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.

(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.

$2.5 \times 6 = 15$

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 electro-negativity. 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

$3 \times 5 = 15$

7. Write Short notes on :

(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 : $2 \times 4 = 8$

(i) Lambert-Beer's law

(ii) Hypochromic and Hypsochromic shift

(iii) Auxochrome

(iv) Principle of UV - Visible Spectroscopy

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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 $T : R^3 \to R^2$ defined by $T(x, y, z) = (|x|, y - z)$ is not a linear transformation.

(e) If $T : U \to V$ is a linear transformation, then show that ker T is a subspace of U. 5

(f) If A is a square matrix, prove that $(A + A')$ is symmetric and $(A - A')$ is skew-symmetric.

UNIT – I

2. (a) Evaluate $\lim_{x \to 0} \left(\frac{1}{x^2} - \frac{1}{\sin^2 x} \right)$ 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 Cromer'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 $T : R^4 \to R^3$ 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 Rank T + Nullity T = dim R^4. 8

7. (a) Let $T : U \to V$ be invertible linear transformation and $T^{-1} : V \to U$ 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_1T_2

(ii) T_2T_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 $A = \begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ orthogonal.

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 proces construct an orthonormal basis of $V_3(R)$ wit standard inner product defined on it, given th basis $u_1 = (1, 1, 1)$, $u_2 = (1, -2, 1)$ and $u_3 = (1, 2, 3)$ 7½

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3011

B. Tech. 1st Semester (CSE) Examination – March, 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. Write short note on the following : 15

   (a) Variables

   (b) Preprocessor

   (c) 1-D Array

   (d) File

UNIT – I

2. Define Algorithm. Describe the different steps to solve logical and numerical problems. 15

3. Define 'C' Language and explain the following : 15

   (i) Object and executable code

   (ii) Storage classes

UNIT – II

4. Give a complete description about conditional and branching statements. 15

5. Explain the following : 15

   (i) Preprocesses

   (ii) Iteration statements

UNIT – III

6. Define function and explain the following : 15

   (i) Call by value

   (ii) Call by reference

7. Explain the following : 15

   (i) Recursion

   (ii) Ackerman function

UNIT – IV

8. Give a complete description about pointers. 15

9. Explain the following : 15

   (i) Structures

   (ii) Union

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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

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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 ?

(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 :

(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 foreig words and make sentences :

(i) en masse

(ii) Prima donna

(iii) Status quo

(iv) Faux Pas

(v) Quid pro quo

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*) : $7.5 \times 2 = 15$

(a) Voiced and voiceless consonants.

(b) Bilabial consonants.

(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
