Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech, IDD (B.Tech and M.Tech)
Sub_Code: 23ES1005

1st Semester Regular Examination: 2023-24
SUBJECT: Basic Civil Engineering
BRANCH(S): ALL
Time: 3 Hour
Max Marks: 100
Q.Code: N608

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

(2 x 10)

Q1 **Answer the following questions:**

a) Mention the two important disciplines of civil engineering.
b) Define bearing capacity of soil.
c) State two uses of adhesives.
d) Define per capita demand.
e) Provide two examples of multipurpose river valley projects of India.
f) Name two disinfectants used in water treatment.
g) Differentiate between fine aggregates and coarse aggregates.
h) State the fastest and slowest medium of transportation.
i) Explain the term "seasoning of timber".
j) Write the two major scopes of urban engineering.

Part-II

(6 × 8)

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**

a) Provide a detailed classification of urban roads.
b) Give a basic lay out public water supply system with neat sketch.
c) Write in short about the different types of dams as per civil engineering point of view.
d) Summarize in short about the different uses of cement.
e) Name the three different categories of glasses and state the different properties of glasses.
f) Write merits and demerits of stone as a construction material.
g) Differentiate between shallow foundation and deep foundation.
h) Name and sketch about different types of canals laid in canal irrigation system.
i) Define composite and write its applications.
j) Write a short note on different types of water demands.
k) Differentiate between rigid pavement and flexible pavement.
l) Write a short note on different ingredients used in making concrete.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Describe in detail about the qualities of a good brick. Illustrate in detail about different uses of bricks.	**(16)**
Q4	Describe in detail about the different modes of transportation. Provide a detailed classification of highways as per Indian context.	**(16)**
Q5	Explain in detail about the different components of a building and also state the basic requirements of buildings.	**(16)**
Q6	Write in detail about the different types of irrigation systems used in India. Write the advantages and disadvantages of irrigation.	**(16)**

Registration No: 2 2 0 1 2 3 0 1 8 8

Total Number of Pages: 02

B. Tech, IDD (B. Tech and M. Tech)
RBM1B001

1st / 3rd Semester Regular/Back Examination: 2023-24
Basic Mechanical Engineering
AERO, AE, AEIE, AUTO, BIOMED, BIOTECH, CIVIL, CSEAI, CSEDS, CSE, CSIT, CSEAIME, ELECTRICAL & C.E, EEE, EIE, ELECTRICAL, ECE, ETC, MANUTECH, MECH, MME, METTA, MINING, PLASTIC
Time: 3 Hour
Max Marks: 100
Q. Code: N611

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

(2 x 10)

Q1 **Answer the following questions:**

a) State the Clausius statement of the Second law of Thermodynamics.
b) A cylinder of a gas has a pressure of 5 atm at 50°C. At what temperature in °C will it reach a pressure of 12 atm?
c) Define the term Enthalpy.
d) Define internal combustion engine.
e) Distinguish between a heat pump and a refrigerator.
f) Classify the gears.
g) What is the use of the braking system in a vehicle?
h) Write down the applications of an industrial robot.
i) Name any two instruments used for pressure measurement.
j) Name any two instruments used for flow measurement.

Part-II

(6 × 8)

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**

a) Discuss the thermodynamic system, surrounding, and universe. Also, discuss the various types of system with suitable example.
b) An ideal gas is heated from 25° C to 145° C. The mass of the gas is 2kg. Determine: (i) specific heats, (ii) change in internal energy
Assume, R = 287 J/kgK and γ = 1.4 for the gas.
c) Define work. Show that work done, W = PdV.
d) Name all the mountings and accessories of a steam boiler and show them in a neat sketch.
e) Differentiate between S.I. engine and C.I. engine.
f) Enumerate the various components used in a refrigerator and explain their working.
g) Explain belt drives and types of belts used in belt drives.
h) Explain the advantages and disadvantages of flexible and rigid couplings.
i) Classify the robots on the basis of the physical configuration.

j) Write short note on Sin-bar.

k) Explain the method of pointer and scale for torque measurement.

l) What is the difference in principle of working of Orificemeter and Rotameter? Discuss with applications.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 0.15 m^3 of air at a pressure of 900 kPa and 300°C is expanded at constant pressure to three times its initial volume, it is expanded polytropically following the law $PV^{1.5} = C$ and finally compressed back to initial state isothermally. Calculate, a) heat received, b) heat rejected, c) efficiency of the cycle. **(16)**

Q4 Explain the working of four-stroke petrol engine with neat sketch and P–V diagram. **(16)**

Q5 Describe an internal expanding shoe brake with a neat sketch and state its applications. **(16)**

Q6 Explain the principle of working of a thermocouple for temperature measurement. **(16)**

230-31/01/2024-18

Registration No.: | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 0 | 2 | 1 |

Total Number of Pages: 03

Course: B.Tech, IDD (B.Tech and M.Tech)
Sub_Code: 23ES1001

1st Semester Regular Examination: 2023-24
SUBJECT: BASIC ELECTRICAL ENGINEERING
BRANCH(S): AEIE, AUTO, BIOTECH, CHEM, CIVIL, CE, CST, CSEAI, CSEDS, CSE, CSEAIME, EEE, ELECTRICAL, ECE,ETC, MANUTECH, MECH, MME, ME, METTA, MINERAL, PLASTIC
Time: 3 Hour
Max Marks: 100
Q.Code: N545

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) State Kirchoff's laws. The nodal analysis and mesh analysis of an electrical circuit is based on which laws?

b) Calculate the supply voltage V in the circuit shown in Figure 1.

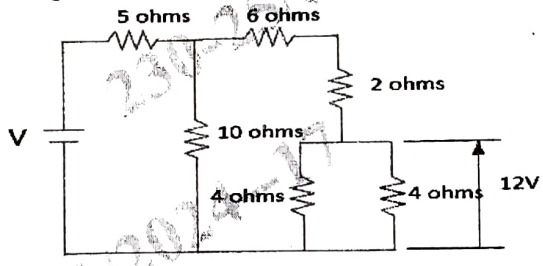

Figure 1

c) What happens to the power factor of a series R-L-C circuit when the frequency of the supply is varied above and below the resonant frequency?

d) If two incandescent lamp of rating 100W, a fan rated 80W and a heater rated at 1000 W are operated for 5 hr/day, calculate the total energy consumption in 7 days.

e) In two wattmeter method for three phase power measurement, what will be the power factor when both wattmeters show equal reading?

f) What do you mean by retentivity and coercivity of a magnetic material?

g) What are the function of commutator in DC generator and DC motor?

h) What is the purpose of using core in a transformer and what are its features?

i) What will happen if the slip of induction motor becomes zero?

j) What are different voltage ranges and frequency for generation and distribution end of electrical power system?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Determine the current flowing through 1Ω resistor in the circuit shown in Figure 2. Use mesh analysis method.

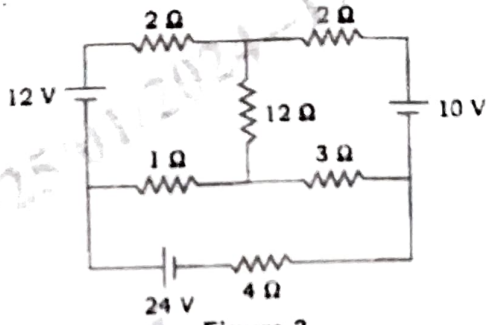

Figure 2

b) Find the equivalent resistance Rab in the circuit shown in Figure 3.

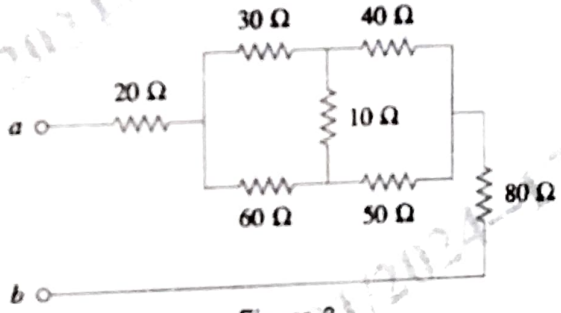

Figure 3

c) Using Thevenin's equivalent circuit for the circuit shown in Figure 4 across x-y terminals, calculate the current flowing through the 5Ω resistor.

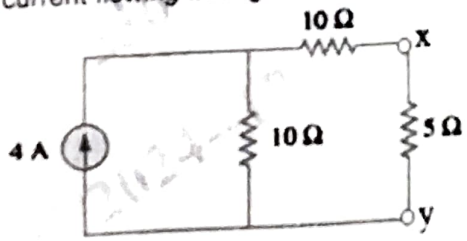

Figure 4

d) For the given Figure 5, find
- (i) Admittance of each parallel branch
- (ii) Total circuit impedance
- (iii) Supply current and power factor

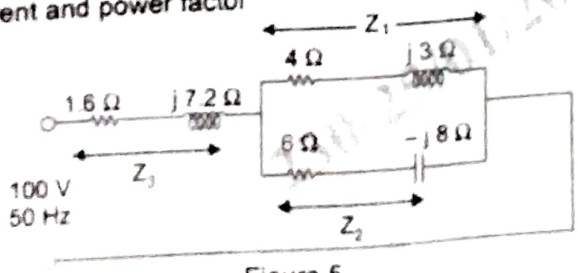

Figure 5

e) A delayed full-wave rectified sinusoidal current has an average value equal to half its maximum value. Find the delay angle θ.

f) Explain the concept of resonance in series RLC circuit and derive the expression for resonance frequency. Also, plot the related curves.

i) For the given Figure 5, find
   I. Admittance of each parallel branch
   II. Total circuit impedance
   III. Supply current and power factor

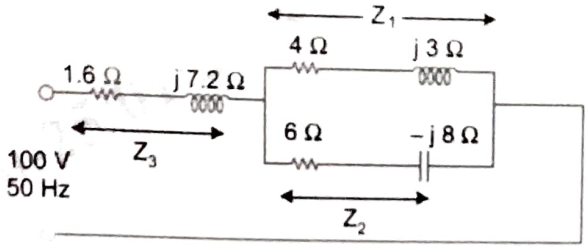

Figure 5

j) Explain the concept of rotating magnetic field in three phase supply to the rotating machines.

k) What are the types of DC machine based on their excitation? Explain with circuit diagram.

l) What is DC motor? Explain the speed control methods of a DC shunt motor.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Derive the expression of transient rise current in RL circuit with DC excitation. Also, draw the waveform. A coil has a resistance of 1 Ω and an inductance of 2 H. It is suddenly connected to a 12 V dc voltage. Find, **(16)**
   a) Initial and final values of current
   b) Time constant
   c) Rate of change of current at t = 0 and t =
   d) Voltage across inductance at t = 0 and t =

Q4 **a)** Explain three phase EMF generation. Derive the voltage and current relations in star and delta connected systems. **(8+8)**

b) Three identical impedances connected in star fashion draw a line current of $(5\angle -30^0)$ A, when connected across a 400 V, 50 Hz, three phase AC supply. Find the resistance, reactance and impedance per phase.

Q5 **a)** Define the terms MMF, flux, reluctance and fringing effect. **(8+8)**

b) An iron ring of circular cross-section of 5×10^{-4} m^2 has mean circumference of 2 m. It has a saw cut of 2 mm and is wound with 800 turns. Determine the exciting current when flux in air gap is 5×10^{-3} Wb. Given μ_r of iron is 600. Neglect leakage and fringing.

Q6 Explain the principle of operation of a single-phase transformer. A 50 KVA transformer has 220 turns on the primary and 35 turns on the secondary winding. The primary is connected to 1300 V, 50 Hz, supply. Find **(16)**
   a) Full load primary current and secondary current,
   b) Secondary emf and maximum flux?

Registration No.: | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 8 | 0 |

Total Number of Pages: 02

Course: B.Tech, IDD (B.Tech and M.Tech)
Sub_Code: 23ES1002

1st Semester Regular Examination: 2023-24
SUBJECT: BASIC ELECTRONICS
BRANCH(S): ALL
Time: 3 Hour
Max Marks: 100
Q.Code: N547

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I (2 x 10)

Q1 **Answer the following questions:**

a) What is ripple factor? Mention its value for Full-wave rectifier.
b) Mention the relationship between α and β of a BJT.
c) Explain the pinch-off voltage (V_P) in n-channel JFET with a diagram.
d) Explain photolithography process in IC fabrication.
e) Mention the advantages of negative feedback.
f) Define virtual ground concept in an Op-Amp.
g) Derive the octal and binary equivalents of the hexadecimal number $(5C.2B)_{16}$.
h) Realize a NOT gate and an AND neither gate using NOR gates.
i) What are the inputs given to the vertical deflecting plate and horizontal deflecting plate of a cathode ray tube?
j) What do you mean by modulating signal and modulated signal in a communication system?

Part-II (6 × 8)

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**

a) With a neat diagram, explain the function of a center-tapped full-wave rectifier circuit.
b) The β value of a BJT in common base configuration is given as 110. Find the collector current (I_C) and base current (I_B), if emitter current (I_E) = 13 mA and I_{CBO} = 250 μA.
c) Draw the transfer characteristic or the I_D *vs* V_{GS} graph of a JFET for given I_{DSS} = 20mA and V_p = –3v.
d) Find the values of V_{dc}, PIV and ripple factor of a half-wave rectifier for an input voltage of peak-to-peak value equal to 10 V.
e) Explain a summing circuit designed with Op-Amp.
f) What is VLSI? Discuss some limitations of VLSI.
g) Explain the concept of feedback with a suitable diagram and compare between the positive feedback and negative feedback.

h) Determine the output voltage of an OP-Amp, if the two input voltages are V_1 = 150 μV and V_2 = 140 μV. Given A_d = 4000 and CMRR = 1000.

i) Perform $(17)_{10} - (5)_{10}$ in binary and also $(17)_8 + (5)_8$ in binary.

j) Find the decimal equivalent values for the signed-binary numbers 11011 and 01010, if they are in (I) Sign-magnitude form, (II) 1's complementary form, (III) 2's complementary form.

k) Explain the working of the CRT with a neat diagram.

l) Make a comparison between Amplitude Modulation and Frequency Modulation.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain the applications of a BJT as an Amplifier and as a Switch. **(16)**

Q4 Explain the physical structure, operation and characteristics of a n-channel, D-MOSFET. **(16)**

Q5 Draw the neat block diagrams of four feedback topologies with the all required notations. Analyze the influence of negative feedback on the gain of an amplifier. **(16)**

Q6 Simplify the following Boolean expressions and implement the final expressions with logic gates. **(16)**

(i) $ABC + AB\bar{C} + A\bar{B}C + A\bar{B}\bar{C} + \bar{A}\bar{B}C$

(ii) $AB + \bar{A}C + ABC + \bar{A}BC$

(iii) $\overline{(\bar{X} + Z)(\overline{XY})}$

(iv) $\overline{(\overline{X.\bar{Y}})(\bar{Y} + Z)}$

Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech, IDD (B.Tech and M.Tech)
Sub_Code: 23BS1003

1st Semester Regular Examination: 2023-24

SUBJECT: Chemistry

BRANCH(S): AERO, AE, AME, AEIE, BIOMED, BIOTECH, CHEM, C&EE, CIVIL, CST, CSEAI, CSEDS, CSE, CSIT, CSEAIME, ELECTRICAL & C.E, EEE, ELECTRICAL, ECE,ETC, IT, MECH, MME, METTA, MINERAL, MINING

Time: 3 Hour

Max Marks: 100

Q.Code: N520

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) If the inter-nuclear distance between two chlorine atoms in a Cl_2 molecule is 198 pm, what is the covalent radius of chlorine?

b) Why the size of a cation is less and that of anion more than its atom?

c) Why does oxygen have a lower ionization enthalpy than nitrogen and Fluorine?

d) Calculate the change in entropy accompanying the isothermal expansion of 5 moles of an ideal gas at 330 K until its volume has increased six times.

e) Write the physical significance of Gibb's free energy.

f) Which of the following molecules will show a microwave rotational spectrum and why?
CH_4, CH_2Cl_2, H_2O, CO_2

g) Which of the following transitions occur at higher frequency of and why: $n\rightarrow\pi^*$, $\sigma\rightarrow\sigma^*$, $\pi\rightarrow\pi^*$ and $n\rightarrow\sigma^*$.

h) Write the conditions required for a molecule to be optical active.

i) Draw the structures E and Z isomers of 2-butene.

j) Arrange the followings in the increasing stability and account for the highest stable ion:
Benzyl carbonium ion, Allyl carbonium ion, tertiary carbonium ion and methyl carbonium ion.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Explain the terms effective nuclear charge, shielding, and penetration effect with suitable example.

b) Define the term first and second ionization energy. Discuss the factors affecting the ionization energy with examples. How does it vary along a period and down the group?

c) Derive Gibbs - Helmholtz equation. For the following reaction,
H_2 (g) $+O_2$ (g)$\rightarrow H_2O$ (l). The value of enthalpy change and free energy change are −68.32 and −56.69 kcal respectively at 25°C. Calculate the value of free energy change at 30°C.

d) Derive the expression for the entropy change of an ideal gas. Calculate the entropy change when 5 moles of an ideal gas undergo isothermal expansion at 20 °C from a pressure of 10 atm to a pressure of 2 atm.

e) Show that for a reversible process the total entropy change of the universe is zero while a thermodynamically irreversible process is always accompanied by an increase in entropy of the system and surroundings taken together.

f) Derive the expression for Entropy change during mixing of ideal gases. 1 mole of H_2 and 9 moles of N_2 are mixed at 298 K and 1 atmosphere. Assuming the ideal behavior of the gas, calculate the entropy of mixing per mole of the mixture formed.

g) Write the principle of Microwave spectroscopy. Derive the expression for radius of a diatomic molecule using the application of microwave spectroscopy.

h) The pure rotational (microwave) spectrum of gaseous HCl consists of a series of equally spaced lines separated by 20.80 cm^{-1}. Calculate the bond distance of the molecule. The atomic masses are ^{1}H = 1.673 x 10^{-27} kg; ^{35}Cl = 58.06 x 10^{-27} kg

i) Write the basic principle of IR spectroscopy and write the expression for vibrational frequency. Mention the factors affecting the vibrational frequency. Also describe the different types of vibration.

j) Identify the chiral carbon in Tartaric acid CH (OH) COOH • CH (OH) COOH and draw the different optical isomers. Define the different terms enantiomers, diastereomers, meso form and racemic mixture and highlight their optical activity using tartaric acid.

k) Justify with mechanism: Propene reacts with HBr to give isopropyl bromide and not n-propyl bromide, but the product is reversed in presence of peroxide.

l) Define free radicals with example. Write one method of formation of free radicals. Discuss the structure of free radical.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Define electronegativity? How does it vary along a period and down the group? **(2+2+2)**

b) Describe the three different scales to express the electronegativity of elements. **(6)**

c) Discuss any two applications of electronegativity. **(4)**

Q4 a) Derive Claypeyron–Clausius Equation and integrated form of this equation for liquid-vapour equilibria. Write the applications of this equation. **(4+4+2)**

b) Chloroform, $CHCl_3$ has a vapor pressure of 197 mmHg at 23.0 °C, and 448 mmHg at 45.0 °C. Estimate its heat of vaporization and normal boiling point. **(6)**

Q5 a) Write Beers Lambert law. Derive the expression for absorbance of a solution using the application of this law. Define and write the terms involved in it. Also write the limitations of this law. **(2+4+4+2)**

b) When a monochromatic radiation is allowed to fall on a solution of a compound with concentration 0.05 M, the intensity of the incident radiation reduces to one fifth of the initial value. If the path length is 1 cm, calculate the absorbance, molar extinction coefficient. **(4)**

Q6 Define substitution reaction with example. Discuss the detailed mechanism and factors affecting the Nucleophilic substation reaction with suitable example. **(2+8+6)**

Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech
Sub_Code: RCE1E001

1st Semester Back Examination: 2023-24
SUBJECT: Communicative English
BRANCH(S): AERO, AG, AEIE, BIOTECH, CIVIL, CST, CSEAI, CSEDS, CSE, CSIT, CSEAIME, ELECTRICAL & C.E, EEE, ELECTRONICS & C.E, EIE, ELECTRICAL, ECE, ETC, MECH, METTA, MINING, PLASTIC
Time: 3 Hour
Max Marks: 100
Q.Code : N579

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) If you wish to convey a negative message in a business letter, which approach you would choose and why?
b) Why is 'revising' considered as an essential step to preparing messages?
c) State the 3 T's of making an effective presentation.
d) The special information ___ in an hour or so, that's why it ___ in the newspapers yesterday. (Fill in the blanks with appropriate grammatical usage)
A) brings / didn't publish B) will bring / don't publish C) will be brought / wasn't published D) will be brought / didn't publish E) brought / wasn't published
e) What is a GD?
f) What do you mean by the "you" attitude in drafting Business letters?
g) One rainy night the old bridge _____ into the river without warning.
(Fill in the blank with appropriate vocabulary)
A) submerged B) collapsed C) degenerated D) immersed E) relapsed
h) The money in our pocket_____ far less today than it_____ bought ten years ago.
(Fill in the blanks with appropriate grammatical usage)
A) could buy / would have B) can buy / had C) should buy / had D) might buy / should E) may buy/had to
i) Define a vowel sound.
j) What is IPA?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Differentiate between active and passive listening.
b) How do you organize an oral presentation?
c) Memo or E-mail, which is comparatively less formal and why?
d) What id bias-free communication. Give suitable examples.

e) How are solicited proposals different from unsolicited proposals?
f) What do you understand by Diphthongs? Give an example of each.
g) Write 03 reasons why oral presentation skills could be useful to you in the future.
h) What do you understand by MTI? How does it affect communication?
i) What are the different types of tone? Give an example of each.
j) What are the two different types of résumés and their characteristics?
k) What is non-verbal communication? State the various types with examples.
l) Feedback is the most important aspect of the communication process. Explain.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 You are Rajesh Kumar Patro living at 42, Saheed Nagar, Bhubaneswar, and Odisha. You wish to buy an inverter to cope with frequent power cuts. Write a letter to Plaza Batteries, 55, Link Road, Cuttack, asking them if they supply branded inverters or those manufactured in their own factory. Ask about voltage, number of batteries, expected life, guarantee, price and other relevant details. **(16)**

Q4 You are Ajith Chatterjee from Kolkata. You are in Bhubaneswar at KBK Autonomous College to give a short presentation on the importance of fire safety to the students. Write down a presentation in 300-350 words, focussing on the importance of fire safety, the role that a student can play to avert a possible fire and what are the measures that can be taken if a fire breaks out. **(16)**

Q5 You are the class representative of your class and need to report your faculty advisor regarding the problems the students are facing during lunch breaks as the break is for 30 mins. Write a short report to be submitted to your faculty advisor regarding the problems of the students, chaos in the canteen etc. Also make suggestions to solve these problems. Invent necessary details. **(16)**

Q6 Wanted a Quality Control Engineer at Ramya Engineering Solutions, Bengaluru. **(16)**

Job description

Planning and development of quality control systems Coordinate and perform inspections of raw materials and finished products as well as manufacturing processes thereby involved including cutting, welding, bending, finishing, assembly, etc., Oversee that appropriate quality assurance testing models and standards to the product life cycle are applied

Required Skills/Abilities:

1. B.E./ B.Tech./ M.Tech. in Mechanical Engineering or other relevant fields
2. Relevant experience: 3-5 years in quality control
3. Candidates with Quality Engineer certificate shall be preferred

Write a chronological cv based on the information provided above. Invent necessary details.

Registration No: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech, IDD (B.Tech and M.Tech)
Sub_Code: 23HS1001

1st Semester Regular Examination: 2023-24
SUBJECT: UNIVERSAL HUMAN VALUES
BRANCH(S): ALL
Time: 3 Hour
Max Marks: 100
Q. Code : N442

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right-hand margin indicate marks.

Answer the question as per the proposal referred in Universal Human Value course

Part-I

Q1 Answer the following questions: (2 x 10)

a) What do you mean by natural acceptance? How is it different from acceptance / preconditioning?

b) As per the proposal in UHV, what else is required for a human being beside physical facility to fulfill basic human aspirations? How much important are those?

c) How can you verify the proposals which may lead to right understanding?

d) What the two existential realities of human being are as discussed in proposal? How are they different from each other based on their needs?

e) What do you mean by self-regulation? What is/are its outcome(s)?

f) Feelings in the relationship are associated to _____ (self/body). State atleast four naturally acceptable feelings discussed in the UHV proposal.

g) What is 'trust' as per the proposal given in the UHV Class? Is it same for all or different for different individuals as per the proposal?

h) What do you mean by 'Justice' in human-to-human relationship?

i) What are common goals discussed in the proposal which may lead to harmony in society?

j) How many orders are there in nature? List them and state one line about each order.

Part-II

Q2 Only Focused-Short **Answer Type Questions- (Answer any Eight out of Twelve)** (8 x 8)

a) Can we observe that there is a gap between "what I am (current state)" and "what I really want to be (natural acceptance)"? Day by day is that gap increasing or decreasing? State the major reasons behind it. What efforts can we make towards reducing the gap?

b) Differentiate between animal consciousness and human consciousness as discussed in the proposal with suitable examples.

c) What do you mean by 'Holistic development'? Is it just doing better in the professional field or something more than that? How can it lead to mutual happiness and prosperity? Justify your answer with suitable examples.

d) What do you mean by 'happiness, and 'unhappiness' as stated in proposal? "Happiness and Excitement", are they same or different? What is the current scenario of Happiness?

e) What do you mean by prosperity as stated in proposal? Explain with suitable examples. Is it true that "Accumulation of Wealth = Prosperity"? Justify your answer.

f) The needs of the Self cannot be fulfilled by Physio-Chemical Things." Elaborate the statement with suitable examples and justify the proposal.

g) On the basis of self-regulation, state the program(s)
   i. For staying healthy,
   ii. For bringing body back to harmony from temporary disharmony.

h) Can we ensure continuous happiness from favourable feelings from others (like attention from others – family members, friends, etc.)? As per the given input in UHV classes, what is the right way to ensure continuous happiness (harmony)?

i) Why does anger arise in anyone for others? What could be solution as per the proposal discussed referring to 'intention' and 'competence' in the content of trust?

j) Define 'respect' as per the proposal discussed in the class. Is it related to body or self? Explain various kinds of evaluation (over/under/otherwise) and their outcomes with suitable examples.

k) As per the proposal explain how all human being are similar in terms of purpose, program, and potential. Why it is called minimum content of respect?

l) State the meaning of excellence as per the proposal. How can we achieve it? Is it through "Competition or Collaboration"? Which is naturally acceptable to you? Justify your answer.

Part-III

Only Long Answer Type Questions (Answer any Two out of Four)

Q3 What are the activities in the self? What are the sources of content of our imaginations and what are their Implications? Explain using suitable diagram and examples in details. **(16)**

Q4 There is a proposal "Differentiation is disrespect". Explain different types of differentiations on the basis of 'body', 'physical facility' and 'beliefs' with suitable examples in each category. **(16)**

Q5 Do you think that there is a need of "Human Education-Sanskar" in current education system? Why do you think so? Explain the role of education in development of 'Undivided Society' and 'Universal Human Order' in details. **(16)**

Q6 What do you mean by competence in professional Ethics as per the proposal? Elaborate on prevalent and proposed approaches to 'Ethics and Professional Ethics' with suitable examples. **(16)**

Registration No: | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 0 | 3 | 7 |

Total Number of Pages: 02

Course: B.Tech & IDD (B.Tech and M.Tech)
Sub_Code: 23BS1001

1st Semester Regular Examination: 2023-24
SUBJECT: Mathematics-I
BRANCH(S): AERO, AE, ..., PLASTIC
Time: 3 Hour
Max Marks: 100
Q.Code : N478

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I **(2 x 10)**

Q1 **Answer the following questions:**

a) Write 2 properties of Gamma function.
b) Define improper integral.
c) Write the Maclaurin series expansion of $\cos x$.
d) Write the necessary condition for $f(x,y)$ to have an extremum value at (a, b).
e) Define saddle point.
f) What is Hessian matrix? Give an example of it.
g) Define basis for a vector space.
h) Suppose $W = \{(x_1, x_2, x_3) | x_1 + x_2 + x_3 = 0\}$ is a subspace of $\mathbb{R}^3$. Find the dimension of W.
i) Give an example of a 3 × 3 skew-symmetric matrix.
j) State Caley Hamilton theorem.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Evaluate $\int_0^1 \int_0^a \int_0^{2a} e^{xyz}\, dxdydz$
b) Find the length of the curve $y = \log \sec x$ from $x = 0$ to $x = \frac{\pi}{3}$.
c) Evaluate $\iint_R (x^2 + y^2)\, dxdy$, where R is the region bounded by $x = 0, y = 0, x + y = 1$.
d) Prove that between any two real roots of $e^x \sin x = 1$, there is at least one real root $e^x \cos x + 1 = 0$.
e) Using mean value theorem solve the inequality $1 - \frac{1}{x} \leq \log x \leq x - 1$.
f) Test the extremum of $f(x,y) = y^2 + 4xy + 3x^2 + x^3$.
g) Write a short note on Jacobian.

h) Let $Ax = b$ be a non-homogeneous system of linear equations in n unknowns, i.e. $b \neq 0$. Show that the solution set is not a subspace of F^n.

i) Solve the system of linear equations $2x_1 + x_2 = 0, x_1 + 2x_2 + x_3 = 0, x_2 + 2x_3 + x_4 = 0, x_3 + 2x_4 = 5$ by Gaussian elimination method.

j) Determine the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 1 & 3 & 1 & 6 \\ 2 & 4 & 3 & 8 & 3 & 15 \\ 1 & 2 & 2 & 5 & 3 & 11 \\ 4 & 8 & 6 & 16 & 7 & 32 \end{bmatrix}$.

k) Discuss the eigenvalues of orthogonal matrices.

l) Using Gauss Jordan elimination method find the inverse of the matrix

$$A = \begin{pmatrix} 3 & 1 & 1 \\ 2 & 4 & 2 \\ -1 & -1 & 1 \end{pmatrix}.$$

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Define Power series, Taylor series, and Maclaurin series. Discuss the relation between them. Also discuss the convergence of these series. Provide examples for each case. **(16)**

Q4 Write the method of Lagrange's multipliers method. Find the extreme values of the function $f(x, y) = xy$ subject to $2x + 2y = 5$. **(16)**

Q5 Show the $\mathbb{R}^3$ is vector space over the real field. Extend the set $\{(1,2,3)\}$ to a basis of $\mathbb{R}^3$. **(16)**

Q6 Determine the eigenvalues and the corresponding eigenspaces for the matrix **(16)**

$$\begin{pmatrix} 1 & -1 & 2 \\ 0 & 1 & 0 \\ 1 & 2 & 1 \end{pmatrix}.$$

2023.24

Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech, IDD (B.Tech and M.Tech)
Sub_Code: 23BS1002

1st Semester Regular Examination: 2023-24

SUBJECT: Physics

BRANCH(S): AEIE, AUTO, CHEM, CIVIL, CE, CST, CSEAI, CSEDS, CSE, CSEAIME, EEE, ELECTRICAL, ECE, ETC, MANUTECH, MECH, MME, METTA, MINING, PT, PLASTIC

Time: 3 Hour

Max Marks: 100

Q.Code: N526

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figur2es in the right hand margin indicate marks.

Part-I

(2 x 10)

Q1 **Answer the following questions:**

a) How a mechanical harmonic oscillator is different from that of electrical oscillator?

b) In a forced damped oscillator, the damping coefficient is 0.6 s^{-1} and the resonant frequency is 600 Hz. Find the Q-factor of the oscillator.

c) In a Newton's ring set up, the gap between the lens and the glass plate is filled with a transparent liquid. If the liquid is replaced by a second liquid, the rings shrink. Which of the two liquids have greater refractive index?

d) Fraunhoffer diffraction pattern is obtained with a slit of width 0.25 mm and a monochromatic light. The angle at which the first dark band is formed is 6^0. Calculate the wavelength of light used.

e) If $\vec{F} = (2xy + z^3)\hat{i} + x^2\hat{j} + 3xz^2\hat{k}$, show that $\vec{F}$ is irrotational vector.

f) Write down the Maxwell's equation which is derived from modified form ampere's circuital law and mention its significance.

g) The particle tapped in a one-dimensional box of length 'l' cm is described by the normalized wave function $\psi = x$. What is the expectation value of the particles position 'x'

h) Why the Schrodinger wave equation is not valid for relativistic particles?

i) What is a four level pumping scheme? Diagrammatically represents the four level pumping schemes in a laser system.

j) Write down the significances of Einstein's coefficient.

Part-II

(6 × 8)

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**

a) Mention the factor responsible for decay of energy in damped harmonic oscillator. Show that decay of energy is exponential in damped harmonic oscillator.

b) What do you mean by electrical harmonic oscillator? Obtain the differential equation in a tuned circuit containing inductor and capacitor which execute electrical harmonic oscillation.

c) Set up the differential equation of progressive wave travelling in medium in one dimension.

d) Explain the formation of thin film and obtain the expression for path difference due to reflection of light incident on it.

e) Why Newton's rings are circular? Newton's rings are observed in reflected light of wavelength 5900 A^0. The diameter of 10^{th} dark ring is 0.50 cm. Find the radius of curvature of the lens and the thickness of the air film

f) The electric potential at any point in the x-y plane is given by $\phi = 5x\left(x^2+y^2\right)^{-1/2} + y\left(x^2+y^2\right)^{-1/2}$. Find the components of the electric field intensity at that point.

g) What is Maxwell's equation? Write Maxwell's equation both in differential form and integral form.

h) State Gauss divergence theorem. Using Gauss divergence theorem evaluate $\iint_S \vec{F}.d\vec{S}$,where $\vec{F} = 4xz\hat{i} - y^2\hat{j} + yz\hat{k}$ and S is the surface of the cube bounded by x = 0, x = 1, y = 1, z = 0, z = 1

i) Distinguish between the phase velocity (V_p) and the group velocity (V_g) of a wave. Prove that $V_pV_g = C^2$

j) What are the matter waves? Derive an expression for the de Broglie wave for an electron accelerated though a potential difference V.

k) Explain the spontaneous and stimulated emission of radiation. Why is spontaneous radiation incoherent?

l) What is lasing action? Explain the mechanism of population inversion in a laser system.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Set up the differential equation for a simple harmonic oscillator subjected to a damping force proportional to velocity of the oscillator. Obtain its solution for under-damped motion. Graphically shows the variation of amplitude with time and mention the condition for critical damping. **(16)**

Q4 a) Show that the diameter of Newton's dark ring and bright ring are proportional to square root of natural and odd natural number respectively. **(8)**

b) Explain diffraction on the basis of Huygens's principle. Obtain the expression for intensity due to diffraction at single slit. **(8)**

Q5 a) Starting from Maxwell's electromagnetic equations in free space, in absence of charge and currents obtain the wave equation for electric field and magnetic field. **(10)**

b) A particle is moving in one dimensional box and its wave function is given by $\psi_n = A\sin\frac{n\pi x}{a}$. Find the expression for the normalized wave function. **(6)**

Q6 a) What do you mean by particle in a box? Deduce the expression for energy and wave function for a particle in a box. **(10)**

b) With a neat and clean diagram describe the construction and working of a Ruby laser and write some of its application. **(6)**

15

Registration No: | | | | | | | | | | |

Total Number of Pages: 02

Course: BTech, IDD (B.Tech and M.Tech)
Sub_Code: 23ES1003

1st Semester Regular Examination: 2023-24
SUBJECT: Programming in C and Dat Structure
BRANCH(S):
AEIE,AUTO,BIOMED,BIOTECH,CHEM,CIVIL,CE,CST,CSEAI,CSEDS,CSE,CSEAIME,EEE,ELECTRICAL, ECE,ETC,IT,MANUTECH,MECH,MME,METTA,MINING,PT,PLASTIC
Time: 3 Hours
Max Marks: 100
Q.Code : N584

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I (2 x 10)

Q1 **Answer the following questions:**

a) Why C is called a middle level language?
b) Write the difference between keywords and identifiers.
c) Write the difference between while and for loop.
d) Differentiate between structure and union with example.
e) The main ( ) is which type of function? Justify your answer.
f) Differentiate between array of pointers and pointer to array.
g) Write any two advantages of using pointer in C.
h) Write the conditions to test the circular queue whether empty or full.
i) How many passes are required in bubble sort if the array is fully sorted and reversely sorted?
j) Why tree is called a non linear data structure?

Part-II (6 × 8)

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**

a) Write any six types of operators used in C. Explain each type of operator with example.
b) Write a program to add all the digits of a number using do-while loop.
c) Differentiate between break and continue with suitable example. Justify whether these two words are required in programming language or not.
d) Can the function return multiple values? Justify your answer with example.
e) Write a program in C to read the roll_no, name and marks in three subjects of ten students using structure and display the list of students who have scored more than 60% of marks.
f) Explain the use of following functions with example.
Malloc (), calloc(), realloc() and free().
g) Differentiate between call by value and call by reference with example.
h) Write a program in C to create a linked list with 10 numbers and then display it.
i) Find the prefix of the following infix expression. Show each step.
(a–b)*d/e*f$g
j) Write a program in C to reverse a string using stack.

k) Sort the following array of elements using quick sort.
43, 56, 12, 98, 27, 54, 67, 29, 15, 36

l) Construct the binary tree for the given
In-order sequence: D B E A F C
Preorder sequence: A B D E C F

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) What do you mean by control structure in C? Explain various types of if statements used in C. Explain each statement with example. *(8)*

b) Explain the difference between iteration and recursion with example. Define a recursive function **add(a, b).** *(8)*

Q4 a) Write a program to count the number of lower case and upper case alphabets in a text. *(8)*

b) Write a program in C multiply two matrices A(m x n) and B(n x p) and then find the transpose of the resultant matrix. *(8)*

Q5 a) Explain the following with example.
Pointer to pointer, pointer to array, pointer to function, array of pointers. *(8)*

b) Write a program to illustrate the insertion and deletion operations on a stack and linear queue. *(8)*

Q6 a) Write a program in C to search an element from an array of *n* numbers using binary search. *(8)*

b) Write the algorithm to illustrate the insertion and deletion operation in a binary search tree. *(8)*

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