \frac{x^6}{\sqrt[5]{4}} + \dots + \infty$

(b) Test the convergence of the series $\sum \frac{(n!)^2}{(2n)!} x^{2n}$. 7.5

5. (a) Test the convergence of an Alternating series $\frac{1}{1} - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \frac{1}{\sqrt{5}} - \dots$ 7.5

(b) Find a Fourier Series to represent $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$. 7.5

UNIT - III

6. (a) If $z = f(x+ct) + \phi(x-ct)$ prove that $\frac{\partial^2 z}{\partial t^2} = c^2 \frac{\partial^2 z}{\partial x^2}$. 7.5

(b) If $u = \tan^{-1} \left(\frac{y}{x} \right)$ where $x = e^t - e^{-t}$ and $y = e^t + e^{-t}$. Find $\frac{du}{dt}$. 7.5

7. (a) A Rectangular Box open at the top is to have volume of 32 cubic feet. Find the dimensions of the box requiring least material for its construction. 7.5

- (b) Find the directional derivative of $\phi = x^2yz + 4xz^2$ at the point $(1, -2, -1)$ in direction of the vector $2\hat{i} - \hat{j} - 2\hat{k}$. 7.5

UNIT - IV

8. (a) Find the Inverse of Matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$.

using Elementary Transformations. 7.5

- (b) Find the values of λ and μ so that the system of equations : 7.5

$$x + y + z = 6, x + 2y + 3z = 10, x + 2y + \lambda z = \mu \text{ has}$$

- (i) no solution
(ii) infinite number of solutions
(iii) unique solution
9. (a) Find the Eigen values and Eigen vectors of Matrix : 7.5

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

- (b) Verify Cayley-Hamilton Theorem and find the Inverse of Matrix : 7.5

$$A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$$

Roll No.

3007

**B. Tech. 1st Semester (ME)
Examination – March, 2021**

MATH - I (Calculus and Matrices)

Paper : BSC-MATH-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (i) Find the Fourier series for the function $f(x) = x$ in the interval $(-\pi, \pi)$.

(ii) Define rank of matrix. Find rank of matrix

$$\begin{bmatrix} 3 & 1 & 2 & 4 \\ -1 & 0 & 4 & 9 \end{bmatrix}$$

(iii) Write the relationship between beta and gamma function and hence evaluate $\Gamma(1/2)$.

3007-1950-(P-4)(Q-9)(21)

P. T. O.

(iv) Evaluate $\lim_{x \rightarrow \infty} \frac{x}{\sqrt{1+x^2}}$

(v) $\int_0^{\infty} \frac{dx}{(a^2+x^2)^{7/2}}$

(vi) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, prove that $\text{div}(r^n \vec{r}) = (n+3)r^n$

UNIT - I

2. (a) State and prove Lagrange's mean value theorem.
 (b) Calculate the total length of the evolute of the asteroid.

$$x^{2/3} + y^{2/3} = a^{2/3}$$

3. (a) Prove that $\Gamma m \Gamma(m+1/2) = \frac{\sqrt{\pi} \Gamma 2m}{2^{2m-1}}$
 (b) Determine the volume of solid generated by revolving the plane area bounded by $y^2 = 4x$ and $x = 4$ about the line $x = 4$.

UNIT - II

4. (a) Expand $\log x$ in power of $(x-1)$ and hence find the value of $\log 1.1$
 (b) Prove that in the interval $0 \leq x \leq 2\pi$,

$$x \sin x = -1 - \frac{1}{2} \cos x + \pi \sin x + \sum_{n=2}^{\infty} \frac{2}{n^2-1} \cos nx$$

5. (a) Show that the sequence $\{x_n\}$, where $x_n = \left(1 + \frac{1}{n}\right)^n$ is convergent.

- (b) Obtain a half-range cosine series for :

$$f(x) = \begin{cases} kx, & \text{for } 0 \leq x < \frac{l}{2} \\ k(l-x), & \text{for } \frac{l}{2} \leq x \leq l \end{cases}$$

UNIT - III

6. (a) Discuss the maxima and minima of $x^3 y^2 (1-x-y)$
 (b) Give the geometrical interpretation of gradient, also prove that $\text{Curl Curl } \vec{F} = \text{grad}(\text{div } \vec{F}) - \nabla^2 \vec{F}$.

7. (a) If $\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$ prove that

$$\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial u}{\partial z}\right)^2 = 2 \left(x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}\right)$$

- (b) Find the directional derivatives of the function $f = x^2 - y^2 + 2z^2$ at the point P(1, 2, 3) in the direction of the line PQ where Q is the point (5, 0, 4).

UNIT - IV

8. (a) For what values of parameters λ and μ do the system of equations
 $x + y + z = 6, x + 2y + 3z = 10, x + 2y + \lambda z = \mu$
 have (i) no solution

(ii) unique solution

(iii) more than one solution

(b) Verify Cayley Hamilton Theorem for the matrix

$A = \begin{pmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{pmatrix}$. Hence obtain the inverse of the matrix.

9. (a) Diagonalise $A = \begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ and obtain the modal matrix.

(b) Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$.

Roll No.

3008

**B. Tech 1st Semester (CSE)
Examination – December, 2019**

MATH -I (CALCULUS AND LINEAR ALGEBRA)

Paper : BSC-MATH-103-G

Time : Three Hours] [Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (i) $\int_0^{\infty} \frac{dx}{(a^2 + x^2)^7}$ 2.5 × 6

(ii) Evaluate $\lim_{x \rightarrow 0} \frac{\log x}{\cot x}$

(iii) Show that $\Gamma\left(\frac{1}{4}\right)\Gamma\left(\frac{3}{4}\right) = \pi\sqrt{2}$

(iv) Define rank of matrix. Find rank of matrix :

3008-3,300-(P-4)(Q-9)(19)

P. T. O.

$$\begin{bmatrix} 3 & 1 & 2 & 4 \\ -1 & 0 & 4 & 9 \end{bmatrix}$$

(v) Find the matrix of the linear transformation $T: V_2 \rightarrow V_3$ defined by $T(x_1, x_2) = (x_1 + x_2, 2x_1 - x_2, 7x_3)$.

(vi) Define basis of a vector space.

UNIT - I

2. (a) State and prove Cauchy's mean value theorem.

(b) Evaluate $\lim_{x \rightarrow 0} \left(\frac{\sin x}{x} \right)^{\frac{1}{x^2}}$.

3. (a) Define Beta function and Gamma function and prove that $\beta(m, n) = \frac{\Gamma m, \Gamma n}{\Gamma m + n}$.

(b) Expand $\sin x$ in powers of $\left(x - \frac{\pi}{2}\right)$. Hence find the value of $\sin 91^\circ$ correct to four places of decimals.

UNIT - II

4. (a) Solve the system of equations:

$$2x_1 + 3x_2 + x_3 = 9$$

$$x_1 + 2x_2 + 3x_3 = 6$$

$$3x_1 + x_2 + 2x_3 = 8$$

by Gauss elimination method.

(b) Solve the following system of linear equations using Cramer's rule:

$$x + 2y + 3z = 6$$

$$2x + 4y + z = 7$$

$$3x + 2y + 9z = 14$$

5. (a) Find the value of λ for which the vectors $(1, -2, \lambda), (2, -1, 5)$ and $(3, -5, 7\lambda)$ are linearly dependent.

(b) Investigate, for what values of λ and μ do the system of equations:

$$x + y + z = 6; x + 2y + 3z = 10; x + 2y + \lambda z = \mu$$

have

(i) no solution

(ii) unique solution

(iii) infinite solutions?

UNIT - III

6. For the linear transformation $T: R^2 \rightarrow R^3$ such that $T(x_1, x_2) = (x_1 - x_2, x_2 - x_1, -x_1)$, find a basis and dimension of its range space and its null space. Also verify, that:

$$\text{rank}(T) + \text{nullity}(T) = \dim R^2$$

7. (a) If U and W are two subspaces of a finite dimensional vector space V , then:

$$\dim(U+W) = \dim(U) + \dim(W) - \dim(U \cap W)$$

- (b) Let V and W be vector space over F , then $T: V \rightarrow W$ is a linear transformation if and only if

$$T(\lambda_1 v_1 + \lambda_2 v_2) = \lambda_1 T(v_1) + \lambda_2 T(v_2), \lambda_1, \lambda_2 \in F \text{ and } v_1, v_2 \in V$$

UNIT - IV

8. (a) Prove that every finite dimensional inner product spaces has an orthonormal basis.
(b) Prove that every inner product space is a metric space.
9. (a) Diagonalise :

$$A = \begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$$

- (b) Find the Eigen values and Eigen vectors of the matrix :

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

Roll No.

3008

**B. Tech. 1st Semester (CSE)
Examination – March, 2021
MATH - I (Calculus and Linear Algebra)
Paper : BSC-MATH-103-G**

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Answer the following questions in brief : $2.5 \times 6 = 15$

- (a) State Taylor's and Maclaurin theorem with remainders.
- (b) Examine the linear independence of the following set of vectors

$$\{(1, 2, 3), (1, 1, 1), (0, 1, 2)\}$$

- (c) Show that for two matrices A and B , $(AB)^{-1} = B^{-1} A^{-1}$.
- (d) Show that the function $T : R^3 \rightarrow R^2$ defined by $T(x, y, z) = (|x|, y - z)$ is not a linear transformation.

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P. T. O.

- (e) If $T : U \rightarrow V$ is a linear transformation, then show that $\ker T$ is a subspace of U .
- (f) If A is a square matrix, prove that $(A + A')$ is symmetric and $(A - A')$ is skew-symmetric.

UNIT - I

2. (a) Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{x^2} - \frac{1}{\sin^2 x} \right)$ 7
- (b) Prove that equation of the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is $(ax)^{2/3} + (by)^{2/3} = (a^2 - b^2)^{2/3}$ 8

3. (a) Find the volume generated by revolution about initial line of $r = a(1 - \cos \theta)$. 7

- (b) Prove that: 8

$$(i) \int_0^1 \frac{x dx}{\sqrt{1-x^5}} = \frac{1}{5} \beta\left(\frac{2}{5}, \frac{1}{2}\right)$$

$$(ii) \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{1}{4\sqrt{2}} \beta\left(\frac{1}{4}, \frac{1}{2}\right)$$

UNIT - II

4. (a) If $A = \begin{bmatrix} 1 & 3 & 0 \\ -1 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ -1 & 1 & 2 \end{bmatrix}$, compute AB and BA and show that $AB \neq BA$. 7½

- (b) Find the rank of a matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ 7½

5. (a) Using Cramer's rule, solve the following equation :
 $x + 3y + 6z = 2$; $3x - y + 4z = 9$; $x - 4y + 2z = 7$. 7½
- (b) Solve the following system of equations by using Gauss-Jordan elimination method : 7½
 $4y + z = 2$; $2x + 6y - 2z = 3$; $4x + 8y - 5z = 4$.

UNIT - III

6. (a) Show that the set $\{(2, 1, 4), (1, -1, 2), (3, 1, -2)\}$ form a basis of R^3 . 7

- (b) If $T : R^4 \rightarrow R^3$ is a linear transformation defined by $T(1, 0, 0, 0) = (1, 1, 1)$, $T(0, 1, 0, 0) = (1, -1, 1)$, $T(0, 0, 1, 0) = (1, 0, 0)$ and $T(0, 0, 0, 1) = (1, 0, 1)$, then verify that $\text{Rank } T + \text{Nullity } T = \dim R^4$. 8

7. (a) Let $T : U \rightarrow V$ be invertible linear transformation and $T^{-1} : V \rightarrow U$ be its inverse. Then show that T^{-1} is also a linear transformation. 7½

- (b) If T_1 and T_2 be two linear operators defined on R^2 s.t. $T_1(x, y) = (x + y, 0)$ and $T_2(x, y) = (-y, x)$. Find a formula for the operators : 7½

(i) $T_1 T_2$

(ii) $T_2 T_1$

(iii) T_1^2

UNIT - IV

8. (a) Find the eigen values and eigen vectors of the

matrix $A = \begin{bmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{bmatrix}$ 8

(b) Find the values of a, b, c if $A = \begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ is orthogonal. 7

9. (a) Diagonalise the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{bmatrix}$. 7½

(b) Using Gram-Schmidt orthogonalization process, construct an orthonormal basis of $V_3(\mathbb{R})$ with standard inner product defined on it, given the basis $u_1 = (1, 1, 1)$, $u_2 = (1, -2, 1)$ and $u_3 = (1, 2, 3)$. 7½

Roll No.

3008

**B. Tech. 1st Semester (CSE)
Examination – February, 2022**

MATH - I (Calculus and LINEAR ALGEBRA)

Paper : BSC-MATH-103-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Prove that $\beta(m, n) = \beta(n, m)$.

(b) Compute $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} d & -b \\ -c & d \end{bmatrix}$.

(c) Find $|A|$ where the matrix $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$

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- (d) Let $T : U \rightarrow V$ be a linear transformation the prove $T(0_u) = 0_v$, where 0_u and 0_v are zeros vectors in U and V respectively.
- (e) Let $T_1 : R^2 \rightarrow R^2$ and $T_2 : R^2 \rightarrow R^2$ be linear transforms, then verify that $T_1 T_2$ and $T_2 T_1$ are well defined or not.
- (f) Define inner products space.

UNIT - I

2. (a) Examine for extreme values of :

$$f(x, y) = 3x^2 - y^2 + x^3.$$

- (b) Show that :

$$\log(x+h) = \log x + \frac{h}{x} - \frac{h^2}{2x^2} + \dots + (-1)^{n-1} \frac{h^n}{n(x+\theta h)^n}$$

3. (a) Find the volume of solid formed by revolution

about x -axis of loop of the curve $y = \left\{ \frac{ax^2 + x^2}{(a-x)} \right\}^{1/2}$.

(b) Show that $\beta(m, n) = \int_0^\infty \frac{y^{n-1}}{(1+y)^{m+n}} dy$

UNIT - II

4. (a) Solve following equations with the help of matrices :

$$x + y + z = 3, \quad x + 2y + 3z = 4, \quad x + 4y + 9z = 6$$

- (b) Show that vectors $x_1 = (1, 2, 4)$, $x_2 = (2, -1, 3)$, $x_3 = (0, 1, 2)$ and $x_4 = (-3, 7, 2)$ are C.D. and find relation between them.

5. (a) Using Gauss-Jordan method find inverse of matrix :

$$\begin{bmatrix} 8 & 4 & 3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

- (b) Solve the following equations by Cramer's rule $6x + y - 3z = 5$, $x + 3y - 2z = 5$, $2x + y + 4z = 8$.

UNIT - III

6. (a) If $P(x)$ denotes the set of all polynomials in x over a field F_1 then show that $P(x)$ is a vector space over F with vector addition as polynomial's addition and scalar multiplication defined as product of polynomial by an element of F .

- (b) Examine the linear independence of the following vectors :

$$(1, 1, 1), (1, 2, 3), (0, 1, 2) \text{ in } R^3.$$

7. (a) Verify that mapping $T : R^3 \rightarrow R^2$ defined by $T(x, y, z) = (2x - 3y, 7y + 2z)$ is linear transformation.

- (b) Find a linear transformation $T : R^3 \rightarrow R^3$ where range space is spanned by vectors $(1, 2, 3)$, $(4, 5, 6)$.

UNIT - IV

8. (a) Find eigen values and eigen vector of :

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

- (b) Show that matrix $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ is not diagonalizable over the field C .

9. Prove that every finite dimensional inner product space has an orthogonal basis.

Roll No.

3006

**B. Tech 1st Semester (Common for All
Branches) Examination – December, 2019**

CHEMISTRY - I

Paper : BSC-CH-101-G

Time : Three Hours] [Maximum Marks : 75

*Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.*

*Note : Question Number 1 is compulsory. Attempt four
questions from remaining four Units selecting one
question from each Unit. Use of non programmable
calculator is allowed.*

1. (a) Give *two* examples of anomalous electronic
configuration. 1.5 × 10 = 15

(b) Define doping in semiconductors.

3006-4250-(P-4)(Q-9)(19)

P. T. O.

- (c) What is polarizability ?
- (d) Mention at least three elements of symmetry.
- (e) Differentiate configuration and conformation.
- (f) Write balanced chemical equation for the oxidation and reduction of carboxyl compounds.
- (g) Define critical temperature.
- (h) Write advantages of demineralization process.
- (i) What is Bathochronic Shift ?
- (j) What are equivalent and non-equivalent protons in NMR Spectrum ?

UNIT - I

2. Write short notes on the following : 15

- (a) Crystal field splitting in octahedral complex.
- (b) Molecular orbitals theory.
- (c) Define ion I.E & its variation in periodic table.

3006-4250-(P-4)(Q-9)(19) (2)

- 3. (a) What are Bonding and Antibonding molecular orbitals ? Explain formation of N_2 molecules on the basis of molecular orbital energy level diagram. 10
- (b) Explain the term angular wave function. 5

UNIT - II

- 4. (a) What are structural isomers and stereo isomers ? Classify them and explain its types. 10
- (b) Write short note on isomerism in transition metals. 5
- 5. Explain the following terms : 15
 - (a) Nucleophilic substitution reactions.
 - (b) Synthesis of Paracetamol.
 - (c) Addition reactions.

UNIT - III

- 6. (a) Define Vander-Waals interactions. Explain its types with suitable example of each. 10

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- (b) Write short note on critical phenomenon. 5
7. (a) Explain EDTA method to measure the hardness of water. 10
- (b) Explain environmental factors affecting corrosion. 5

UNIT - IV

8. (a) Discuss in detail the basic principle and application of IR spectroscopy. 10
- (b) Write short note on magnetic resonance imaging. 5
9. Explain the following terms : 15
- (a) Flame photometry.
- (b) Shielding and de-shielding of proton.
- (c) Splitting of NMR signal.

Roll No.

3006

**B. Tech. 1st Semester (Common for All
Branches) Examination – March, 2021**

CHEMISTRY – I

Paper : BSC-CH-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

*Note : Attempt **five** questions in all, selecting **one** question from each Section. Question No. 1 is **compulsory**. All questions carry equal marks.*

1. (a) Why electron affinity of fluorine is less than chlorine ?
- (b) Define rearrangement reactions. Give at least *two* examples.
- (c) Calculate the effective nuclear charge experienced by 4s orbital of zinc atom.

3006- 2000 -(P-4)(Q-9)(21)

P. T. O.

- (d) What is the effect of solvent polarity on various transitions in UV spectroscopy ?
- (e) Give significance of Vander Waal's constants a and b.
- (f) Write a short note on hardness of water.

2.5 × 6 = 15

SECTION – I

2. (a) Define electron affinity. Why successive electron affinities have negative values ? 3
- (b) Define Vander Waal's radii. Why they are larger than covalent radii ? 3
- (c) What is ionization energy ? What are the factors on which it depends ? 3
- (d) Write short notes on (i) role of doping on band structures and (ii) crystal field theory. 6
3. (a) Write brief notes on polarisability and electronegativity. 4
- (b) Draw energy level diagram for NO molecule. Predict its bond order. 4
- (c) Explain why the size of a cation is always smaller while that of an anion is always larger than the size of corresponding atom ? 3
- (d) What are normal and orthogonal wave functions ? Give an expression for Schrodinger wave equation. 4

SECTION – II

4. (a) Define distereoisomerism, meso compounds and tautomers with examples. 6

- (b) Can optical isomerism be possible in a compound having no chiral carbon. Explain giving *two* suitable examples. 2
- (c) What are elimination reactions ? What are its types ? Give *one* example of each. 4
- (d) Give the method of synthesis of Aspirin. 3

5. (a) Explain the following with examples :
 (i) Electrophilic substitution reactions 4
 (ii) Chiral carbon atom 2
 (iii) Metamerism 2
 (iv) Enantiomers 2
 (v) Difference between an intermediate and transition state 2
- (b) Give the method of synthesis of Paracetamol. 3

SECTION – III

6. (a) What are critical constants ? Explain the methods for the measurement of critical constants. 5
- (b) Derive the following : (i) Vander Waal's equation and (ii) Relation in between Boyle's temperature and Vander Waal's constants. 6
- (c) Explain Zeolite process for water softening. 4

7. Write Short notes on : 3 × 5 = 15
- (i) Ion Exchange Process
 - (ii) Measurement of Hardness of water by EDTA method
 - (iii) Soil Corrosion
 - (iv) Stress Corrosion
 - (v) Mechanism of Dry corrosion

SECTION - IV

8. (a) Explain the principle & applications of IR Spectroscopy. What is the importance of finger print region in this technique? 7
- (b) Describe principle and applications of NMR and MRI. 8
9. (a) What is flame photometry ? Describe its applications and drawbacks. 7
- (b) Explain the following : 2 × 4 = 8
- (i) Lambert-Beer's law
 - (ii) Hypochromic and Hypsochromic shift
 - (iii) Auxochrome
 - (iv) Principle of UV - Visible Spectroscopy

Roll No.

3006

**B. Tech. 2nd Semester (Common for All
Branches) Examination – July, 2021**

CHEMISTRY-I

Paper : BSC-CH-101-G

Time : Three Hours]

[Maximum Marks : 75

*Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.*

*Note : Question No. 1 is compulsory. Students have to
attempt five questions in total selecting one
question from each unit.*

1. Write short notes on the following : $2.5 \times 6 = 15$

- (a) What do you mean by alternate axis of symmetry ?
- (b) Discuss absorption spectroscopy in brief.
- (c) Define Electron gain enthalpy energy.
- (d) Discuss Anti-Markonikov's Rule.

3006-2300-(P-4)(Q-9)(21)

P. T. O.

- (e) Define pilling Bedworth rule.
 (f) What are ion exchange resins?

UNIT - I

2. (a) Discuss the crystal field theory in detail. Explain the energy level diagram for transition metal ion. 10
 (b) Discuss Pi-molecular orbital diagram of butadiene. 5
3. (a) The increasing order of reactivity among group 1 elements is $Li < Na < K < Rb < Cs$ whereas that among group 17 elements is $F > Cl > Br > I$. Explain. 4
 (b) Discuss the band structure of solid and role of doping on band structure. 8
 (c) What is Ionization energy? How it varies along the period and group explain? 3

UNIT - II

4. (a) Write the differences between E1 and E2 with suitable example. 4
 (b) Discuss the synthesis of Aspirin in details. 6

3006-2300-(P-4)(Q-9)(21) (2)

- (c) Write the conformation of ethane molecules with suitable energy level diagram. 5

5. Write short note on : $5 \times 3 = 15$

- (a) Electrophilic aromatic substitution
 (b) Structural Isomer
 (c) Isomerism transition metal compounds

UNIT - III

6. (a) Describe the Zeolite process for water softening of hard water. Discuss their advantage and disadvantages. 10
 (b) Discuss the function of Lime & soda in lime soda process for water softening. 5
7. (a) What is differential aereation corrosion? Discuss with suitable example. 6
 (b) Discuss the various methods for prevention of corrosion in detail. 9

UNIT - IV

8. (a) Describe the Principle and application of UV Spectroscopy. 9

3006-2300-(P-4)(Q-9)(21) (3)

P. T. O.

(b) Write short note on magnetic resonance imaging.

6

9. (a) Discuss the principle working & application of flame photometry.

8

(b) Write short note on nuclear magnetic resonance. 7

B.Tech. (Common for All Branches) 2nd Semester
(G-Scheme) Examination, July-2022

CHEMISTRY-I

Paper- BSC-CH-101-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Question No. 1 is compulsory. Students have to attempt five questions in total selecting one question from each unit.

1. (a) What do you mean by centre of symmetry?
- (b) Discuss emission spectroscopy in brief.
- (c) Why do halogen atoms have strong electron affinity
- (d) Define Pilling Bedworth rule.
- (e) What are ion exchange resins?
- (f) What is Markonikov's Rule? 6×2.5

Unit - I

2. (a) What is crystal field theory? Discuss its postulates with suitable example. 8
- (b) Discuss Pi-molecular orbital diagram of benzene. 7
3. (a) Discuss the band structure of solid. 5
- (b) Explain the molecular orbital energy level diagram of oxygen molecule 7

(2)

3006

- (c) Explain why the reducing power decreases as we move from left to right in a period? 3

Unit - II

4. (a) Write the differences between SN^1 and SN^2 . Discuss with suitable example in deatill. 6
(b) Write down the chemical reaction for the synthesis of paracetamol. 5
(c) Write short on addition reactions. 4
5. (a) Discuss the Isomerisms in transitional metal compound. 6
(b) Define Geometrical isomers with suitable example. 4
(c) Write the conformation of Butane molecules with suitable energy level diagram. 5

Unit - III

6. (a) Describe the demineralisation process for water softening of hard water. Discuss its advantage and disadvantages. 8
(b) Discuss the EDTA method for determine the hardness of water. 7
7. (a) Write the differences between dry corrosion and wet corrosion. 6
(b) Discuss the various factor effecting corrosion. 9

3006

(3)

3006

Unit - IV

8. (a) Describe the Principle and application of IR Spectroscopy. 9
(b) Write short note on nuclear magnetic resonance. 6
9. (a) Discuss the principle and application of flame photometry. 8
(b) Write short note on magnetic resonance imaging. 7

3006

Ist Yr.

Roll No.

3003

**B. Tech 1st Semester (CSE)
Examination – December, 2019**

SEMICONDUCTOR PHYSICS

Paper : BSC-PHY-103-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory.

1. (a) State Bloch theorem and write Bloch function ?
- (b) What do you mean by knee voltage in p-n junction ?
- (c) Write a short note on Fermi energy.
- (d) What do you mean by radiative and non-radiative emission ?

3003-2000-(P-3)(Q-9)(19)

P. T. O.

- (e) Explain why a semiconductor acts as an insulator at 0°k and why its conductivity increases with increasing temperature.
- (f) What do you mean by a phonon? $6 \times 2.5 = 15$

UNIT - I

2. What is the effect of periodic potential on the energy of electron in a metal? Explain it on the basis of Kronig-penny model and explain the formation of energy bands. 15
3. (a) Obtain an expression for energy levels in one dimensional free electron gas. 10
- (b) What is the main difference between metals, semiconductors and insulators? 5

UNIT - II

4. Derive an expression for the carrier concentration in intrinsic semiconductors. What would be the position of Fermi level? Explain. 15
5. Write a short note on : $5 \times 3 = 15$
- (a) Intrinsic and extrinsic semiconductor
- (b) Drift and diffusion current
- (c) Metal semiconductor junction (Ohmic and Schottky)

3003-2000-(P-3)(Q-9)(19) (2)

UNIT - III

6. (a) Derive the expression for density of states of photons. 10
- (b) What is difference between Spontaneous and Stimulated emission? 5
7. Derive an expression for the conductivity of metals on the basis of Drude model. 15

UNIT - IV

8. Explain the principle, working and application of UV-visible spectroscopy. 15
9. (a) Derive the expression for density of state in 2D, 1D and 0D. 9
- (b) Explain the concept of quantum well, wire and dot. Citing necessary examples. 6

3003-2000-(P-3)(Q-9)(19) (3)

1st Sem - 2021

Roll No.

3003

**B. Tech. 1st Semester (CSE)
Examination – March, 2021**

SEMICONDUCTOR PHYSICS

Paper : BSC-PHY-103-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Attempt any six parts : $2.5 \times 6 = 15$
- (i) What are main drawbacks of classical free electron theory ?
 - (ii) When does an intrinsic s/c behave as an insulator ?
Explain giving examples of intrinsic s/c.
 - (iii) What is meant by density of states in metals ?
 - (iv) Define stimulated and spontaneous emission.

3003-185-(P-4)(Q-9)(21)

P. T. O.

- (v) Why is Schottky junction diode preferred over Pn junction diode for high frequency device application ?
- (vi) What is the significance of Fermi energy level ? Under what condition Fermi-Dirac distribution function changes to Boltzmann distribution ?
- (vii) What is band gap theory ?
- (viii) What is meant by latch-up in a CMOS structure ?

UNIT - I

- 2. (a) What is density of states function ? Derive expression for density of states. 5
- (b) Consider a P-type silicon at 300 K doped with boron. Assume that the limit of the Boltzmann approximation occurs when $E_f - E_a = 3KT$. Determine the Fermi level position and the maximum doping at which the Boltzmann approximation is still valid. 5
- (c) What is expression for probability of function of electrons and holes in the donor and acceptor states ? Discuss complete ionization and freeze out condition for suitable band-energy diagrams. 5
- 3. (a) Discuss the Kronig-Penny model for the motion of an e^- in a periodic potential. 8
- (b) What is Fermi level ? Derive an expression for the Fermi-energy in terms of the number of electrons per unit volume. 7

3003- (P-4)(Q-9)(21) (2)

UNIT - II

- 4. (a) Discuss the drift and diffusion phenomenon in semiconductor, which is more often present in semiconductor devices ? 6
- (b) Explain how the resistivity of intrinsic semiconductor varies with temperature. 6
- (c) What is Fermi-Dirac distribution function ? 3
- 5. (a) Explain Schottky Effect. Show that actual Schottky barrier height proportionately related to position of maximum barrier height due to Schottky effect. 10
- (b) Design an ohmic contact for n-type Ga As using In As. With an intervening graded in In Ga As region. 5

UNIT - III

- 6. (a) What is Drude Model ? 9
- (b) Define and explain optical loss and gain. 6
- 7. (a) How optical transitions takes place in Bulk Semiconductors ? 6
- (b) Define spontaneous emission and absorption in detail. Why population inversion is necessary for stimulated emission ? 9

3003- (P-4)(Q-9)(21) (3)

P. T. O.

UNIT - IV

8. (a) Write the concept of band gap by UV-VIS spectroscopy. 9
- (b) Write parameter extraction from diode IV characteristics. 6
9. Write and explain design fabrication and characterization techniques for quantum wells, wires and dots. 15
-

Roll No.

3004

**B. Tech. 1st Semester (Civil Engineering)
Examination – March, 2021**

MECHANICS

Paper : BSC-PHY-104-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all. All questions carry equal marks.

1. (i) Distinguish between Inertial and Fictitious forces. 3
- (ii) What do you understand by free, forced and resonant oscillator ? 3
- (iii) Define rigid body. How man coordinates are required to specify its configuration ? 3
- (iv) What is inverse square law ? Give some examples. 3

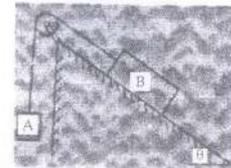
3004-450 -(P-3)(Q-9)(21)

P. T. O.

- (v) What are free body diagrams ? Explain with an example. 3
2. Derive relations between Plane polar coordinates and Cartesian coordinates. 15
3. (a) What is a conservative force ? How is it related to the potential energy ? 8
 (b) Describe the invariance of Newton's Laws of Motion. 7
4. What are equipotential surfaces ? What is the magnitude of the gradient of potential given by $U = x^2 + y^2 + z^2 + xy + xz$ at point (1, 1, 2). 15
5. What is coriolis force ? Prove that it owes its existence to motion of a particle with respect to a rotating frame of reference. 15
6. Discuss Angular Momentum of a system of particles. Establish a relationship between Torque and Angular Acceleration. 15
7. Find an expression for moment of inertia of a rod about an axis passing through the centre of the rod and perpendicular to it. 15

3004- (P-3)(Q-9)(21) (2)

8. Knowing that $W_a = 25 \text{ N}$ and $\theta = 30^\circ$. Determine :
- (a) The smallest value of W_b for which the system is in equilibrium.
- (b) Largest value of W_b for which system is in equilibrium. take $\mu_s = 0.35$ and $\mu_k = 0.25$. 15



9. (a) What is angle of friction and angle of repose ? 8
 (b) Discuss the Coulomb's Law of dry friction. 7

3004- (P-3)(Q-9)(21) (3)

Roll No.

3003

**B. Tech. (CSE) 1st Semester
Examination – February, 2022**

SEMICONDUCTOR PHYSICS

Paper : BSC-PHY-103G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Students have to attempt *five* questions in all selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (i) What do you mean by drift velocity of electrons, how is it related to mobility of free electrons ?
- (ii) What is the cause of failure of free electron theory ?
- (iii) Explain the term doping and its need.
- (iv) Write about the phonons.

3003-2400-(P-4)(Q-9)(22)

P. T. O.

- (v) Write about the density of states.
 (vi) What is Drude Model of gas of free electron. $2.5 \times 6 = 15$

UNIT - I

2. (a) Deduce the relation for effective mass of an electron. Show how it differs from the rest mass of the electron? 9
 (b) What one E-K diagrams? 6
3. (a) Discuss the origin of energy bands in solid on the basis of Kronig-Penny model. 10
 (b) What is the difference between metals, insulators and semi conductors? 5

UNIT - II

4. Explain Fermi Dirac distribution functions. Explain how this functions varies with temp. Evaluate the Fermi function for energy KT above the Fermi energy. 15
5. (a) What is doping? What are extrinsic semiconductors? Explain the term donor and acceptors. 9
 (b) Differentiate between Schottky contacts and normal P-N junction contact. 6

3003-2400-(P-4)(Q-9)(22) (2)

UNIT - III

6. (a) What are density of states? Derive an expression for density of states for semi-conductor substances. 9
 (b) What are exciton? Write their role in process of luminescence. 6
7. (a) On account of Fermi's golden rule discuss the transition rate in a semiconductor material. 6
 (b) Give the assumption of Drude model for free electron theory. Derive the electrical conductivity of a metal. 9

UNIT - IV

8. (a) Explain Deep Level transient spectroscopy and UV-visible spectrometer. 12
 (b) The saturation current density of a p-n junction Ge diode is 250 mA/m^2 at 300 k. Find the voltage that would have to be applied across the junction to cause a forward current density of 10^5 A/m^2 to flow. 3

3003-2400-(P-4)(Q-9)(22) (3)

P. T. O.

9. (a) What do you mean by Fabrication of junctions ?
Write the types of junctions based on different
fabrication methods. 9
- (b) Write short note on : 6
- (i) Semiconductor Quantum Well
 - (ii) Quantum Wire
 - (iii) Quantum Dot
-

3001

B.Tech. (ECE) 2nd Semester (G-Scheme)
Examination, July-2022
INTRODUCTION TO ELECTROMAGNETIC THEORY
Paper- BSC-PHY-101-G

Time allowed : 3 hours] [Maximum marks : 75

Note : Attempt five questions in all selecting one question from each unit and question no. 1 is compulsory. Each question carries equal marks.

1. Attempt any six questions
 - (a) Write Laplace and Poisson equations.
 - (b) Define permanent magnet and electromagnet.
 - (c) If an electric dipole is placed in a sphere then find out electric flux linked with the sphere.
 - (d) Explain Lenz's law and self-induction.
 - (e) State Gauss divergence theorem and explain its physical significance.
 - (f) Find out the value of gradient of a scalar $(S) = x^2yz$ at a point P (1, 2, -1) i. e. $\vec{\nabla} S$.
 - (g) What do you mean by electromagnetic breaking?
 - (h) Define electric dipole and electric dipole moment.

6×2.5=15

3001-P-4-Q-9 (22)

[P. T. O.]

(2)

3001

Unit - I

2. (a) What do you mean by polar and nonpolar dielectrics? Define electric field intensity (\vec{E}), electric polarization vector (\vec{P}) and electric displacement vector (\vec{D}) and derive the relation between them. 7
- (b) Derive electric field intensity and electric potential at equatorial line of short electric dipole. 8
3. (a) Derive boundary conditions of electric field intensity and electric potential. 7
- (b) State Gauss law in electrostatics and find out electric field intensity at distance 'r' from center of uniformly charged solid sphere of radius 'R' and volume charge density ' λ '. Plot the graph of variation of electric field with distance from center. 8

Unit - II

4. (a) State Biot-Savart law and derive magnetic field intensity at center current carrying circular wire. 7
- (b) Show that relative permeability (μ_r) = $1 + \chi_m$, where χ_m is magnetic susceptibility and discuss important properties of diamagnetic, paramagnetic and ferromagnetic materials. 8

3001

(3)

3001

5. (a) Define electric current density (\vec{J}) and magnetic vector potential (\vec{A}) and show that $\nabla^2 \vec{A} = -\mu_0 \vec{J}$ 7
- (b) Define Ampere's law and derive its differential equation. Also discuss incompleteness of Ampere's law. 8

Unit - III

6. (a) Write Maxwell's equations in integral and differential form in vacuum and discuss their physical significance. 7
- (b) Derive equation of continuity and show that modified Ampere's law satisfies the equation of continuity. 8
7. (a) Show that magnetic energy stored in a magnetic field i.e., $U_m = \frac{1}{2\mu_0} \int B^2 dV$. 7
- (b) State and prove Poynting theorem and show that Poynting vector (\vec{S}) = $\frac{1}{\mu_0} (\vec{E} \times \vec{B})$ 8

Unit - IV

8. (a) Write important properties of electromagnetic wave and write equation of electromagnetic wave in term of electric field and magnetic field. 7

3001

[P. T. O.]

- (b) Derive speed of electromagnetic wave in medium and write equation of refractive index of medium in term of absolute permittivity and permeability. 8

9. (a) If monochromatic electromagnetic wave is incident normally from a dielectric medium of refractive index (μ_1) on the surface of dielectric medium of refractive index (μ_2) then show that

$$\text{reflection coefficient (R)} = \left(\frac{\mu_1 - \mu_2}{\mu_1 + \mu_2} \right)^2 \text{ and}$$

$$\text{transmission coefficient (T)} = \frac{4\mu_1\mu_2}{(\mu_1 + \mu_2)^2} \cdot 7$$

- (b) Derive the equation of pressure exerted by electromagnetic wave of intensity 'I' incident normally on perfect absorber. The intensity of sunlight hitting the earth is about 1300 W/m^2 . If sunlight strikes a perfect absorber, what pressure does it exert? 8

3002

B.Tech. (EE) 2nd Semester (G-Scheme)

Examination, July-2022

WAVES AND OPTICS & QUANTUM MECHANICS

Paper- BSC-PHY-102-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt five questions in all, selecting one question from each unit and question no. 1 is compulsory. All questions carry equal compulsory

1. Attempt any six questions

- (a) Define Brewster's law and Brewster angle.
- (b) What do you mean by wave front and write down Huygens principles of wave optics?
- (c) Write short note on pumping and population inversion.
- (d) What do you mean by coherent sources and how they can be produced?
- (e) Write applications of Laser.
- (f) Write down de-Broglie hypothesis and formula of de-Broglie wave-length.
- (g) Define n-type and p-type semiconductors and draw their energy band diagram.
- (h) Explain the difference between interference and diffraction.

6×2.5=15

3002-P-3-Q-9 (22)

[P. T. O.]

(2)

3002

Unit - I

2. Write down the equation of a forced oscillator being driven by an alternating force $F_0 \cos \omega t$. Explain the transient and steady behavior of a forced oscillator. 15
3. (a) Write the equation of transverse wave on a string and derive its speed. 10
(b) Define total internal reflection and write its conditions. Also explain its one example. 5

Unit - II

4. Explain the phenomenon of diffraction through single slit and show that relative intensities of successive maxima are nearly $1: \frac{4}{9\pi^2} : \frac{4}{25\pi^2} : \frac{4}{49\pi^2} : \dots$ 15
5. (a) Draw neat diagram of He-Ne Laser and explain its construction and working with energy level diagram. 10
(b) Explain the phenomenon of stimulated absorption, spontaneous emission and stimulated emission. 5

Unit - III

6. (a) Derive time independent Schrodinger wave equations and write physical significance of wave function. 10

3002

(3)

3002

- (b) Write short notes on tunneling and scattering of particle from potential barrier. 5
7. (a) By using Schrodinger wave equation derive the equations of energy and wave function of a particle in one dimensional box. 10
(b) Find the value of energy of free electron in a box of length 1\AA (one angstrom). Given that Planck's constant (h) = 6.6×10^{-34} Js and mass of electron (m_e) = 9.1×10^{-31} Kg. 5

Unit - IV

8. Explain the motion of electron in periodic potential by using Kronig-Penney Model and also plot its E-K diagram. 15
9. (a) Derive density of states of one, two and three dimensional bodies. 10
(b) Explain principles of classical free electron theory and write its failure. 5

3002

3004

B.Tech. (Civil Engg.) 2nd Semester (G Scheme)

Examination, July-2022

MECHANICS

Paper-BSC-Phy-104-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt five questions in all, selecting at least one question from each unit. Question No. 1 is compulsory.

1. (a) Find $A \times B$, if $A = 2i + j + 3k$, $B = 3i + 5j + 2k$; (where i , j and k are unit vectors along x , y and z -axis, respectively).
- (b) Discuss the various types of forces in nature.
- (c) What do you mean by equipotential surface?
- (d) Define and relate angular velocity, momentum and moment of inertia.
- (e) What is Resultant Force? What would be the angle between two forces when the resultant is maximum and minimum respectively? $5 \times 3 = 15$

Unit-I

2. What do you mean by constraints notion, explain it with suitable examples? Write the equation of motion for a bead of mass m moving on a circular wire of radius R . 15

3004-P-3-Q-9(22)

[P.T.O.]

(2)

3004

3. (a) What are the scalar and vector? Also, discuss the effect of rotation transformation on them. 10
(b) What do you mean by a frictional force, and how does it relate to the angle of response? 5

Unit-II

4. What are central and non-central forces? Derive the energy equation and energy diagrams for elliptical, parabolic and hyperbolic orbits. 15
5. What do you understand by damped harmonic oscillations? Explain the terms lightly damped, overdamped and critically damped oscillations using its differential equation of motion. 15

Unit-III

6. (a) State and prove the perpendicular axis theorem for a moment of inertia for a plane lamina. 10
(b) A flywheel has moment of inertia 70 kg m^2 and its axle has diameter 4.4 cm . How much pull should be applied on a thread wound on the axle to produce an angular acceleration of 0.5 rad/s^2 ? 5
7. (a) Discuss the relation angular momentum and angular velocity and define a moment of inertia tensor. 10

3004

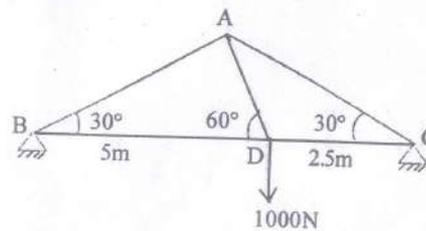
(3)

3004

- (b) Calculate the moment of inertia of a solid sphere about one of its diameters. 5

Unit-IV

8. (a) Define trusses and explain perfect and non-perfect trusses. What are the main assumptions in truss analysis? 8
(b) What are the conditions of equilibrium in three and two dimensions? 7
9. Analyse the given truss of $BC = (BD + DC) = 5\text{m} + 2.5\text{m}$ spans, loaded at D shown in the figure. Find the magnitude and nature of the force in all members. 15



3004

Roll No.

3014

**B. Tech. 1st Semester (Common for
All Branches)
Examination – December, 2022**

ENGLISH

Paper : HSMC-ENG-101-G

Time : Three Hours] [Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Answer the following questions briefly : $2.5 \times 6 = 15$
- (a) What is the central theme of 'The Secret of Work' ?
 - (b) What is Intellectual Rubbish ?
 - (c) Differentiate between 'Course' and 'Coarse' by using in sentence.

3014-3850-(P-7)(Q-9)(22)

P. T. O.

- (d) Make words using the prefixes -inter, -extra, -in, -im, ambi
- (e) Describe a Scientific Calculator.
- (f) What are Diphthongs ?

UNIT – I

2. (a) Make sentences based on following verb patterns : $5 \times 3 = 15$

- (i) Sub+Verb+Gerundian Infinitive
- (ii) Sub+Verb+Noun Complement
- (iii) Noun Phrase+Verb+Direct Object
- (iv) Subjet+Verb+Subject Complement
- (v) To Infinitive+Verb+Noun

- (b) Correct the following sentences :

- (i) I live in Delhi since 2004
- (ii) I have received your letter yesterday
- (iii) The doctor saw my pulse

- (iv) I begged him a favour
- (v) I am looking forward to hear from you
- (c) Do as directed :
- (i) He died cholera.
(insert preposition)
- (ii) He is fool, He is knave.
(make compound)
- (iii) Honesty is best policy.
(insert article)
- (iv) Three and three four.
(insert correct verb form)
- (v) I, you and he will go. (re-arrange pronouns)

3. Use the following pairs in your sentences so as to make the meanings of the individual words clear :

$3 \times 5 = 15$

- (i) Lately, Late
- (ii) Serial, Cereal
- (iii) Currant, Current
- (iv) Lather, Leather
- (v) Dessert, Desert

UNIT – II

4. (a) Supply One-word Substitutes : $7.5 \times 2 = 15$

- (i) After death
- (ii) Absence of law and order
- (iii) Fear of books
- (iv) Absence of government
- (v) The study of birds

(b) Supply meanings of the following foreign words and make sentences :

- (i) Ad infinitum
- (ii) Alma-mater
- (iii) Bon Voyage
- (iv) Honorarium
- (v) Ex-gratia

5. (a) Make sentences with the following idioms :

$7.5 \times 2 = 15$

- (i) Dark horse,

3014-3850-(P-7)(Q-9)(22) (4)

(ii) Break the ice,

(iii) Run into

(iv) Turn down

(v) Watch out

(b) Change into passive voice :

(i) He has finished editing his copy.

(ii) Sit down please.

(iii) Who has asked you for chocolate ?

(iv) They have thrown it.

(v) The government has passed a legislation.

UNIT – III

6. Write short notes on any *two* : $7.5 \times 2 = 15$

(a) Respiratory system

(b) Nasal Consonants

(c) Articulatory Organs

3014-3850-(P-7)(Q-9)(22) (5)

P. T. O.

OR

Draw a neat diagram of Speech Mechanism and mark all speech organs.

7. Define Monophthongs. Why are they called pure vowels? List all Monophthongs? 15

UNIT - IV

8. Record your impression of Bertrand Russell's essay *An Outline of Intellectual Rubbish* 15 × 1 = 15

OR

Describe a typical day of a sister of charity commenting on the four vows taken by the Missionaries.

9. Write an essay on Swami Vivekanand's idea of "Working like a master, not like slave". 15 × 1 = 15

3014-3850-(P-7)(Q-9)(22) (6)

OR

Draft an application to the Vice Chancellor of your university and request for review of your curriculum by academic council and upgrade the same in line with industry demands.

3014-3850-(P-7)(Q-9)(22) (7)

Roll No.

3013

**B. Tech. 1st Semester (Common for All
Branches)
Examination – December, 2022**

WORKSHOP TECHNOLOGY

Paper : ESC-ME-102-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Explain the following :

2.5 × 6 = 15

- (a) First Aid
- (b) Punching and Blanking
- (c) Casting defects
- (d) Pattern
- (e) TIG welding
- (f) Fitting tools

3013-2150-(P-3)(Q-9)(22)

P. T. O.

UNIT – I

2. Explain the manufacturing processes. Also discuss different types of plant layouts and their advantages. 15
3. What do you mean by Industrial Safety ? Discuss the common sources of accidents. 15

UNIT – II

4. Discuss the basic principle of hot and cold working. Explain the hot rolling in detail. 15
5. Discuss in detail the types of timber and defects in timber. Briefly explain the fitting operations. 15

UNIT – III

6. Explain cupola furnace in details with the help of neat and clean diagram. 15
7. What do you mean by CNC Machining ? Briefly explain the different operations which we can perform on shaper machine ? 15

UNIT – IV

8. Explain the principle of arc welding. Explain TIG and MIG welding in detail. 15

9. Explain :

5 × 3 = 15

- (a) Classification of welding
- (b) Resistance welding
- (c) Welding defects

3013

B. Tech. 2nd Semester (Common for All Branches)

(G-Scheme) Examination, May-2023

WORKSHOP TECHNOLOGY

Paper-ESC-ME-102-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt any five questions in all, selecting one question from each unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Explain the following : 2½×6=15
- (a) Sources of Accident
 - (b) Hot and Cold Working Processes
 - (c) Steps in Casting Process
 - (d) Gating System
 - (e) Principle of Arc Welding
 - (f) Soldering and Brazing

Unit-I

2. Explain the concept of plant layout. Also explain the different types of plant layout. 15
3. What do you mean by accident? Discuss different types of accidents. What are the safety measures to reduce accident? 15

Unit-II

4. Explain various sheet metal operations in details. 15

3013-P-2-Q-9(23)

[P.T.O.]

(2)

3013

5. Discuss in details the hot cold working processes. 15

Unit-III

6. What do you mean casting ? Explain different patterns and pattern allowances. 15

7. Explain the principle of resistance welding. Also explain the various welding defects. 15

Unit-IV

8. Explain the principle of resistance welding. Also explain the various welding defects. 15

9. Explain : 3×5=15

- (a) Gas Welding
- (b) TIG
- (c) MIG

3013

Roll No.

3008

**B. Tech. 1st Semester (CSE)
Examination – December, 2022
MATH - I (CALCULUS AND LINEAR ALGEBRA)
Paper : BSC-MATH-103-G**

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. Marks are shown against each question.

1. (a) Evaluate: $\lim_{n \rightarrow \infty} \frac{e^x - e^{\sin x}}{x - \sin x}$. 2.5

(b) Using Rolle's theorem for $f(x) = (x+2)^3(x-3)^4$ find the value of x in $(-2, 3)$. 2.5

(c) Evaluate: $\int_0^1 \frac{1}{\sqrt{1-x^4}} dx$ in terms of gamma function. 2.5

(d) Find the rank of the matrix: $\begin{bmatrix} 3 & 4 & 1 & 2 \\ 3 & 2 & 1 & 4 \end{bmatrix}$. 2.5

3008-3000-(P-4)(Q-9)(22)

P. T. O.

(e) Evaluate : $3A - 4B$, where $A = \begin{bmatrix} 3 & -4 & 6 \\ 5 & 1 & 7 \end{bmatrix}$ and

$$B = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 0 & 3 \end{bmatrix} \quad 2.5$$

(f) Determine whether the following set of vectors $(1, 1, 1)$, $(0, 4, 1)$, $(3, 0, 1)$ are linearly independent or linearly dependent. 2.5

(g) Write the zero vector in the vector space R^3 and R^4 . 2.5

(h) Examine whether the following set of vectors forms a basis of R^2 : $(0, 1)$, $(0, -3)$. 2.5

(i) Find $T : R^2 \rightarrow R$ defined by $T(x, y) = xy$ is a linear transformation. 2.5

(j) Prove that $A = \frac{1}{3} \begin{bmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{bmatrix}$ is orthogonal. 2.5

UNIT - I

2. (a) Evaluate : $\lim_{x \rightarrow 1} \left[\frac{x}{x-1} - \frac{1}{\log x} \right]$ 6

(b) Using Taylor's theorem express the polynomial $2x^3 + 7x^2 + x - 6$ in powers of $(x - 1)$. 6.5

3. (a) Find the surface area of the solid formed by revolving the cardioids $r = a(1 + \cos \theta)$ about the initial line. 6

3008-3000-(P-4)(Q-9)(22) (2)

(b) Show that : $\int_0^1 y^{q-1} \left(\log \frac{1}{y} \right)^{p-1} dy = \frac{(p-1)!}{q^p}$ where $p > 0$, $q > 0$. 6.5

UNIT - II

4. (a) Solve the following system of equations : $2x - y + z = 3$; $x + 3y - 2z = 1$; $x + y + z = 6$ by Cramer's rule. 6

(b) If A and B are symmetric, prove that AB is symmetric iff AB commute. 6.5

5. (a) Find the rank of the matrix : $\begin{bmatrix} 3 & 4 & 1 & 2 \\ 3 & 2 & 1 & 4 \\ 7 & 6 & 2 & 5 \end{bmatrix}$. 6

(b) Solve the following equations : $2x + y + 4z = 12$; $8x - 3y + 2z = 20$; $4x + 11y - z = 33$ by Gauss Jordan method. 6.5

UNIT - III

6. (a) Is the set of all polynomials over R with constant term zero, form a vector space over reals ? If not why ? 6

(b) Find the basis and dimension of the vectors of R^4 generated by $(1, -4, -2, 1)$, $(1, -3, -1, 2)$, $(3, -8, -2, 7)$. 6.5

3008-3000-(P-4)(Q-9)(22) (3)

P. T. O.

7. (a) Find a linear transformation $T : \mathbb{R}^4 \rightarrow \mathbb{R}^3$ whose image is generated by $(1, 2, 3)$ and $(4, 5, 6)$. 6

(b) Let T be a linear operator defined by :

$$T(x, y, z) = (2y + z, x - 4y, 3x).$$

Find the matrix of T w.r.t. the basis $B = \{(1, 0, 0), (0, 1, 0), (0, 0, 1)\}$. 6.5

UNIT - IV

8. Find the Eigen values and corresponding Eigen vector

of the matrix : $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$. 12.5

9. (a) Verify that the matrix : $\begin{bmatrix} \cos\theta & 0 & \sin\theta \\ 0 & 1 & 0 \\ \sin\theta & 0 & \cos\theta \end{bmatrix}$ is orthogonal. 6

(b) If $A+B = \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$ and $A-B = \begin{bmatrix} 3 & 1 \\ 1 & 4 \end{bmatrix}$ compute the product AB . 6.5

3015

B.Tech. (M.E.) 2nd Semester
(G-Scheme) Examination, May-2023

MATH - II

Paper - B.Sc.-MATH-102-G

Multivariable Calculus, Differential Equations and
Complex Analysis

Time allowed : 3 hours]

[Maximum marks : 75

*Note : Question no. 1 is compulsory. Attempt total five
questions with selecting one question from each unit.*

All questions carry equal marks.

1. (a) Show that, $\frac{d}{dx} [x^{-n} J_n(x)] = -x^{-n} J_{n+1}(x)$.
- (b) Solve: $2x^3 - xy^2 - 2y + 3)dx - (x^2y + 2x)dy = 0$.
- (c) Solve: $\frac{d^2y}{dx^2} + y = 0$.
- (d) Split up into real and imaginary parts e^{e^z} .
- (e) State the necessary and sufficient conditions for a function to be analytic.
- (f) Define Mobius transformations. 6×2.5

3015-P-4-Q-9(23)

[P.T.O.]

Unit-I

2. (a) Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dz \, dy \, dx$.
- (b) Evaluate by changing the order of integration

$$\int_0^{\infty} \int_0^x x \cdot e^{-\frac{x^2}{y}} \cdot dy \, dx.$$

3. (a) If $\vec{F} = (3x^2 + 6y)\hat{i} - 14yz\hat{j} + 20xz^2\hat{k}$, evaluate the line integral $\int_C \vec{F} \cdot d\vec{r}$ from $(0, 0, 0)$ to $(1, 1, 1)$ along the path $x = t, y = t^2, z = t^3$.

- (b) Using divergence theorem for

$$\vec{F} = (x^2 + yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k},$$

find $\int \vec{F} \cdot d\vec{S}$ taken over the rectangular parallelepiped $0 \leq x \leq a, 0 \leq y \leq b, 0 \leq z \leq c$.

Unit - II

4. (a) Solve the equation,

$$\left[y \left(1 + \frac{1}{x} \right) + \cos y \right] dx + (x + \log x - x \sin y) dy = 0.$$

- (b) Solve: $\frac{dy}{dx} + \frac{1}{x}y = 3x^2y^3$.

5. (a) Find the power series solution of

$$(1-x^2) \frac{d^2y}{dx^2} + 2y = 0, \text{ where } y(0) = 4 \text{ and } y'(0) = 5.$$

- (b) Solve:

$$(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 4 \cos \log(1+x).$$

Unit-III

6. (a) If $\tan(\theta + i\phi) = \tan \alpha + i \sec \alpha$, Show that

(i) $e^{2\phi} = \pm \cot \alpha / 2$

(ii) $2\theta = (n+1/2)\pi + \alpha$

- (b) Prove that the functions defined by

$$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}, z \neq 0 \text{ and } f(0) = 0$$

is continuous and the Cauchy-Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist.

7. (a) Determine the analytic function whose real part is $e^x [x \cos y - y \sin y]$.
- (b) Prove that every Mobius transformation maps circles or straight lines into circles or straight lines.

Unit-IV

8. (a) Evaluate $\oint \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz,$

the where C is the circle $|z| = 3$.

- (b) Find the Laurent's series expansion of

$$\frac{z^2 - 2}{z^2 + 5z + 6} \text{ in the region}$$

(i) $2 < |z| < 3$

(ii) $|z| > 3$

9. (a) Evaluate the integral $\int_0^\pi \frac{\cos \theta}{3 + \sin \theta} d\theta,$ by contour integration.

(b) $\oint_C \frac{4-3z}{z(z-1)(z-2)} dz$ where, C is the circle $|z| = \frac{3}{2}$.

3016

B.Tech. (CSE) 2nd Semester (G-Scheme)

Examination, May-2023

MATH-II

Paper - BSC-MATH-104-G

Probability and Statistics

Time allowed : 3 hours]

[Maximum marks : 75

Note: Attempt five questions in total by selecting one question from each unit. Question no. 1 is compulsory.

1. (a) Define probability spaces.
- (b) Explain multinomial distribution.
- (c) State memoryless property of exponential distribution.
- (d) Fit a straight line $y = a + bx$ to the following data by method of least squares.

x	0	1	3	6	8
y	1	3	2	5	4

3016-P-7-Q-9(23)

[P.T.O.]

(2)

3016

- (e) Explain
- (i) Null hypothesis
 - (ii) Alternative hypothesis
 - (iii) Level of significance
- (f) A random sample of 27 pair of observations from a normal population gives a correlation coefficient of 0.6. Is this significant of correlation in population? 15

Unit - I

2. (a) A purse contains two silver coins and four copper coins. A second purse contains four silver and three copper coins. If a coin is pulled out at random from one of the two purses, what is the probability that it is a silver coin?
- (b) Four coins are tossed. What is the expectation of number of heads? 15

3016

(3)

3016

3. (a) State and prove Chebyshev's inequality.
- (b) A car-hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which neither car is used and the proportion of days on which some demand is refused ($e^{-1.5} = 0.2231$).

15

Unit - II

4. (a) Is the function given below a density function?

$$f(x) = \begin{cases} 0 & \text{for } x < 2 \\ \frac{1}{18}(3+2x) & \text{for } 2 \leq x \leq 4 \\ 0 & \text{for } x > 4 \end{cases}$$

Also find $P(2 \leq x \leq 3)$.

3016

[P.T.O.]

(4)

3016

- (b) The mean height of 500 male students in a certain college is 151 cm and standard deviation is 15 cm. Assuming the heights are normally distributed, find how many students have heights between 120 and 155 cm? 15
5. (a) If X and Y are independent continuous random variables, then find p.d.f of variable $X + Y$.
- (b) A bag X contains 2 white and 3 red balls and a bag Y contains 4 white and 3 red balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag Y . 15

Unit - III

6. (a) The following table shows the marks obtained by 100 candidates in an examination. Calculate the mean and standard deviation.

Marks obtained	1-10	11-20	21-30	31-40	41-50	51-60
No. of Candidates	3	16	26	31	16	8

3016

(5)

3016

- (b) Compute skewness and kurtosis, if the first four moments of a frequency distribution $f(x)$ about the value $x = 4$ are respectively 1, 4, 10 and 45. 15

- (a) Calculate correlation coefficient for the following :

x	5.1	5.3	5.6	5.7	5.8	5.9	5.10	5.11	6.0	6.1
y	11	17	19	14	8	15	20	6	18	12

- (b) Following table gives the data on rainfall and discharge in a certain river. Obtain the lines of regression of y on x .

Rainfall x (inches)	1.53	1.78	2.6	2.95	3.42
Discharge y (1000 ce)	33.5	36.3	40.0	45.8	53.5

15

3016

[P.T.O.]

(6)

3016

Unit - IV

8. (a) In a sample of 600 men from certain city, 450 are found smokers. In another sample of 900 men from another city, 450 are smokers. Do the data indicates that the cities are significantly different with respect to the habit of smoking among men?
- (b) A random sample of size 25 form a normal population has the mean $\bar{x} = 47.5$ and s.d $s = 8.4$. Does this information refute the claim that the mean of the population is $\mu = 42.1$.

15

9. (a) In two groups of ten children each, the increase in weight due to different diets during the same period, were in pounds

3, 7, 5, 6, 5, 4, 4, 5, 3, 6

8, 5, 7, 8, 3, 2, 7, 6, 5, 7

Is there a significant difference in their variability.

3016

(7)

3016

- (b) The theory predicts the proportion of beans in the four groups, G_1, G_2, G_3, G_4 should be in ratio $9 : 3 : 3 : 1$. In an experiment with 1600 beans the numbers in four groups were 882, 313, 287 and 118. Does the experimental results support the theory?

15

3016

Roll No.

3003

**B. Tech. 1st Semester (CSE)
Examination – December, 2022**

SEMICONDUCTOR PHYSICS

Paper : BSC-PHY-103-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) What do you mean by direct and indirect band gap semiconductor materials ?
- (b) Write a short note on the term effective mass.
- (c) What is DLTS ? Discuss.
- (d) What are excitons ? Briefly discuss two types of excitations.

3003-1950-(P-3)(Q-9)(22)

P. T. O.

- (e) How does a semiconductor behave electrically at 0 K temperature ?
- (f) Discuss heterojunction devices. $6 \times 2.5 = 15$

UNIT - I

2. Explain the Kroning-Penney model and discuss how it explains formation of energy bands ? 15
3. Discuss quantum free electron theory of electrons. Explain density of states, Fermi energy and probability of occupation. 15

UNIT - II

4. Derive an expression for the carrier concentration in intrinsic semiconductors and discuss the position of Fermi level. 15
5. (a) Draw and discuss the energy band diagram for p-n junction diode. 7
- (b) Explain Ohmic and schottky contacts. 8

UNIT - III

6. (a) Discuss the Drude Model to explain electrical conductivity in metals. 10
- (b) Explain the Photovoltaic process. 5

7. Derive an expression for joint density of photons in semiconducting materials. 15

UNIT - IV

8. (a) Explain Vander Pauw method and how to determine the resistivity and Hall mobility of a semiconductor material by this method ? 11
- (b) What is hot-point probe measurement ? 4
9. (a) What are low dimensional systems ? Explain quantum well, quantum wire and quantum dot with suitable practical examples and applications. 11
- (b) Explain VLS growth method to grow nanowires. 4

3002

(Graph Paper)

B.Tech. (EE) 2nd Semester (G-Scheme)

Examination, May-2023

WAVES AND OPTICS & QUANTUM MECHANICS

Paper - BSC-PHY-102-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt five questions in all. Attempt one question from each Section. All questions carry equal marks.

1. (a) What are evanescent waves? 1.5
- (b) State and explain the phenomenon of Total Internal Reflection. 1.5
- (c) Define resolving power of grating. 1.5
- (d) Discuss the phenomena of population inversion. 1.5
- (e) What is Poynting vector for an electromagnetic wave? What does it represent? 1.5
- (f) State Heisenberg Uncertainty principle. 1.5
- (g) Distinguish between stimulated emission and spontaneous emission. 1.5
- (h) What is impedance matching? Why it is needed? 1.5

3002-P-3-Q-9(23)

[P.T.O.]

(2)

3002

- (i) Define Brewster angle and Brewster's Law. 1.5
(j) What are coherent sources? How coherent sources can be obtained? 1.5

Section-I

2. Deduce expression for the velocity of transverse wave along stretched string. 15
3. Derive laws of reflection and reflection when an electromagnetic wave is incident obliquely on a boundary separating two different media. 15

Section-II

4. (a) What are Newton's Rings? Discuss formation of Newton's ring in reflected light. How it can be used to determine refractive index of a liquid? 12
(b) In Newton's Rings experiment diameter of 5th and 25th dark rings are 0.3 cm and 0.8 cm respectively. Find wavelength of light, R= 100 cm. 3
5. (a) What are three level and four level lasers? Give construction and working of Ruby laser with necessary diagrams. 12
(b) Discuss necessary conditions for lasing action. 3

3002

(3)

3002

Section-III

6. (a) Derive expression for Schrodinger time independent wave equation in three dimensions. 10
(b) An electron is within a nucleus of radius 10^{-15} m. Using Uncertainty principle, the kinetic energy of electron in eV. 5
7. Solve Schrodinger equation for one-dimensional motion of particle in a box of side L and show that its Eigen values are inversely proportional to square of side L. 15

Section-IV

8. (a) Derive expression for Density of States (DOS) for 3-D bulk system. 10
(b) How does 3-D density of states differ from 2-D and 1-D density of states? Explain graphically. 5
9. (a) What do you mean by effective mass of an electron in an energy band? How do you account for negative mass of electron in an energy band? 10
(b) Explain why Fermi level of an *intrinsic* semiconductor lies near the middle of forbidden gap, whereas it is closer to conduction band in n-type semi conductors. 5

3002

[Encl. Graph Paper]

3004

B. Tech (Civil Engg.) 2nd Semester (G-Scheme)

Examination, May-2023

MECHANICS

Paper : BSC-PHY-104-G

Time allowed : 3 hours]

[Maximum marks : 75

Note: Attempt five questions in all, selecting at least one question from each unit. Question no. 1 is compulsory.

1. (a) Discuss the different types of forces in nature.
- (b) What do you mean by limiting and non-limiting friction ?
- (c) Explain conservative force with the help of an example.
- (d) What is the physical significance of the moment of inertia ?
- (e) What are trusses ? Explain perfect and non-perfect trusses. 5×3=15

Unit-I

2. (a) Show that Newton's second law is invariant in inertial frames of reference. 8

3004-P-4-Q-9 (23)

[P. T. O.]

(2)

3004

- (b) What are the scalar and vector? Also, discuss the effect of rotation transformation on them. 7
3. Derive the expression for Newton's second law in spherical polar co-ordinate. 15

Unit-II

4. Define Coriolis force and discuss its effect on a particle moving on the earth's surface at latitude λ and discuss Coriolis force's impact on the weather system. 15
5. What are central and non-central forces? Derive the energy equation and energy diagrams for elliptical, parabolic and hyperbolic orbits. 15

Unit-III

6. What do you understand by a rigid body? Discuss the kinematics of rigid body rotating and translating in a plane? 15
7. (a) Discuss the relation between angular momentum and angular velocity and define a moment of inertia tensor. 10

3004

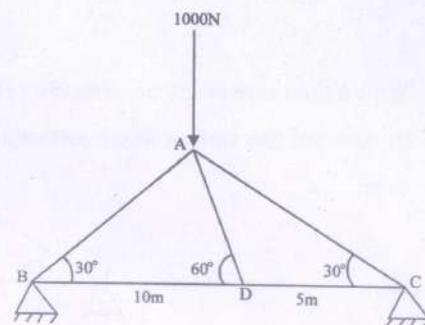
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3004

- (b) Calculate the moment of inertia of a solid sphere about one of its diameters. 5

Unit-IV

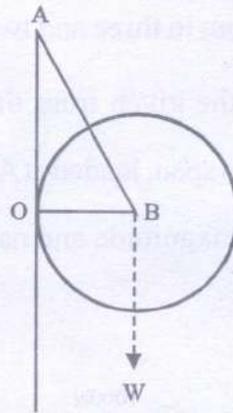
8. (a) What do you mean by rigid body equilibrium? Furthermore, what are the conditions of equilibrium in three and two dimensions? 5
- (b) Analyse the given truss of $BC = (BD + DC) = 10\text{ m} + 5\text{ m}$ span, loaded at A as shown in the figure. Find the magnitude and nature of the force in all members. 10



3004

[P. T. O.]

9. (a) Draw a free body diagram of a ball of weight 30 kg supported by a string of length $AB = 10$ cm and resting against a smooth vertical wall as shown in fig. (given that radius of the ball is 5cm). Find the wall reaction on ball and tension in string AB. 8



- (b) Write a short note on Frictional forces ? Discuss its type and the various factors affecting it in detail. 7

Roll No.

3010

**B. Tech. 1st Semester (Common for All
Branches) Examination – December, 2022**

BASIC ELECTRICAL ENGINEERING

Paper : ESC-EE-101-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, by selecting one question from each Section. Question No. 1 is compulsory.

1. (a) State and explain Faradays law of electro magnetic induction. 5 × 3 = 15
- (b) Define Average Value, if the standard value of current is $i = I_m \sin \omega t$, what will be the rms value ?
- (c) Write down assumptions for an ideal transformer.
- (d) What do you mean by back EMF, give expression ?

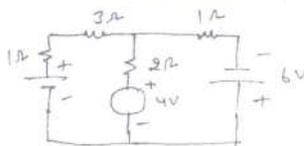
3010-2750-(P-4)(Q-9)(22)

P. T. O.

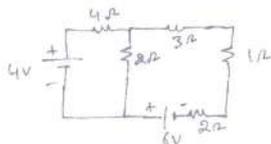
- (e) Briefly write down about attraction type MI instruments.

SECTION - A

2. (a) State and explain Norton's Theorem. 7
 (b) In the given circuit, find the current through 2 ohm resistor using Superposition Theorem. 8



3. State Thevenin's Theorem. Determine the value of current flowing through 1 ohm resistance by using Thevenin's theorem. 15



SECTION - B

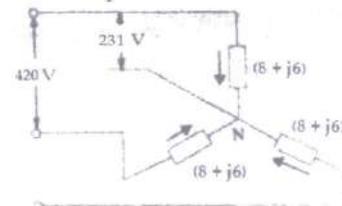
4. (a) The maximum value of alternating voltage and current are 420V and 22A respectively in a circuit connected to 50Hz supply and these quantities are sinusoidal. The instantaneous values of the voltage and current are 280V and 10A respectively at $t = 0$ both increasing positively. 10

- (i) Write down the expression for voltage and current at time t .
 (ii) Determine the power consumed in the circuit.
 (b) Define RMS value of a sinusoidal signal and hence deduce Form Factor. 5

5. (a) An alternating current of frequency 50Hz has a maximum value of 115A. Write down the equation for its instantaneous value. Reckoning time from the instant the current is zero and becomes positive; find (a) the instantaneous value after $1/360$ sec and (b) the time taken to reach 96A for the first time. 8
 (b) Define real power, reactive power and apparent power. Also explain the mathematical equation for all these three terms. 7

SECTION - C

6. (a) Using appropriate phasor diagram, derive the relationship among voltages and current in star connection in three phase system. 8
 (b) A balanced star-connected load of $(8+j6)$ ohms per phase is connected to a balanced 3-phase 420V supply. Find the line current, power factor and total volt-amperes. 7



7. (a) Using the appropriate phasor diagram, derive the relationship among voltages and currents in delta connected three phase system. 8
- (b) A delta connected balanced 3 phase load is supplied from a 3 phase, 420V supply. The line current is 22A and the power taken by the load is 10,500W. Find (i) impedance in each branch (ii) the line current, power factor and power consumed if the same load is connected in star. 7

SECTION – D

8. Briefly explain construction, working and principle of Induction machine with neat labelled diagrams. 15
9. A separately excited DC generator has armature circuit resistance of 0.2 ohm and the total brush drop is 1 V per brush. When running at 960 rpm, it delivers a current of 110A at 260V to a load of constant resistance. If the generator speed drop to 680 r.p.m, with field-current unaltered, find the current delivered to the load. 15

3010

B.Tech. 2nd Semester (G-Scheme)

(Common for All Branches) Examination, May-2023

BASIC ELECTRICAL ENGINEERING

Paper - ESC-EE-101-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Attempt five questions in all, selecting one question from each unit. Question no.-1 is compulsory. All questions carry equal marks.

1. (a) Define Thevenins theorem and give logical proof of it.
- (b) Differentiate between induction type ammeter and voltmeter.
- (c) Define the following terms w.r.t. AC circuits:
 - (i) Form Factor
 - (ii) Peak Factor
- (d) State and explain the losses in transformer.
- (e) Explain power factor and state its importance.
- (f) Define phase sequence and list out the advantages of three phase system as compared to single phase system.

3010-P-4-Q-9(23)

6×2.5=15

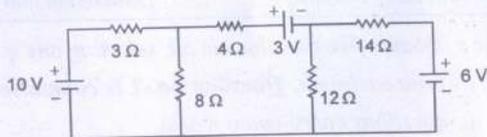
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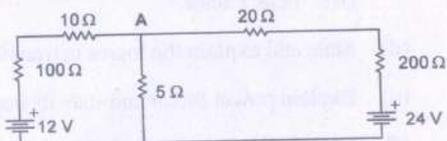
3010

Unit-I

2. (a) In the circuit shown below deduce the current flowing through different branches by using Loop Analysis. 7.5



- (b) Prove that the average power consumed in a pure inductive circuit is zero. Support the answer with suitable circuit diagram, phasor diagram and waveforms. 7.5
3. (a) In the fig. given below, evaluate the current in AB by using Norton's Theorem. 7.5



- (b) Justify that power consumed in an R-C series circuit is $VI \cos \phi$. Draw the waveform for voltage, current and power. 7.5

3010

(3)

3010

Unit-II

4. (a) Discuss the method to measure the power in a three phase circuit using two wattmeter method. 7.5
- (b) Explain the construction and working of autotransformer. 7.5
5. (a) Illustrate the relationship between the line and phase values of voltage and current in a three phase, star connected circuit with relevant phasor diagram and circuit diagram. 7.5
- (b) Elaborate the difference between balanced and unbalanced 3 Φ AC system. 7.5

Unit-III

6. Explain the construction and working of DC machines. Draw and explain the torque speed characteristics of DC motor. 15
7. (a) Explain the concept of back EMF and its significance. 7.5
- (b) List the advantages of rotating field over rotating armature used in alternators. 7.5

3010

[P.T.O.]

Unit-IV

8. (a) Explain the constructions and working principle of dynamometer type Wattmeter. 7.5
- (b) Explain the following: 7.5
- (a) MCB
- (b) MCCB
9. Write a detailed note on different Types of wires and cables. 15

Roll No.

3012

**B. Tech. 1st Semester (Common for All
Branches Except CSE, ECE, IT, CS & IT
and EEE)**

Examination – December, 2022

PROGRAMMING FOR PROBLEM SOLVING

Paper : ESC-CSE-102-G

Time : Three hours]

[Maximum Marks : 75

*Before answering the questions, candidates should ensure that they
have been supplied the correct and complete question paper. No
complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all, selecting one question
from each Unit. Question No. 1 compulsory. All
questions carry equal marks.*

1. (a) Discuss header files used in C-Language.
- (b) What do you understand by Pseudo code ? Give examples.
- (c) Define RAM.
- (d) Define flowchart and the symbols used in flowchart.

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P. T. O.

- (e) Find 2's complement of 1010010110100.
 (f) Define Data Types. 2.5 × 6 = 15

UNIT – I

2. (a) Convert $(869)_{10}$ into $()_2, ()_8, ()_{16}$ 5
 (b) Convert $(10101101)_2$ into $()_{16}$ 5
 (c) Convert $(BC5)_{16}$ into $()_2$ 5
3. Explain the components of computer system with its block diagram in detail. 15

UNIT – II

4. (a) What is Algorithm ? Write an algorithm to check the number is prime or not. 7.5
 (b) Draw a flowchart to find the roots of a quadratic equation. 7.5
5. (a) Input and output functions 4
 (b) Syntax and logical errors 4
 (c) Algorithm to calculate the simple interest 7

UNIT – III

6. What are loops ? Describe the loops available in C Programming language using suitable example. 15

7. Explain various Conditional and Branching statements used in C-programming. 15

UNIT – IV

8. What are Arrays ? Explain parameters passing in functions with an example. 15
9. Write short note on : 15
 (a) String Manipulation functions
 (b) Ackerman function

Roll No.

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**B. Tech. 1st Semester (Common for All
Branches) Examination – December, 2022**

CHEMISTRY-I

Paper : BSC-CH-101-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) Differentiate between ionic and Vander Waals interaction. $6 \times 2.5 = 15$
- (b) Define Hardness. How is it expressed ?
- (c) What is an electromagnetic spectrum ?

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- (d) Write the factors that govern the magnitude of crystal field splitting.
- (e) What do you mean by tautomerism ? Give example.
- (f) Briefly explain role of doping on band structure.

UNIT - I

2. (a) Explain the various parameters used in Schrodinger wave equation of Hydrogen. What are orthogonal and normalized wave functions ? 8
- (b) What are factors on which electron affinity depends ? How does the electron affinity of the elements vary in a group and period ? 7
3. (a) Predict the bond order and magnetic properties of nitrogen molecule by M. O. energy level diagram. 8
- (b) Discuss the physical properties of *d* and *f* block elements. 7

3006-2300-(P-4)(Q-9)(22) (2)

UNIT - II

4. (a) Explain addition, oxidation, substitution, reduction and cyclization reactions with suitable examples. 10
- (b) Describe R and S configuration. 5
5. (a) Give the synthesis of Aspirin drug. 7
- (b) Draw various conformations of n-butane. Also compare their stability with reason. 8

UNIT - III

6. (a) What are critical constants ? Derive relationship between them. 7
- (b) Illustrate the zeolite process used for the softening of water with reaction involved. 8
7. (a) Define corrosion. What are factors affecting corrosion ? How is it prevented ? 7
- (b) What do you mean by demineralization and desalination ? Discuss in detail electro dialysis process desalination of sea water. 8

3006-2300-(P-4)(Q-9)(22) (3)

P. T. O.

UNIT – IV

8. (a) What is meant by shielding and de-shielding of protons ? Illustrate your answer with suitable example. 8
- (b) Explain the principle of U. V. spectroscopy. 7
9. (a) How will you distinguish ethyl alcohol and acetic acid by I. R. spectra ? 7
- (b) Write brief notes on : $4 \times 2 = 8$
- (i) Flame photometry
- (ii) Magnetic resonance imaging
-

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B.Tech. 2nd Semester (G-Scheme)
(Common for All Branches) Examination, May-2023

CHEMISTRY-I

Paper - BSC-CH-101-G

Time allowed : 3 hours]

[Maximum marks : 75

Note : Question no. 1 is compulsory and attempt four questions by selecting one from each Section.

1. (a) Is presence of chiral carbon, essential condition for a compound to be optically active? Explain giving a suitable example. 2.5
- (b) Give merits of Zeolite process. 2.5
- (c) How actual nuclear charge differs from effective nuclear charge? 2.5
- (d) State Aufbau and Pauli's exclusion principle for filling of electrons. 2.5
- (e) What is Tautomerism? Give an example. 2.5
- (f) Why tetramethylsilane (TMS) is chosen as reference for measuring Chemical shift in NMR spectroscopy? 2.5

6×2.5=15

3006-P-3-Q-9(23)

[P.T.O.]

(2)

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Section-I

2. (a) With the help of M.O. diagram, explain the magnetic behavior, bond order and stability of NO molecule. 7
(b) Discuss the Pi-molecular orbital diagram of butadiene. 4
(c) Explain the role of doping in increasing the conduction in solids. 4
3. (a) Define Ionisation energy. Explain the variation of I.E. along period and group. 7
(b) What is polarisability? How it is helpful in explaining covalent character of a bond? 4
(c) Write the mathematical expression for Schrodinger wave equation. Define Eigen function and Eigen value. 4

Section-II

4. (a) Differentiate the following: 8
(i) Enantiomers and Diastereomers
(ii) SN^1 and SN^2 reactions
(b) What are Addition reactions? Classify them and explain the types. 7
5. Write a short note on the following: 15
(i) Synthesis of Paracetamol
(ii) Conformations of Butane
(iii) Reduction of carbonyl compounds

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(3)

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Section-III

6. (a) What is corrosion? Explain all the factors that affect the phenomenon of corrosion. 12
(b) Define critical volume, critical pressure and critical temperature. 3
7. (a) Explain the following terms: 8
(i) Differential aeration corrosion
(ii) Galvanic corrosion
(b) Why $CaCO_3$ is used as standard to measure the hardness of water? Explain EDTA method to measure the hardness. 7

Section-IV

8. (a) Discuss the principles and applications of UV-Visible spectroscopy. 7
(b) Explain the following terms: 8
(i) Spin-spin coupling
(ii) Equivalent and non-equivalent protons
9. Write short note on the following: 15
(i) Flame photometry
(ii) Shielding and Deshielding of protons
(iii) Types of vibrations in IR spectroscopy

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