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A000211(011)

B.Tech. (Second Semester) Examination

Nov.-Dec. 2023

(AICTE Scheme)

(Common to all Branches)

CHEMISTRY-I

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Unit-I to V are common for the students of all branches except chemical engineering and from Unit VI to X are only for chemical engineering students. All question are compulsory. Part (a) is compulsory in each unit and carries 4 marks. Attempt any two parts from (b), (c) and (d) which carry 8 marks.*

Unit-I

1. (a) What is meant by bonding and antibonding molecular orbitals?

(b) With the help of molecular orbital diagram. Explain why :

(i) The bond order in N_2^+ ion is less than that in N_2 molecule

(ii) Oxygen molecule is paramagnetic while nitrogen molecule is diamagnetic

(c) What do you mean by delocalisation of Pi orbitals. Explain delocalisation of Pi-electrons taking example of 1, 3-butadiene orbital structure?

(d) The complex ion $\left[Co(NH_3)_6\right]^{-3}$ is octahedral but diamagnetic; while complex ion $\left[CoF_6\right]^{-3}$ is also octahedral, but paramagnetic. Explain on the basic of crystal field theory.

Unit-II

2. (a) What is the selection rule for electronic transition of molecule?

(b) Write short notes on the following : (any **two**)

(i) Chromophore

(ii) Auxochrome

(iii) Red shift

(iv) Blue shift

(c) (i) What is the importance of IR spectroscopy in finger print region?

(ii) What type of molecules exhibit vibrational-rotational spectra and why?

(d) Write with examples, the shielding and the deshielding effects involved in NMR spectroscopy?

Unit-III

3. (a) Explain the term enthalpy show that it is a state function? Give its units.

(b) Define spontaneity and free energy. Explain the criterion for feasibility or spontaneity of a process.

(c) Write short notes on : (any **two**)

(i) Stress corrosion

(ii) Nernst equation for cell potential

(iii) Cathodic Protection for Corrosion Control

(d) Write the mechanism of evolution of hydrogen and

absorption of oxygen on metal.

Unit-IV

4. (a) Explain, the atomic radii decrease in mvoing from left to right in any given period and increase in moving from top to bottom in any given group.

(b) What is the Valence Shell Electron Pari Repulsion Theory? Discuss the shape water and ammonia molecule.

(c) Write short notes on : (any **two**)

(i) Person concept of acid and base

(ii) Penetration effects

(iii) Effective nuclear charge

(d) (i) Explain the term polarisability giving at least two examples. What factors influence the polarisability?

(ii) What is Co-ordination number? Give two examples of complexes having Coordination number of 2 and 4.

Unit-V

5. (a) Define, why do aldehyde and ketone undergo nucleophillic addition reactions?

(b) What are elimination reactions? Give two examples.

(c) Write short notes on : (any **two**)

(i) Beckamann rearrangement

(ii) Baeyer Villiger Oxidation

(iii) Clemmensen Reduction

(d) (i) What do you mean by cyclization? Give examples.

(ii) Explain the synthesis and uses of Aspirin?

Unit-VI

6. (a) Calculate the energy required to cause the ionisation of the one mole of the hydrogen atom?

(b) Based on the postulates of quantum equation, derive schrodinger wave equation?

(c) What do you understand by probability distribution curve? Discuss the probability distribution curves for 1s, 2s and 3s orbitals.

(d) (i) Discuss the significance of a wave function?

(ii) Eigen values and eigen function.

Unit-VII

7. (a) Explain the term ferrimagnetism and paramagnetism.

(b) Explain LCAO. What are the conditions of combination of atomic orbitals?

(c) What are organometallic compounds? Describe their classification giving suitable examples.

(d) (i) Write the two major components of bioinorganic chemistry.

(ii) What is electronic spectrum of complex ions?

Unit-VIII

8. (a) Define the term Enantiomers and diasteromers compounds giving examples for each them.

(b) Write two examples of opitcally active compounds without chirality, also explain the meso compound and recemisation.

(c) What is Geometrical isomerism of transition metal complexes? Give two example in each case for :

(i) Octahedral complexes

(ii) Tetrahedral complexes

(d) Write short notes on :

(i) Conformation of Ethane

(ii) Concept of Chirality

Unit-IX

9. (a) What is acidity of molecules? Give suitable examples.

(b) What is meant by nucleophilicity? Write the factors influencing nucleophilicity of organic compound.

(c) Explain, the difference between kinetic and thermodynamic control of a reaction.

(d) Define basicity. What factors influence basicity of organic compounds"? How does stability affect basicity.

Unit-X

10. (a) Define the term carbanion and free radical.

(b) What are elimination reactions? Give two examples.

(c) Give a detailed account of Kinetics and stereochemicstry of SN_1 and SN_2 reactions.

(d) Write note on : (any **two**)

(i) Role of solvents

(ii) Electrophilic reagents

(iii) Rearrangement reactions

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A000212(014)

B. Tech. (Second Semester) Examination
Nov.-Dec. 2023

(AICTE Scheme)

(Common to all Branches)

MATHEMATICS-II

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) of each question is compulsory. Attempt any* ***two*** *parts from (b), (c) and (d).*

Unit-I

1. (a) Evaluate : 4

$$\int_0^4 \int_x^{x^2} e^{y/x}\, dy\, dx$$

(b) Change the order of integration and evaluate :

$$\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y}\, dy\, dx$$ 8

(c) Find the volume bounded by the cylinder

$x^2 + y^2 = 4$ and the plane $y + z = 4$ and $z = 0$. 8

(d) Verify Green's Theorem for

$$\int_C (xy + y^2)\, dx + x^2\, dy$$

where C is bounded by $y = x$ and $y = x^2$. 8

Unit-II

2. (a) Solve : 4

$$y\,dx - x\,dy + 3x^2 y^2 e^{x^3}\, dx = 0$$

(b) Solve :

$$\left[x - \frac{y}{x^2 + y^2}\right] dx + \left[y + \frac{x}{x^2 + y^2}\right] dy = 0$$ 8

(c) Solve :

$$y + px = x^4 p^2$$ 8

(d) Solve :

$$(px - y)(py + x) = a^2 p$$ 8

Unit-III

3. (a) Solve :

$$\frac{d^4 x}{dt^4} + 4x = 0$$ 8

(b) Solve :

$$\frac{d^2 y}{dx^2} - 4\frac{dy}{dx} + 4y = 8x^2 e^{2x} \sin 2x$$ 8

(c) Solve :

$$y'' - 2y' + 2y = e^x \tan x$$ 8

(d) Prove that :

$$\int_{-1}^{1} P_m(x) P_n(x)\, dx = \frac{2}{2n+1} \text{ if } m = n$$ 8

Unit-IV

4. (a) If $W = \log z$ find $\frac{dw}{dz}$. 4

(b) If $f(z)$ is an analytic function with constant modulus show that $f(z)$ is constant. 8

(c) Find the analytic function $f(z) = u + iv$ if

$$2u + v = e^x (\cos y - \sin y)$$ 8

(d) If $f(z)$ is a regular function of z prove that

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |f(z)|^2 = 4 |f'(z)|^2$$ 8

Unit-V

5. (a) Write the Cauchy's theorem. 4

(b) Evaluate :

$$\int_C \frac{\sin^2 z}{\left(z - \frac{\pi}{6}\right)^3} dz$$

where C is the circle $|z| = 1$. 8

(c) Find the Laurent's series expansion of

$$f(z) = \frac{7z - 2}{(x+1) z (z-2)}$$

in the region $1 < z + 1 < 3$. 8

(d) Prove that : 8

$$\int_0^{2\pi} \frac{\sin^2\theta}{a+b\cos\theta}\,d\theta = \frac{2\pi}{b^2}\left(a-\sqrt{a^2-b^2}\right),\ 0<b<a$$

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A000213(022)

B. Tech. (Second Semester) Examination, Nov.-Dec. 2023

(AICTE Scheme)

(Common for All Branch)

PROGRAMMING for PROBLEM SOLVING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) question of each unit is compulsory. Attempt any* ***two*** *parts from (b), (c) and (d). Part (a) carries 4 marks, part (b), (c), and (d) carries 8 marks.*

Unit-I

1. (a) Define OS with examples. 4

   (b) Explain about components of a computer system. 8

   (c) Explain about representation of algorithm with

flowchart, source code with examples. 8

(d) What is memory explain with types of memory? 8

Unit-II

2. (a) Explain about variable. 4

(b) What is datatype explain in detail? 8

(c) What is loop explain about it with example. 8

(d) Explain writing and evaluation of conditionals and consequent branching. 8

Unit-III

3. (a) What is strings explain about it. 4

(b) What is array explain 1D and 2D array with example. 8

(c) Explain about insertion sort with example. 8

(d) Explain about notion of order of complexity through example programs. 8

Unit-IV

4. (a) Define prototyping. 4

(b) Explain about call by value with example. 8

(c) Explain about quick sort method with proper example. 8

(d) What is merge sort explain about it with example. 8

Unit-V

5. (a) What is pointer, explain with example. 4

(b) Explain about file handling in detail. 8

(c) Explain use of pointers in self-referential structures. 8

(d) Define array of structure with example. 8

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A000213(022)

B. Tech. (Second Semester) Examination, Nov.-Dec. 2023

(AICTE Scheme)

(Common for All Branch)

PROGRAMMING for PROBLEM SOLVING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Attempt all questions. Part (a) question of each unit is compulsory. Attempt any* ***two*** *parts from (b), (c) and (d). Part (a) carries 4 marks, part (b), (c), and (d) carries 8 marks.*

Unit-I

1. (a) Define OS with examples. 4

(b) Explain about components of a computer system. 8

(c) Explain about representation of algorithm with

flowchart, source code with examples. 8

(d) What is memory explain with types of memory? 8

Unit-II

2. (a) Explain about variable. 4

(b) What is datatype explain in detail? 8

(c) What is loop explain about it with example. 8

(d) Explain writing and evaluation of conditionals and consequent branching. 8

Unit-III

3. (a) What is strings explain about it. 4

(b) What is array explain 1D and 2D array with example. 8

(c) Explain about insertion sort with example. 8

(d) Explain about notion of order of complexity through example programs. 8

Unit-IV

4. (a) Define prototyping. 4

(b) Explain about call by value with example. 8

(c) Explain about quick sort method with proper example. 8

(d) What is merge sort explain about it with example. 8

Unit-V

5. (a) What is pointer, explain with example. 4

(b) Explain about file handling in detail. 8

(c) Explain use of pointers in self-referential structures. 8

(d) Define array of structure with example. 8

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A000214(046)

B.Tech. (Second Semester) Examination, Nov.-Dec. 2023

(Common to All Branches)

ENGLISH

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *All questions are compulsory. Internal choice given in the questions.*

Unit-I

1. (a) Define communication. Explain the cycle of Communication with a clear diagram. 4

(b) What are the seven C's of communication. Explain with examples. 8

Or

Explain various physcial and mental barriers in communication; also suggest measures to remove them.

(c) Do as directed : (Attempt any **four**) 4×2=8

(I) What are Diphthongs?

(II) From two words with Prefix "Auto" and Suffix two words with "Logy".

(III) Give antonyms of the following words :

(i) Vicious

(ii) Enormous

(IV) Give Synonyms of the following words :

(i) Authorize

(ii) Omit

(V) Make sentences of the following Homophones and state the difference :

(i) Greak

(ii) Creek

(VI) Give one word for :

(i) The study of different skin diseases

(ii) A sentimental longing or wistful affection for a period in the past

Unit-II

2. (a) What does it mean to create coherence in writings? 4

(b) Do as directed : (Attempt any **four**) 4

(I) Use the phrases in sentences :

(i) Break down

(ii) Call Around

(II) Make a complex sentence using a conjunction :

(i) I was annoyed.

(ii) I kept quiet.

(c) Do as directed : (Attempt any **two**) 2×4=8

(i) English is spoken all over the world.

(Change Voice)

(ii) I asked him, "Dont's you know the way home?

(Change Narration)

(iii) He gave her a book.

(Change into interrogative)

(iv) Your gave her a book.

(Rewrite as Imperative sentence)

(v) The bus (leave) the stoppage before I arrived.

(Use the correct form of Tense)

(vi) He (finish) his work just now.

(Use the correct form of Tense)

(d) Punctuate the following sentences : (Attempt any **four**) 4

(i) The shepherd finding this flock destroyed exclaimed I have been rightly served why did I trust my sheep to a wolf.

(ii) Modern ideas of government date back to

the 1960s when for the first time people began to question a king's right to rule once throught to be god given

(iii) She took for classes last semester history biology arts and economics

(iv) We had a great time in France the kids really enjoyed it

(v) Did you understand why I was upset

(vi) We will be arriving on Monday morning at least I think so.

Unit-III

3. (a) What is the meaning of cliches? Explain and give examples. 4

(b) Do as directed : (Attempt any **four**) 4×2=8

(I) Choose correct verb.

(i) Either my shoes or your coat (is, are) always on the floor.

(ii) The movie, including all the previews, (take, takes) about two hours to watch.

(II) Place the modifiers correctly :

(i) He bought running stoller for the he called 'Speed Racer'.

(ii) We returned the juice to the waiter that was sour.

(III) Rewrite teh sentence removing Redundancy.

(i) Would you please repeat again what you said.

(ii) The new innovations were startling.

(IV) Fill in the blanks with appropriate articles :

(i) ..... Ozone layer will continue to disappear if we don't find ..... way to stop it.

(ii) ..... world's weather is changing. Pollution is having ..... effect on our climate.

(V) Fill in the banks with approprite prepositions :

(i) Reshma travelled ..... her father all ..... the world when she was 12 years old.

(ii) People judge us by our actions, ... we judge ourselves ..... our thoughts.

(c) Define different parts of speech with examples. 8

Unit-IV

4. (a) What is a Formal Report? Explain the types and their formal usage. 4

(b) Define what is essay and its types. 4

(c) You arte Anand kumar Bhonsle, Purchase Manager of Apple Telesystems, 9th Street, Mahim, Mumbai. Write to Ganpati Stationery Mart, Charchgatge, Mumbai asking for rates and terms of supply of stationery items such as pencils, papers, ribbons, carbon papers etc. 4

(d) Write the precis of the given paragraph with the appropriate title : 8

Almost every organism has the tendency to react to certain stimuli for survival. This reaction to each

and every situatin has an evaluationary basis of adaptation. Ths study of hum,an emotion dates bnack to the 19th century and psychologiwsts have discovered many reasons for every emotin, yet thesse are just theories. The arousal of emotion and their assumed structures is said to accour due to repeated encounters with a situation followed by the adaptation of the encouter. Human emotion have beenlinked to adaptively reguate emotion-gathering mechanisms. Th emotion of fear which is assoicated with ancint parts of the brain has presumably evolved among out pre-mammal ancestors while the emotion of a mother's love called the 'fiial emotion' has seen to evolve among early mammals. Variaous emotion work as manipulative strategies that famour survival. F\eigning emotions by an acoused person may halp him be saved from the punishment. An exaggerated display of anger is also associated with manipulating or threatening someone. Despite there being several emotin for various event, eronically the most intersting emotion in the emotion

of disguest.disgust is aroused when the body sense a danger to the immunity of the physiology ot the human. The disgusted memory is associated with alerting the brain of a potentially danggerous substance. A few studies have show that that the eccoding trigered in adaptive memory for problems is stronger than any other behvavirour. This mkes us instantly have a disgusted expression at the sight of something that makes us uncomfortartble or uneasy. These expression are also closely linked to self-protective communication.

Unit-V

5. (a) What is the difference between Hearing and listening? 4

(b) Describe the physical and psychological barriers to listening. 4

Or

What is note makeing? Define the Dos and Don's of Note making.

(c) What is the proces of listening? Define. 4

(d) What are the types of listening? Describe. 8

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A000215(020)

B. Tech. (Second Semester) Examination, Nov. - Dec. 2023

(New Scheme)

BASIC CIVIL ENGINEERING and MECHANICS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Answer all* ***five*** *questions. Part (a) of each section is compulsory carries 4 marks. Attempt any two from (b), (c) and (d) carries 8 marks.*

Unit-I

1. (a) List the function of sand in mortar. 4

   (b) Describe the different test conducted cement Explain compressive strength of cement. 8

(c) Describe the quality of good brick earth. 8

(d) Explain the mortar mix proportion for different works. 8

Unit-II

2. (a) Describe the ingredient of concrete. 4

(b) Describe properties of fresh concrete. Explain compressive strength test of concrete. 8

(c) Define curing. Explain different method used for curing. 8

(d) Difference between Load Bearing and Framed Construction. 8

Unit-III

3. (a) Describe principles of surveying. 4

(b) Describe the following terms : 8

(i) Bench Mark

(ii) Reduce Level

(iii) Height of instrument

(iv) Mean sea level

(c) Following Consecutive staffs reading were with a level along a sloping ground line *AB* at a regular intervals of 20m by using 4 m leveling staff 0·420, 1·115, 2·265, 2·900, 3·615, 0·535, 1·470, 2·815, 3·505, 4·445, 0·605, 1·925, 2·885. RL of point *A* is 155·272. Calculate RL of all points by rise and fall method, and workout the gradient of line *AB*. 8

(d) Calculate the RL of each point and apply the usual checks for the following dumpy level consecutive readings. The instrument having been shifted after the fourth and eighth readings. The first reading was taken on the B.M. of 112·620 m and the reading are 2·375, 1·730, 0·615, 3·450, 2·835, 2·070, 1·835, 0·985, 0·435, 1·630, 2·255, 3·630. 8

Unit-IV

4. (a) The block weighting W = 10 kN is resting on an inclined plane as shown in (a) Determine its components normal to and parallel to the inclined plane. 4

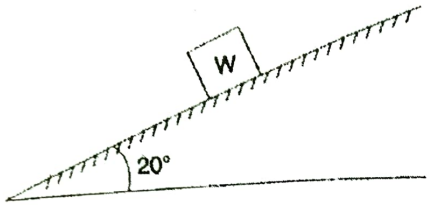

Fig. 1

(b) A wire rope is fixed at points A and D as shown in fig. Weight 20 kN and 25 kN are supported at B and C respectively. When equilibrium is reached it is found that inclination of AB is 30° and that of CD is 60° to the vertical. Determine the tension in the segments AB, BC and CD of the rope and also the inclination of the BC to the vertical. 8

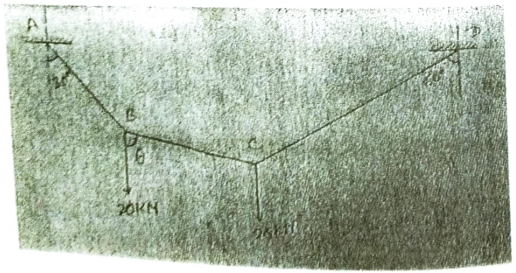

Fig. 2

(c) The smooth spheres each of radius 100 mm and weighting 100 N, rest in a horizontal channel having vertical walls, the distance between which is 360 mm. Find the reaction at the points of contact A, B, C and D as shown in figure. 8

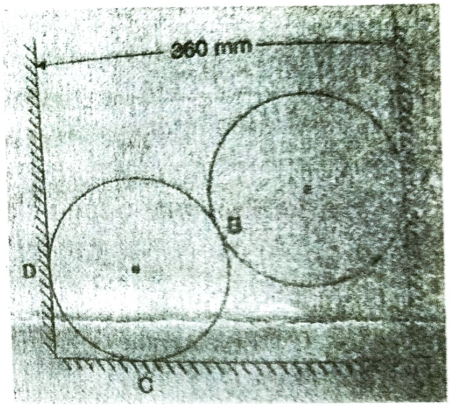

Fig. 3

(d) A 600 N cylinder is supported by the frame $ABCD$ as shown in figure. The frame is hinged at D. Determine the reaction developed at contact points A, B, C and D. Neglect the weight of frame and assume all contact surface are smooth. 8

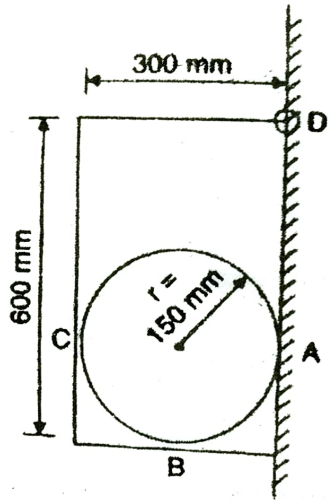

Fig. 4

Unit-V

5. (a) Discuss the method of joint and method of section. 4

(b) Determine the forces in all the members of the frames shown in figure. Indicate the nature of forces also. 8

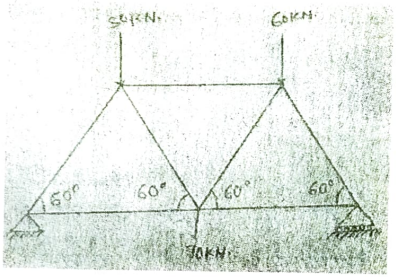

Fig. 5

(c) Determine the forces in all members of the truss shown in figure and indicate the magnitude and the nature of the forces on the dig. of the truss. 8

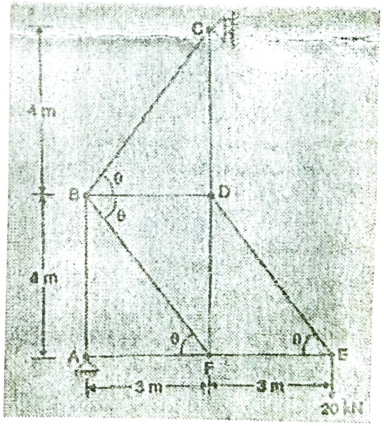

Fig. 6

(d) Find the forces in all members of the truss shown in figure. Tabulate the results use method of joint. 8

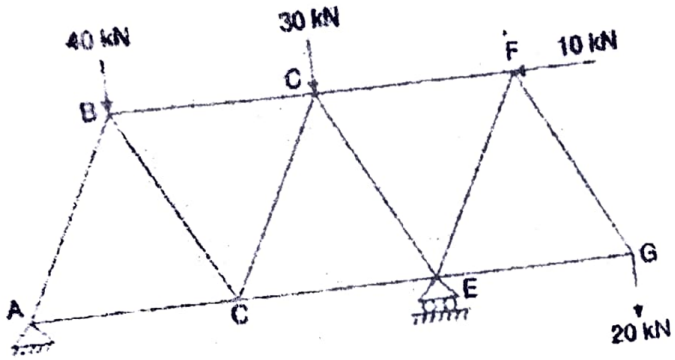

Fig. 7