CLASS: BTECH/IMSC
BRANCH: BT/CHEMICAL/CIVIL/MECH/PIE/FT

SEMESTER: I
SESSION: MO/2022

SUBJECT: CS101 PROGRAMMING FOR PROBLEM SOLVING

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates.

		CO	BL
Q1 (a) What is the difference between a keyword and an identifier?	[2]	1	1
Q1 (b) Explain the features of different types of storage classes of a variable.	[3]	1	2

Q2 (a) What is the role of an Operating System?	[2]	1	1
Q2 (b) Given x=4, y=20 and z=5, evaluate the value of the following expressions:	[3]	2	5

    i. $x * y / z + (x * z + y)$
    ii. $x + y * z - 4 \wedge y / x$

Q3 (a) What is an ASCII code?	[2]	1	1
Q3 (b) What will be the output of the following program?	[3]	1	1

```c
#include <stdio.h>
int main()
{
int a=20, b=5;
++ a;
b= b-- + a;
printf("%d, %d", a++, --b);
return 0;
}
```

Q4 (a) Given a= 10, b=5 and c=6, evaluate the following logical expression: [2]   2   5
    $d= ((a < b) \&\& (b > c)) || (a > c)$
Q4 (b) Write a C program to input a number from the user in a loop till the user enters -1 and   [3]   2   1
    count how many numbers inputted are positive, negative and zero valued.

Q5 (a) What are the different types of errors in C programming?   [2]   1   1
Q5 (b) Write a C program to generate the following pattern as an output: [3]   2   4

```
  1
 2 2
3 3 3
4 4 4 4
```

::::::: 16/01/2023 ::::::M

CLASS: BTECH/BHMCT
BRANCH: BT/CHEMICAL/CIVIL/MECH/PIE/HMCT

SEMESTER: I
SESSION: MO/2022

SUBJECT: BE101/ BER101 BIOLOGICAL SCIENCE FOR ENGINEERS

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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|			CO	BL
Q.1(a)	Define the term life.	[2]	1	1
Q.1(b)	Give a brief illustration on any two theories of origin of life	[3]	1	3
Q.2(a)	Enlist the name of any two vitamins, with their source and disease caused by deficiency of these vitamins.	[2]	1	1
Q.2(b)	Explain the steps of cell cycle.	[3]	1	2
Q.3(a)	State the first law of thermodynamics and give a suitable mathematical expression for it.	[2]	2	2
Q.3(b)	How will you differentiate between Plant and Animal cells? Explain with their contrasting features.	[3]	1	2
Q.4(a)	Name the storage polysaccharides in plants and in animals. Which hormone is responsible for conversion of stored polysaccharide to glucose?	[2]	1	1
Q.4(b)	Distinguish between aerobic and aerobic respiration with suitable examples.	[3]	2	2
Q.5	How glucose molecules are broken down into pyruvates? Give the metabolic steps involve in it.	[5]	1	3

::::::: 20/01/2023 ::::::M

CLASS: BTECH/IMSC
BRANCH: BT/CHEMICAL/CIVIL/MECH/PIE/PHYSICS

SEMESTER: I
SESSION: MO/2022

SUBJECT: EE101 BASIC OF ELECTRICAL ENGINEERING

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
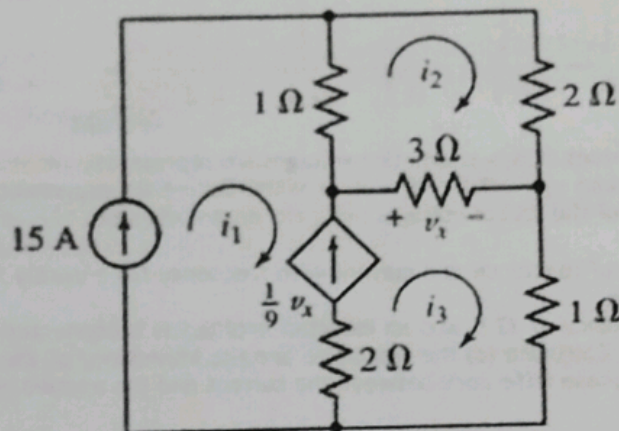
	CO	BL

Q.1(a) Determine and sketch the voltage in a 3 H inductor if the current waveform is as below: [2] CO1 BL3
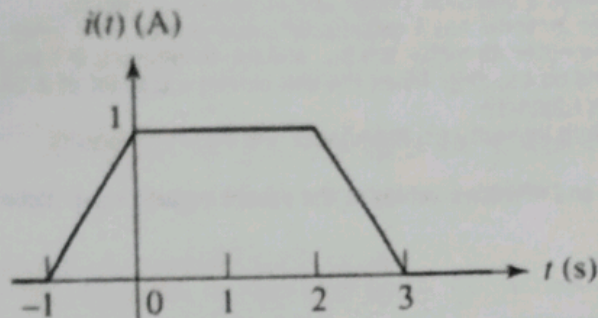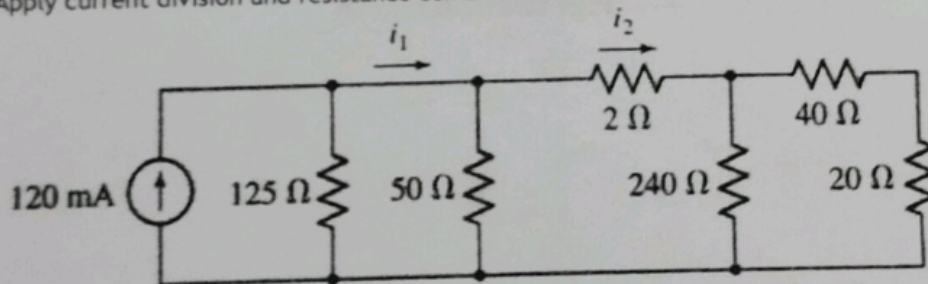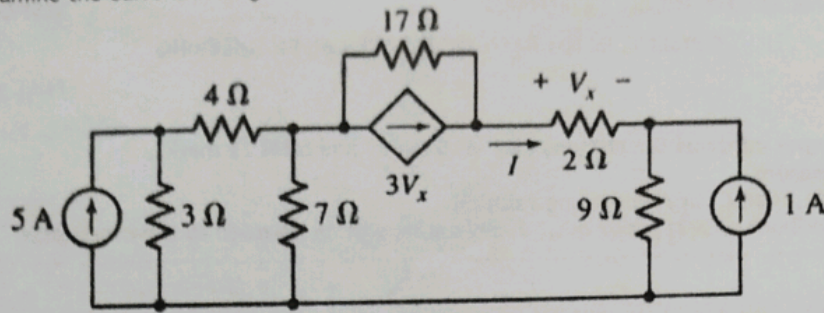

Q.1(b) Evaluate the mesh currents.   [3] CO1 BL3

Q.2(a) Apply current division and resistance combination methods to find i_1 and i_2.   [2] CO1 BL3

Q.2(b)   Examine the current through the 2Ω resistor by using source transformations.   [3]   CO1   BL4

Q.3(a)   What is a magnetic circuit?   [2]   CO1   BL2
Give the analogy between a magnetic circuit and an electrical circuit.
Q.3(b)   A ring of ferromagnetic material has a rectangular cross-section. The inner   [3]   CO1   BL2
diameter is 7.4 in., the outer diameter is 9 in., and the thickness is 0.8 in. There is a
coil of 600 turns wound on the ring. When the coil carries a current of 2.5A, the flux
produced in the ring is $1.2 \times 10-3W$.
Express (i) Magnetic field intensity (ii) Reluctance and (iii) Permeability

Q.4(a)   Compute the average and effective values of the square voltage wave shown.   [2]   CO2   BL2
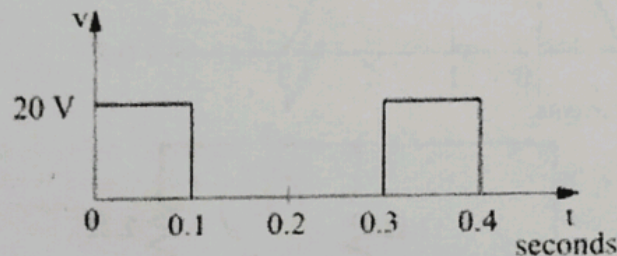
Q.4(b)   The instantaneous values of two alternating voltages are represented respectively by   [3]   CO2   BL3
v_1 = 60 sin θ volts and v_2 = 40 sin (θ – π/3) volts. Derive an expression for the
instantaneous value of the sum of voltages using the phasor diagram.

Q.5(a)   Sketch the variation of reactance and current with frequency for a purely inductive   [2]   CO2   BL3
and capacitive circuit.
Q.5(b)   A coil having a resistance of 12 Ω and an inductance of 0.1 H is connected across a   [3]   CO2   BL3
100 V, 50 Hz supply. Calculate (a) the reactance and the impedance of the coil; (b)
the current; (c) the phase difference between the current and the applied voltage.

:::::: 18/01/2023 ::::::M

CLASS: BTECH/IMSC.   SEMESTER: I
BRANCH: BT/CHEMICAL/CIVIL/MECH/PROD/FT   SESSION: MO/2022

SUBJECT: PH113 PHYSICS

TIME: 2 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates.

			CO	BL
Q.1(a)	Explain polarization of light.	[2]	1	II
Q.1(b)	Develop the condition for maxima and minima due to interference in thin parallel film. (Oblique incidence)	[3]	1	III
Q.2(a)	Explain why Newton's rings are circular in nature.	[2]	1	II
Q.2(b)	Formulate the expression for intensity distribution due to double slit Fraunhofer diffraction pattern.	[3]	1	VI
Q.3(a)	Define Gauss's law. Develop the differential form of Gauss's law from its integral form.	[2]	2	I
Q.3(b)	Formulate the relation between E and V in differential form. Show that electrostatic field is conservative in nature.	[3]	2	VI
Q.4(a)	Explain equation of continuity. Define displacement current.	[2]	2	V
Q.4(b)	Develop the boundary condition between B & H in magnetostatics across an interface separating two media having different permeabilities.	[3]	2	III
Q.5(a)	Define postulates of special theory of relativity.	[2]	3	I
Q.5(b)	Construct Lorentz transformation equations of space and time coordinates.	[3]	3	VI

:::::: 17/01/2023 ::::::M

CLASS: B.TECH / BHMCT/IMSC
BRANCH: BT/CHEMICAL/CIVIL/MECH/PIE/HMCT/IMSC_ALL

SUBJECT: CE101 ENVIRONMENTAL SCIENCE

FULL MARKS: 25

TIME: 02 Hours

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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		CO	BL
Q.1(a) Explain the concept of Ecosystem services using suitable examples for each service.	[2]	1	2
Q.1(b) Correlate the relationship between Biotic and Abiotic factors in a holistic manner	[3]	1	3
Q.2(a) Differentiate between the primary and secondary pollutants released due to the burning of fossil fuel and the reactions for the secondary pollutant formations.	[2]	2	3
Q.2(b) With the help of a suitable diagram, discuss a biogeochemical cycle, which does not enter the atmosphere.	[3]	1	2
Q.3(a) Discuss sick building syndrome.	[2]	2	2
Q.3(b) Explain any two methods for gaseous air pollutants emission control.	[3]	2	3
Q.4(a) Explain the principle of electrostatic precipitator.	[2]	2	3
Q.4(b) Discuss the concept of bioaccumulation and biomagnification.	[3]	1	3
Q.5(a) Classify water resources. What are the various requirements and uses of water?	[2]	3	3
Q.5(b) Define water pollution. Discuss four different sources of water pollution?	[3]	3	2

::::::26/05/2023::::::M

CLASS: BTECH
BRANCH: BT/CHEMICAL/CIVIL/MECH/PIE

SEMESTER : II
SESSION : SP/2023
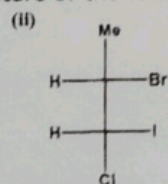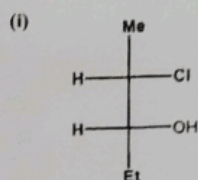
SUBJECT: CH101 CHEMISTRY

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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			CO	BL
Q.1(a)	Discuss radius-ratio rule along with its limitations.	[2]	1	2
Q.1(b)	Estimate the ionic radius of Cs^+. The lattice energy of CsCl is 633 kJ/mol. For CsCl the Madelung constant, M, is 1.763, and the Born exponent, n, is 10.7. The ionic radius of Cl^- is known to be 1.81 Å.	[3]	1	3
Q.2(a)	Show by means of a diagram how the pattern of d orbital splitting changes as an octahedral complex undergoes tetragonal distortion and eventually becomes a square planar complex.	[2]	1	2
Q.2(b)	(i) Why transition metal complexes have higher measured lattice energy as compared to the normal metals and explain the reason for the hump. (ii) If the CFSE of $[Co(H_2O)_6]^{2+}$ is -0.8 Δ_o, what spin state is it in?	[2+1]	1	2
Q.3(a)	Apply selection rule (Laporte and Spin) for the electronic transition in $[Mn(H_2O)_6]^{2+}$ and predict possible transitions.	[2]	1	3
Q.3(b)	Show the formation of σ and π bonding and antibonding molecular orbitals due to overlap of 'p' orbitals with suitable diagram.	[3]	2	2
Q.4(a)	Predict the hybridisation and shape of BF_3 molecule.	[2]	2	2
Q.4(b)	Find out the bond order and magnetism of O_2^+, O_2^{2-} and N_2^-.	[3]	2	3
Q.5(a)	Why in general boiling point of cis-isomers is higher compared to trans-isomers?	[2]	2	2
Q.5(b)	Find out the R, S nomenclature of the following compounds.	[1.5+1.5]	2	3

(i)
```
        Me
        |
H-------CI
        |
H-------OH
        |
        Et
```

(ii)
```
        Me
        |
H-------Br
        |
H-------I
        |
        CI
```

CLASS: BTECH   SEMESTER : II
BRANCH: ALL   SESSION : SP/2023

SUBJECT: MA107: MATHEMATICS-II

TIME: 02 Hours   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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			CO	BL

Q.1(a)   Find only the complementary function of the differential equation   [2]   1   BL-1 &2
$$3\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 4y = 0$$

Q.1(b)   Find only the particular integral of the differential equation   [3]   BL-1 &2
$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 2\sin x + 3\cos x$$

Q.2   Solve the Cauchy Euler's linear differential equation-   [5]   BL-1,2,3
$$x^3\frac{d^3y}{dx^3} + 3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 24x^2$$

Q.3   Find the power series solution of the differential equation   [5]   BL-1,2,3
$$\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 2y = 0$$
about an ordinary point $x = 0$ only.

Q.4(a)   Find the values of m and n if $3x^2 = mP_2(x) + nP_0(x)$ where $P_0(x)$ and $P_2(x)$ are   [2]   BL-2,3
Legendre's polynomials.

Q.4(b)   Show that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$ [3]   BL-1,2

Q.5   Find the Fourier series to represent the function defined as   [5]   BL-1,2,3
$$f(x) = \begin{cases} \pi + x, & -\pi < x < 0 \\ 0, & 0 \le x < \pi \end{cases}$$

::::::24/05/2023 M::::::