COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2019

CHEMISTRY

FUEL CHEMISTRY

SEC-1 (SECCEMH1)

Time Allotted: 2 Hours   Full Marks: 40

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

1.   Answer any ***ten*** questions from the following: $1×10 = 10$

  (a) Write full form of LNG.

  (b) Give one example of synthetic fuel.

  (c) Write one advantage of solid fuel.

  (d) What is lead free gasoline?

  (e) What is bituminous coal?

  (f) How hard cokes are obtained?

  (g) Mention one important requirement for a good fuel.

  (h) What is blue gas?

  (i) What do you mean by fine point?

  (j) What is solvent refining?

  (k) Mention one use of xylene.

  (l) What is coke number?

2.   Answer any ***one*** question from the following: $5×1 = 5$

  (a) Differentiate between diesel oil and gasoline. Define flash point and cetane number. $2+(1\frac{1}{2}+1\frac{1}{2}) = 5$

  (b) What is fuel? How is it classified? What are the important requirements for a good fuel? $1+2+2=5$

3.   Answer any ***one*** question from the following: $10×1 = 10$

  (a) Write down the properties of semi-conducting lubricants. How do wastes use as a source of fuel? Discuss the preparation of coal gas with flow-chart diagram. $3+2+5=10$

(b) Write short notes on any *four* of the following: $2\frac{1}{2} \times 4 = 10$

   (i) Carbonization of coal

   (ii) Gaseous fuel

   (iii) Cracking of petroleum

   (iv) Aviation gasoline

   (v) Colloidal fuels.

4. Answer any *one* question from the following: $15 \times 1 = 15$

  (a) (i) How petroleums can be classified depending on it's composition?   3

     (ii) What are petrochemicals? Give the uses of following petrochemicals (two use each):   2+2=4

             Propylene oxide and butadiene

     (iii) Describe the manufacturing process of synthetic gasoline by Fischer-Tropsch process with flow chart diagram.   5

     (iv) Write short notes on Saponification value of oils.   3

  (b) (i) What are lubricants? Classify them with examples.   2+2=4

     (ii) How can you use the solar energy in your house as an alternative source of energy?   3

     (iii) Discuss the preparation of water gas with flow chart diagram.   4

     (iv) Mention two differences between liquid fuel and gaseous fuel.   2

     (v) Give two examples of non-petroleum fuel and their importances.   2

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COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2019

ZOOLOGY

AQUARIUM FISH KEEPING AND MANAGEMENT

SEC-1 (SECZOOH1)

Time Allotted: 1 Hour 30 Minutes   Full Marks: 30

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

1.   Answer any **ten** questions from the following: $1 \times 10 = 10$

   (a) Define exotic fish with example.

   (b) Write the best temperature range required for 'Freshwater tropical aquarium fishes' for household aquarium at Tropical countries.

   (c) Write the common names of two popular 'Endemic' aquarium fish species of North Bengal.

   (d) Name one disinfectant used in aquarium.

   (e) What should be the 'pH' range for better household aquarium fish keeping?

   (f) Mention two basic characteristics that are the drawbacks for fishes, not considered in an household aquarium.

   (g) What should the 'Nitrite (NO_2^-)' range for better aquarium fish keeping?

   (h) Write the name of one antibacterial agent used in aquarium.

   (i) Write the name of two live feed for freshwater household aquarium fishes.

   (j) Name one live fish feed.

   (k) Write the type of filters used in household aquarium in Tropical countries.

   (l) Write the name of one aquarium fish which shows the sexual dimorphism.

2.   Answer any **four** questions from the following: $2\frac{1}{2} \times 4 = 10$

   (a) Write a note on various diseases occur in household tropical fish aquarium.

   (b) How do you prepare / formulate aquarium fish feed?

   (c) Mention the transportation of aquarium fish in tabular format.

   (d) Write a note on morphology of Molly.

   (e) What are the purposes of filtration?

   (f) Write the process of introducing fishes in aquarium.

3.   Answer any **one** question from the following: $10 \times 1 = 10$

   (a) Write the distinguishing characteristics, feeding habit, behaviour of Blue morph and Gold fishes.

   (b) With the help of a flow chart describe briefly the various maintenance systems in a tropical fish aquarium.

   (c) Prepare a budget require to set up a $3' \times 1.5' \times 1'$ household tropical fish aquarium.

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COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2019

PHYSICS

ELECTRICAL CIRCUITS AND NETWORK SKILLS

SEC-1 (SECPHSH1)

Time Allotted: 2 Hours   Full Marks: 40

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Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

Answer Question No. 1 and *one* each from Group-A, Group-B and Group-C

1. Answer any ***ten*** questions from the following: $1 \times 10 = 10$

   (a) Explain why Nichrome is used to make high resistance.

   (b) What is the dimension of an inductor?

   (c) How a semiconductor will behave at 0 K temperature?

   (d) If the potential difference between two points is 42 V, then find the amount of work required to bring 6 C of charge from one point to the other.

   (e) What is shunt resistance?

   (f) What are thermistors?

   (g) An electric heater draws 9.5 A current when connected across 120 V supply. What is the internal resistance of the heater?

   (h) What are the characteristics of an ideal voltage source?

   (i) What is the function of a fuse in electric circuit?

   (j) What is the unit of electrical conductivity?

   (k) What is specific conductivity?

   (l) A.C. e.m.f producing machine is called

        (i) generator   (ii) alternator   (iii) motor

   (m) Power factor of an a.c. circuit is equal to

        (i) tangent of phase angle   (ii) sine of phase angle

        (iii) cosine of phase angle   (iv) none of these

(n) Find out the unknown resistance R of the following circuit.
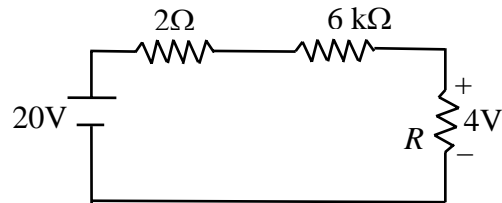
(o) Why transformers are used in a sub-station?

GROUP-A

Answer any *one* question from the following

$5×1 = 5$

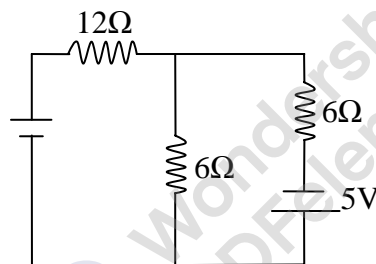2. (a) The ac current and voltage in a circuit is represented by the following

$$v = 10 \sin (\omega t + 30°)$$
$$i = 5 \sin (\omega t + 70°)$$

2

Plot the ac signal and show the phase relationship.

(b) Find current through each resistor of the following network using superposition principle.

3

3. (a) What is the reactance of an inductance 'L' in an ac circuit? 1

(b) Why does the current lag behind the voltage in a inductive circuit? 2

(c) What measures are taken to minimize different kinds of losses in a transformer? 2

4. State Kirchoff's law for a.c. networks. Explain that the Kirchoff's law led to charge and energy conservation. 2+3
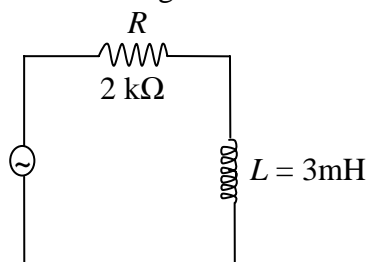
GROUP-B

Answer any *one* question from the following

$10×1 = 10$

5. (a) Write down the impedance of the following a.c. circuit. 5

Calculate the voltage across R and L if $v = 120 \sin 20°$.

(b) Explain how diode can be used to regulate voltage using the break-down region.

6. (a) Explain how RC circuit can be used as a low-pass filter as well as a high-pass filter. | 3

(b) A 60 W lamp with a capacity to withstand 100 V is operated in a 220 V, 50 Hz mains. What (i) pure resistance, (ii) pure inductance must be placed in series with the lamp so that it glows normally? Which of the two alternatives is more economical? | 3+1

(c) A coil of inductance 2 H and resistance 50 Ω is connected in series with a resistance of 500 Ω. Calculate the time constant of the circuit. If a 5 V battery is switched on to the circuit at time $t = 0$, determine the maximum rate of growth of current. | 1+2

7. (a) Discuss different losses of a transformer. | 3

(b) Sketch an elementary DC generator and indicate its different components. What are the advantages of using electromagnet instead of a permanent magnet in a DC generator? | 3+2

(c) Does the power consumption of a ceiling fan change by changing its speed through a regulator? | 2

GROUP-C

Answer any *one* question from the following | 15×1 = 15

8. (a) Explain briefly the working principle of | 2+2+2

   (i) Ammeter (ii) Voltmeter and (iii) Ohmmeter

(b) Explain with a sketch about the working of a magnetic circuit breaker. Why is it more preferable than an ordinary fuse in an electric network? | 3+1

(c) The instantaneous voltage and current is given by $v = V_m \sin\omega t$ and $i = I_m \sin(\omega t - \theta)$. Hence deduce an expression of power (P) delivered to the circuit. What is the power delivered to a purely inductive circuit? | 4+1

9. (a) Design and explain the working principle of a DC motor. | 4

(b) Design and explain the operation of a full wave diode rectifier. | 3

(c) What is an equivalent circuit? Show that any complicated two port network containing linear passive elements can be replaced by a simple T (or star) or pi (or delta) section network. | 2+3

(d) Three electrical cells are connected in parallel with similar poles connected together with wires of negligible resistances. The e.m.f of the cells are 2, 1 and 4 volts and the corresponding internal resistances are 4, 3 and 2 Ω. Find the current through the 4 volt cell. | 3

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COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2019

MATHEMATICS

LOGIC AND SETS

SEC-1 (SECMTMH1)

Time Allotted: 2 Hours   Full Marks: 40

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Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP-A

1. Answer any *ten* questions from the following: $1 \times 10 = 10$

    (a) Construct the truth table for $p \wedge \sim p$.

    (b) Define power set of a set.

    (c) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.

    (d) If $A = \{1, 3, 5, 7\}$ and $B = \{2, 5, 6, 8, 9\}$, then find $A \Delta B$.

    (e) Give an example of a relation on the set of +ve integers which is reflexive, transitive but not symmetric.

    (f) Define partial order relation.

    (g) If $A = \{x : 0 < x < 4\}$ and $B = \{x : 3 \leq x < 6\}$, where x is an integer, then $A \cap B = ?$

    (h) Show that $f(x) = \dfrac{|x|}{|x|+1}$, $x \in \mathbb{R}$ is neither injective nor surjective.

    (i) Define enumerable set.

    (j) Write the negation of the proposition "Tokyo is in Japan".

    (k) What is a predicate statement?

    (l) Define universal quantifier.

    (m) Define conditional statement.

    (n) Prove that $A - B = B^c - A^c$ for any two non-empty set A and B.

    (o) Write the symbols for connectives in "Either p or not p".

3420   1   Turn Over

GROUP-B

2.   Answer any *two* questions from the following: 5×2 = 10

(a) Prove that $A \cap (B \Delta C) = (A \cap B) \Delta (A \cap C)$.   5

(b) Show that $(p \wedge \sim q) \wedge [\{(p \vee \sim q) \wedge (\sim p \wedge \sim q)\} \vee q]$ is a contradiction.   5

(c) What is mean by *n*-ary relation? What is the degree and domain of this relation?   2+2+1
    Give an example.

(d) Simplify the following: 5

$(p \wedge (\sim p \vee q)) \vee (q \wedge (\sim (p \wedge q)))$.

GROUP-C

3.   Answer any *two* questions from the following: 10×2 = 20

(a) (i)   Let ρ be an equivalence relation on a set S and $a, b \in S$. Then prove that   5
          $\mathrm{cl}(a) = \mathrm{cl}(b)$ iff $a \rho b$.

    (ii) Show that for any three non-empty set A, B, C;   5
          $(A \cap C) \cup (B \cap C^c) = \phi \Rightarrow A \cap B = \phi$, where C^c denotes the complement
          of C.

(b) (i)   If R be an equivalence relation on a set A, then show that R^{-1} is also an   5
          equivalence relation.

    (ii) Prove that $[(\sim p) \wedge q] \vee p \vee [\sim (p \vee q)]$ is a tautology without using truth   5
          table.

(c) (i)   Let $p : \forall$ real numbers x, $\cos x + \sin x = 1$;   5

          $\sim p : \exists$ a real number x, such that $\cos x + \sin x = 1$.

          Prove that $\sim p$ is true.

    (ii) Find the equivalence classes determined by the equivalence relation ρ on $\mathbb{Z}$ 5
          defined by "$a \rho b$ iff $a - b$ is divisible by 5" for $a, b \in \mathbb{Z}$.

(d) (i)   Using truth table, show that $p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$.   5

    (ii) Three boxes are presented to you, one contains gold, the other two are   5
          empty. Each box has imprinted on it a clue as to its contents, the clues are:

          Box 1: "The gold is not here"

          Box 2: "The gold is not here"

          Box 3: "The gold is in Box 2"

          Only one message is true, the other two are false.

          Formalize the puzzle in propositional logic and find the solution using a
          truth table.

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COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2019

BOTANY

SEC-1 (SECBOTH1)

Time Allotted: 1 Hour 30 Minutes   Full Marks: 25

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

1.   Answer any ***ten*** questions from the following: $1 \times 10 = 10$
   (a) Define microtome.
   (b) What is the temperature range for pasteurization?
   (c) Give two examples of bacteriological media.
   (d) What is Supernatant?
   (e) What is the boiling point of liquid nitrogen?
   (f) Write the full form of DPX.
   (g) Mention the use of thermostat in an incubator.
   (h) Which instrument is used for determination of protein concentration in a sample?
   (i) How many grams of NaOH would be required to prepare 100 ml of 1(N) Sodium hydroxide solution?
   (j) Why a UV lamp is fixed in a laminar air flow machine?
   (k) Why distilled water is used in biochemical tests?
   (l) Name two stains used for single staining of plant organs.
   (m) Name a solvent mixture (with ratio) for separating amino acids by paper chromatography.
   (n) Why two types of mirror are fixed in a compound microscope?
   (o) Write the significance of using pH meter.

2.   Answer any ***one*** question from the following: $5 \times 1 = 5$
   (a) Mention the requirements for the estimation of protein in the laboratory (any standard method).   5
   (b) What is double staining? Write its advantages. How it differs from single staining? $1+2+2 = 5$
   (c) What is pH and why is it important? How to find pH of a sample? $1+2+2 = 5$

3.   Answer any ***one*** question from the following: $10 \times 1 = 10$
   (a) What is laminar flow cabinet? Mention the different types of laminar flow hood. How does a laminar air flow unit work? What are the uses of Laminar flow cabinet? $2+2+3+3=10$
   (b) What is chromatography? Describe briefly the procedure used in thin layer chromatography technique. $2+8 = 10$
   (c) Write briefly on: $5 \times 2 = 10$
        (i) Fire extinguisher in the laboratory (ii) Maintenance of a laboratory.

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COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2019

COMPUTER SCIENCE

UNIX

SEC-1 (SECCMSH1)

Time Allotted: 1 Hour 30 Minutes   Full Marks: 25

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP-A

1.   Answer any *ten* questions: 1×10 = 10

    (a) How can we open a read only file in UNIX?

        (A) vi filename   (B) open filename   (C) read filename   (D) vi (filename)

    (b) How can we stop a process in UNIX?

        (A) break   (B) dspid   (C) stop   (D) kill pid

    (c) Which command is used to display the top of a file?

        (A) cat   (B) grep   (C) head   (D) more

    (d) Which symbol is used to separate more than one command in the same command line?

        (A) $ (B) #   (C) :   (D) ;

    (e) Which sign gives the exit status of the last command that was executed?

        (A) $?   (B) $#   (C) $$ (D) $!

     (f) Which command is used to make the directory?

        (A) mkdir   (B) make   (C) mdit   (D) rmdir

    (g) Which command is used to terminate a process?

        (A) shutdown   (B) haltsays   (C) cancel   (D) kill

    (h) What is a shell script?

        (A) a group of statements   (B) a file containing special symbols

        (C) group of functions   (D) a file containing series of commands

3424   1   Turn Over

(i) The first line of a shell script begins with

    (A) &   (B) !   (C) $ (D) #

(j) To run a shell script, we should make it executable first by using

    (A) chmod + *x*   (B) chmod + *r*   (C) chmod .777   (D) chmod + *w*

(k) Which of the following is not a feature of UNIX?

    (A) Multi-tasking   (B) Multi-user   (C) Portability   (D) Easy to use

GROUP-B

Answer any *one* question from the following   5×1 = 5

2. (a) What is directory in UNIX?   2+3

  (b) Write down various files support in UNIX?

3.   What is Java Server pages? Discuss with syntax − the control structures used in Java Script (JS).   2+3

GROUP-C

Answer any *one* question from the following   10×1 = 10

4. (a) Write a shell program to take input from keyboard and check whether the number is palindrome or not.   7+3

  (b) What are the output of the following command?

    (i) echo $ PATH

    (ii) who > user list

    (iii) type mkdir ; mkdir test

5. (a) What is a shell script? Explain the following statement with syntax and example: 5+5

    (i) if   (ii) case   (iii) until

  (b) Distinguish between hard link and soft link with suitable example.

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COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2019

COMPUTER SCIENCE (PRACTICAL)

INTERNET TECHNOLOGY UNIX AND SHELL PROGRAMMING LAB

SEC-1 (SECCMSH1)

Time Allotted: 3 Hours   Full Marks: 15

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

Practical	= 10
Viva	= 03
Lab copy	= 02
Total	= 15

Answer any *one* question from the following on lottery basis

1. Shell script to add two numbers by the use of function.

2. Shell script to check whether a given string is palindrome or not.

3. Shell script to check whether a given number is palindrome or not.

4. Shell script to display number using array.

5. Shell script to find Greatest of three numbers by if-else statement.

6. Shell script to find factorial of a number.

7. Shell script to find sum of the digit of a number.

8. Shell script to find the max-value from an array.

9. Shell script to find "*a*" to the power "*b*" using function.

10. Shell script to print pyramid of stars.

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