

Writing anything except roll number on question paper will be deemed as an act of indulging in unfair means and action shall be taken as per rules.

2E000321	Roll No.:	Total No. of Pages: 3
	2E000321	
	B. Tech. II Semester End-Term Examination (Main), June-2022	
	Branch: Computer Science & Engineering 2FY2-03: Engineering Chemistry	

Time: 3 Hours

Maximum Marks: 140

Instructions to Candidates:

The question paper is divided in three parts A, B & C.

- (i) **Part-A:** 7 Basics/Fundamentals related questions (without choice).
- (ii) **Part-B:** 5 Numerical/Analytical questions (with internal choice i.e. attempt one question either A or B from each question).
- (iii) **Part-C:** 5 Descriptive/Analytical/Problem Solving/Design questions (attempt any 3 out of 5).

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination:

1. Nil 2. Nil

PART-A

(Basics/Fundamentals related questions)

All questions are compulsory

- Q.1 (a)** What is degree of hardness? What problems are caused by scale and sludge formation in boilers? [2+2]
- (b)** Why is lubricant needed? Why does graphite act as lubricant? [2+2]
- (c)** What is the dimension wise classification of a nanomaterial? [4]
- (d)** State Hook's Law. Write the equation for calculating absorbance. [2+2]
- (e)** Define Organic fuel. What are the characteristics of a good fuel? [2+2]
- (f)** Justify the statement 'Corrosion can be considered as reverse of metal extraction'. Bolt and Nut made of the same metal is preferred in practice. Why? [2+2]
- (g)** Explain the Complexometric (EDTA) method and its principle for determination of hardness of water? [4]

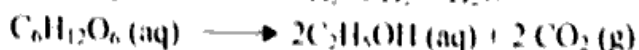
PART-B

(Numerical/Analytical questions)

- Q.2 (A)** How R4 M4 Model is satisfied. Explain using any one [4+4]
- (i) Survisometer
 - (ii) Econoburette

OR

(B) Calculate the atom economy for reaction [8]



Q.3 (A) A sample of water on analysis has been found to contain the following in mg/L: $\text{Ca}(\text{HCO}_3)_2 = 12.5$, $\text{CaCl}_2 = 8.2$, $\text{MgSO}_4 = 2.6$. Calculate the temporary, permanent and total hardness of the water sample in degree French ($^\circ\text{Fr}$) and degree Clark ($^\circ\text{Cl}$). [8]

OR

(B) A sample of water was analysed and found to contain temporary magnesium hardness 25 mg/L, permanent magnesium chloride hardness 15 mg/l and permanent calcium sulphate hardness 20 mg/L, SiO_2 is 300 mg L, and NaCl is 340 mg /L. Calculate the lime and soda required for softening 30,000 L of hard water. [8]

Q.4 (A) Design a flow battery using solid oxide as an electrolyte. Explain with the help of diagram and reactions. [4+4]

OR

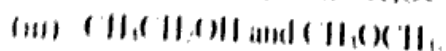
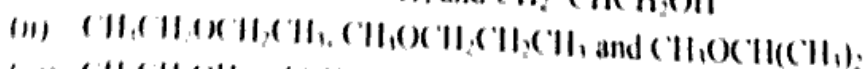
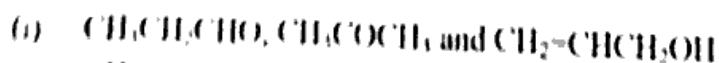
(B) What is the sacrificial method of protection of metallic surfaces? Explain giving two examples? [4+4]

Q.5 (A) A sample of coal was found to contain: C=80 %, H=5 % and N=2 % and remaining ash. Calculate the minimum amount of air required for complete combustion of 1 kg of this coal sample. Also calculate the % composition of dry products formed if 45 % excess air is used. <https://www.btubikaner.com> [8]

OR

(B) Calculate the high calorific value and low calorific value of a coal sample in kcal/kg, having the following ultimate analysis: C = 80%, H = 7%, S = 3.5%, N = 2.1% and ash = 4.4%. [8]

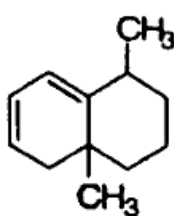
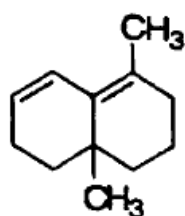
Q.6 (A) Draw the structural formula of each of the following compounds, and label all sets of equivalent protons. How many NMR signals would you expect to see from each? [8]



OR

(B) Calculate Lambda max for following molecules:

[4+4]



PART-C

**(Descriptive/Analytical/Problem Solving/Design questions)
(attempt any 3 out of 5) (Q.7 to Q.11)**

- Q.7** (i) Explain Sedimentation and sedimentation with coagulation to treat the potable water. [12]
(ii) Explain Break point chlorination in detail with the help of diagram. [12]
- Q.8** (i) Green Chemistry: The future is in your hand". Justify with the principles of green chemistry. [12]
(ii) Write notes on: [6+6]
(a) Seger cone test
(b) Functions of lubricants.
- Q.9** Write notes on: [8+8+8]
(i) Pilling-Bedworth rule
(ii) Galvanization
(iii) Galvanic Corrosion
- Q.10** (i) Explain the working and construction of bomb calorimeter with the help of diagram. [12]
(ii) What is meant by cracking? Describe the fluidized-bed catalytic cracking process to obtain gasoline. [12]
- Q.11** (i) What are the various types of vibrations in a molecule when it is placed in IR radiation? [10]
(ii) State Lambert Beer's Law? Write notes on application of UV-visible spectroscopy. [4+10]

21N505

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21N505

B. Tech. II - Sem. (New Scheme) (Main) Exam., (Academic Session 2021- 2022)

All Branch

**2FY3 – 05 Managerial Economics and Financial
Common to all Branches**

Time: 2 Hours

Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 5×3 marks = 15 marks.
Candidates have to answer **five** questions out of **ten**.

Part – B: Analytical/Problem solving questions 3×5 marks = 15 marks.
Candidates have to answer **three** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving questions 2×20 marks = 40 marks.
Candidates have to answer **two** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

- Q.1 Define elasticity of supply.
- Q.2 Define demand schedule.
- Q.3 What is demand elasticity?
- Q.4 Differentiate between fixed and variable cost.
- Q.5 Define double entry system.
- Q.6 What do you mean by economies of scale?

- Q.7 Define earning per share.
- Q.8 What is sole trader?
- Q.9 Define inflation.
- Q.10 Define production function.

PART – B

- Q.1 Define Laws of Return to Scale with graph and diagrams.
- Q.2 What do you mean by public sector and private sectors companies?
- Q.3 What do you mean by Business Cycles, Explain different phases?
- Q.4 Explain -
- (i) Implicit and Explicit Cost
 - (ii) Isoquants
 - (iii) Law of Diminishing Return
- Q.5 What do you mean by managerial economics? Explains its scope and nature.
- Q.6 What do you mean by perfect competition? Explain different features of perfect competition.
- Q.7 The following information of company is given - current ratio = 2.5:1, Acid test ratio = 1.5:1, current liabilities = 50000
- Find out:-
- (i) Current Assets
 - (ii) Liquid Assets
 - (iii) Inventory

PART – C

- Q.1 What do you mean by final accounts? Explain Proforma of Balance Sheet with suitable example?
- Q.2 From the following particulars:

Calculate:-

(i) Break Even Point in terms of sales value in units

Output = 3000 units

Selling price per unit = Rs.30

Variable cost per unit = Rs.20

Total fixed cost = Rs.20000

Q.3 From the following particulars prepare Balance Sheet of H/S Dayal as on 31st March, 2022.

Capital	5,50,000
Drawings	10,000
Sundry Debtors	10,00,00
Sundry creditors	80,000
Loan from Bank	20,000
Net profit	1,60,000
Closing stock	50,000
Plant and machinery	1,50,000
Building	1,20,000
Land	3,00,000
Goodwill	50,000
Furniture & fixtures	30,000

Q.4 What do you mean by demand? What are various determinants of demand?

Q.5 What do you mean by partnership firms? Explain its significance and disadvantages.

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Total No. of Pages: **3**

21N506

B. Tech. II - Sem. (New Scheme) (Main) Exam., (Academic Session 2021- 2022)

All Branch

2FY2 – 06 Introduction to Built Environment

Common to all Branches

Time: 2 Hours

Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 5×3 marks = 15 marks.
Candidates have to answer **five** questions out of **ten**.

Part – B: Analytical/Problem solving questions 3×5 marks = 15 marks.
Candidates have to answer **three** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving questions 2×20 marks = 40 marks.
Candidates have to answer **two** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

PART – A

- Q.1 What are the factors affecting built environment?
- Q.2 What do you understand by rain water harvesting?
- Q.3 Write objectives of water resources planning.
- Q.4 What are the components of smart environment?
- Q.5 What are the uses of steel in building works?

- Q.6 How are masonry works classified?
- Q.7 Write drinking water quality standards.
- Q.8 What are the criteria for the selection of material for stone masonry?
- Q.9 What are the basic requirements of a foundation?
- Q.10 Write various types of road traffic signs.

PART - B

- Q.1 What are the different modes of transport? Explain briefly.
- Q.2 Explain the components of smart cities.
- Q.3 Explain domestic and home automation with areas of practice of energy-efficient built environment.
- Q.4 What are the various basic requirements a building should satisfy in design and performance? Explain the main components of a building.
- Q.5 What are the general principles in brick masonry? Explain the different bonds used in brick masonry using neat sketches. <https://www.btubikaner.com>
- Q.6 What do you understand by traffic calming? Write road safety measures for accidents prevention.
- Q.7 Explain physical, chemical and biological characteristics of water as per Indian Standards.

PART - C

- Q.1 What is the modern world approach towards built environment? Explain in detail by giving examples.
- Q.2 Explain the types of civil engineering branches with reference to their roles in built environment.
- Q.3 Write the differences between historical architecture and modern structural design. Explain building bye-laws and their role in controlled development of built-environment?
- Q.4 What are the components of building physics? Discuss lighting and acoustics aspects of a building.

Q.5 Write short notes on any four –

- (a) Smart metering
 - (b) Road safety
 - (c) Energy flow in ecosystem
 - (d) Green buildings
 - (e) Conventional constructions
 - (f) Environmental Pollution
-

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21502

Roll No. _____

Total No. of Pages: 3

21502

B. Tech. II - Sem. (Old Scheme) (Back) Exam., (Academic Session 2021- 2022)
2FY2 - 02 Engineering Physics

Time: 2½ Hours

Maximum Marks: 160
Min. Passing Marks:

Instructions to Candidates:

Part - A: Short answer questions (up to 25 words) 6×4 marks = 24 marks.
Candidates have to answer **six** questions out of **ten**.

Part - B: Analytical/Problem solving questions 4×13 marks = 52 marks.
Candidates have to answer **four** questions out of **seven**.

Part - C: Descriptive/Analytical/Problem Solving questions 3×28 marks = 84 marks.
Candidates have to answer **three** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

PART - A

~~Q.1~~ What are the methods to create the coherent light source?

~~Q.2~~ Describe metastable state.

~~Q.3~~ What are the conditions for circular fringes and localize fringes in Michelson interferometer?

~~Q.4~~ What happen if distance between lens and plate increase in Newton's Ring experiment.

[21502]

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Q.5 Describe Rayleigh Criterion of Resolution.

Q.6 What is physical significance of wave function?

Q.7 Proof that $\text{curl } \vec{r} = 0$.

Q.8 What is Fermi-Dirac distribution Function?

Q.9 If intensity of electric field is

$$\vec{E} = ixz^3 - j2x^2yz + k2yz^4$$

Calculate its divergence at point (1, 2, 3).

Q.10 Write down the three differences between simple light and laser light.

PART - B

Q.1 Explain the construction and working of Michelson Interferometer with the help of a suitable diagram.

Q.2 A particle is in one-dimensional box. Find its Eigen function and Eigen value.

Q.3 Calculate Refractive indices of the core and cladding material of a fiber from the given data

(NA = Numerical Aperture Δ = Fractional refractive index change)

$$NA = 0.22 \text{ and } \Delta = 0.012$$

Q.4 What is Faraday Law of Induction? Derive the Maxwell equation from it.

Q.5 A plane diffraction grating has 6000 lines per cm. Calculate the highest order of spectrum which can be seen with light of wavelength 4000 \AA .

Q.6 Explain clearly the propagation of an electromagnetic wave inside optical fiber. Use proper diagram for derive the expression of numerical aperture.

Q.7 Explain -

(i) Spontaneous emission

(ii) Stimulated emission

And find out relationship between Einstein co-efficient.

PART - C

Q.1 Explain Fraunhofer diffraction due to single slit with the help of suitable diagram and proof that intensity of secondary maxima are in the ratio.

$$1 : \frac{1}{22} : \frac{1}{61} : \frac{1}{121} \dots\dots\dots$$

Q.2 Explain the formation of Newton's Ring and prove that diameter of dark ring is proportional to the square root of Natural number.

Q.3 Describe the construction and working of semiconductor LASER with the help of suitable diagram.

Q.4 Explain Maxwell's Four Equations in differential and integral form.

Q.5 (a) Explain Hall Effect with the help of suitable diagram and show that for n-type

semiconductor coefficient is given by $R_H = - \frac{1}{ne}$

(b) Conductivity and Hall coefficient of n-type Si are $112 \Omega^{-1} \text{ m}^{-1}$ and $1.25 \times 10^{-13} \text{ m}^3 \text{ C}^{-1}$ respectively calculate charge carrier density and electron mobility.

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21N509

Roll No. _____

Total No. of Pages: **4****21N509****B. Tech. II - Sem. (New Scheme) (Main) Exam., (Academic Session 2021- 2022)****All Branch****2FY2 – 09 Elements of Mechanical Engineering
Common to all Branches****Time: 2 Hours****Maximum Marks: 70****Instructions to Candidates:**

Part – A: Short answer questions (up to 25 words) 5×3 marks = 15 marks.
Candidates have to answer **five** questions out of **ten**.

Part – B: Analytical/Problem solving questions 3×5 marks = 15 marks.
Candidates have to answer **three** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving questions 2×20 marks = 40 marks.
Candidates have to answer **two** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL2. NIL**PART – A**

- Q.1 Explain briefly Zeroth Law of Thermodynamics.
Q.2 What is a PMM1? Why is it impossible?
Q.3 Why is Carnot cycle not practicable for a steam power plant?
Q.4 How are the maximum temperature and maximum pressure in the Rankine cycle fixed?
Q.5 What do you mean by latent heating and latent cooling?
Q.6 Define thermal efficiency and mechanical efficiency of I.C. engine.

- Q.7 Give advantages of two-stroke engine over four-stroke engine.
- Q.8 Define the following mechanical properties:
- (i) Strength (ii) Hardness (iii) Ductility (iv) Toughness
- Q.9 What are the required properties of molding sands? Classify the molding sand.
- Q.10 State the Law of Gearing.

PART – B

- Q.1 A heat pump working on a Carnot cycle takes in heat from a reservoir at 8°C and delivers heat to the reservoir at 50°C . The heat pump is driven by a reversible heat engine taking heat from a reservoir at 850°C and rejecting heat to a reservoir at 50°C . The reversible heat engine also drives a machine of input required of 25 kW. If the heat pump extracts 15 kJ/sec from the 8°C reservoir, determine (a) the rate of heat supply from the 850°C source and (b) the rate of heat rejection to 50°C sink.
- Q.2 What is a reversible process? A reversible process should not leave any evidence to show that the process had ever occurred. Explain.
- Q.3 Explain with a neat sketch the working of a vapor compression refrigerator. Also draw p-h and T-s diagram for the same.
- Q.4 Derive an expression for the air standard efficiency of a Brayton cycle in terms of pressure ratio.
- Q.5 Define composite material. How are composite classified? Discuss its applications in aerospace industry and automobile industry.
- Q.6 What is forging? Explain different forging process.
- Q.7 List different types of gears and explain any one with advantages.

PART – C

- Q.1 (a) State and explain Carnot theorem.

- (b) A fluid is confined in a cylinder by a spring-loaded, frictionless piston so that the pressure in the fluid is a linear function of the volume ($p = a + b V$). The internal energy of the fluid is given by the following equation:

$$U = 34 + 3.15pV$$

Where U is in kJ, p in kPa, and V in cubic meter. If the fluid changes from an initial state of 170 kPa, 0.03 m^3 to a final state of 400 kPa, 0.06 m^3 , with no work other than that done on the piston, find the direction and magnitude of the work and heat transfer.

Q.2 (a) With a neat sketch of a room air-conditioner, explain its working principle.

- (b) Carnot refrigeration cycle absorbs heat at 250 K and rejects heat at 300 K.

(a) Calculate the coefficient of performance of this refrigeration cycle.

(b) If the cycle is absorbing 1,050 kJ/min at 250 K, how many kJ of work is required per second? <https://www.btubikaner.com>

(c) If the Carnot heat pump operates between the same temperatures as the above refrigeration cycle, what is the coefficient of performance?

(d) How many kJ/min will the heat pump deliver at 300 K if it absorbs 1,050 kJ/min at 250 K?

Q.3 (a) What is scavenging? Explain with the neat sketch, working of the two-stroke petrol engine.

- (b) In an engine working on Diesel cycle inlet temperature and pressure are 1 bar and 290 K respectively. Pressure at the end of adiabatic compression is 40 bar. The ratio of expansion i.e., after constant pressure heat addition is 5.2. Calculate the heat addition, heat rejection and thermal efficiency of the cycle.

Assume $\gamma = 1.4$, $C_p = 1.004 \text{ kJ/kg.K}$ and $C_v = 0.717 \text{ kJ/kg.K}$.

Q.4 (a) Define ferrous and non-ferrous metals and discuss its applications.

(b) Explain the principle of arc welding with neat sketch.

Q.5 (a) Explain chain drives and rope drives and their applications?

(b) Derive an expression for length of the belt in open belt drive.

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21N508

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21N508

B. Tech. II - Sem. (New Scheme) (Main) Exam., (Academic Session 2021- 2022)

All Branch

2FY2 - 08 Computer Fundamentals & Programming
Common to all Branches

Time: 2 Hours

Maximum Marks: 70

Instructions to Candidates:

Part - A: Short answer questions (up to 25 words) 5×3 marks = 15 marks.
Candidates have to answer **five** questions out of **ten**.

Part - B: Analytical/Problem solving questions 3×5 marks = 15 marks.
Candidates have to answer **three** questions out of **seven**.

Part - C: Descriptive/Analytical/Problem Solving questions 2×20 marks = 40 marks.
Candidates have to answer **two** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

PART - A

Q.1 Define compiler.

Q.2 Convert the binary number 11001 to decimal.

Q.3 What is literals?

Q.4 Explain the concept of break statement.

Q.5 What is the use of Enum?

[21N508]

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Q.6 Arrange following operators in order of precedence and associativity rules of 'C'

+, %, <, /, *, ==, !, ++, ().

Q.7 What do you mean by streams?

Q.8 Explain firmware.

Q.9 Discuss on ternary operators.

Q.10 Explain storage classes.

PART - B

Q.1 Explain High level, Assembly and Low level language.

Q.2 Write a 'C' program to allocate memory dynamically to an Integer array.

Q.3 What is function? Explain call by value and call by reference with suitable example.

Q.4 Write 'C' statement for passing a structure to a function defined in another source file.

Q.5 Write a program in 'C' to read character one by one and display it back.

Q.6 What are data types in 'C'? Explain with examples.

Q.7 Write a program in 'C' to read contents of a file and display them in upper case.

PART - C

Q.1 Convert following.

i. $(651.24)_8 = (?)_2$

ii. $(10110001101)_2 = (?)_{10}$

iii. $(9896)_{10} = (?)_{16}$

iv. $(5676)_{10} = (?)_8$

v. $(1010.267)_8 = (?)_2$

Q.2 What are the various operators in C? Discuss each of them with suitable illustration.

Q.3 Explain Array of structure with the help of suitable program also describe structure within structure with an example.

Q.4 Write a program to pass matrix as an argument to a function and display the matrix in the function.

Q.5 What is file? Why do we need to store data in files? Write short note on the following functions, give a program code that demonstrate its usage.

- (a). fopen()
 - (b). fclose()
 - (c). fgetc()
 - (d). fputc()
-

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21N504

B. Tech. II - Sem. (New Scheme) (Main) Exam., (Academic Session 2021- 2022)

All Branch

2FY3 - 04 Communication Skill
Common to all Branches

Time: 2 Hours

Maximum Marks: 70

Instructions to Candidates:

Part - A: Short answer questions (up to 25 words) 5×3 marks = 15 marks.
Candidates have to answer **five** questions out of **ten**.

Part - B: Analytical/Problem solving questions 3×5 marks = 15 marks.
Candidates have to answer **three** questions out of **seven**.

Part - C: Descriptive/Analytical/Problem Solving questions 2×20 marks = 40 marks.
Candidates have to answer **two** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL

2. NIL

PART - A

Q.1 Write down any 4cs from 7cs of effective communication.

Q.2 Define interpersonal communication.

Q.3 What is effective listening?

Q.4 What can be done to overcome common obstacles of reading?

Q.5 What is a paragraph?

Q.6 How do you define a formal letter?

- Q.7 What is the structure of a sentence in **passive** voice?
- Q.8 Write down the structure of all **present** tenses (simple, present continuous, perfect and perfect continuous).
- Q.9 Who are the three important characters in the story, "The Three Questions"?
- Q.10 What is the overall tone of the poem, "The Psalm of Life"?

PART - B

- Q.1 Describe the process of communication with the help of a diagram.
- Q.2 What steps can be taken to improve articulation?
- Q.3 What are the guidelines for effective listening?
- Q.4 Write a paragraph on "My First Day in College".
- Q.5 What were the three questions of the King and what was the Hermit's reply to them?
- Q.6 Read the following passage and fill in the blanks with appropriate form of verbs given in brackets. You may use different forms of the present tense.

In solids, the constituent parts are very closely packed. They cannot..... (move) from one place to another, but only.....(vibrate) about their mean positions. When one end of the spoon..... (be) heated, the particles at the end(absorb) heat energy and start vibrating more rapidly. These vibrating particles..... (collide) with the neighbouring particles and transfer a part of heat energy to them. As a result, these particles also start.....(vibrate) more rapidly. This process..... (continue) until the last particle also starts vibrating rapidly. Thus, heat energy is transferred to the entire spoon and the object....(become) hot.

- Q.7 Explain these lines from "All the World's a Stage".

All the world's a stage,
 And all the men and women merely players,
 They have their exits and entrances,
 And one man in his time plays many parts,
 His acts being seven ages.

PART - C

- Q.1 What are the barriers to effective communication? What measures can be taken to overcome them?
- Q.2 Define reading. What are the different reading skills required for reading a document? Give examples of reading material and reading skills needed for comprehending them.
- Q.3 Prepare a detailed C.V. with application for the post of Assistant Professor in your respective branch in response to the following advertisement.
- ABC College invites applications for the post of Assistant Professor. The candidate must have an M. Tech. degree with good academic record. Candidates with at least 2 years of experience will be preferred. Send your application to; The Registrar, ABC College, Near Mumbai University Staff Quarters, Navi Mumbai.
- Q.4 Which are the seven different stages in a man's life, the poet has described in your prescribed poem? What are the characteristics of these stages? Explain.
- Q.5 How does the poet successfully inspires and energizes the reader in the poem, "A Psalm of Life"?

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21507

Roll No. _____

Total No. of Pages: **2**

21507

B. Tech. II - Sem. (Old Scheme) (Main) Exam., (Academic Session 2021- 2022)
All Branch

2FY3 – 07 Basic Mechanical Engineering
Common to all Branches

Time: 2 Hours

Maximum Marks: 80

Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 2×3 marks = 6 marks.
Candidates have to answer two questions out of five.

Part – B: Analytical/Problem solving questions 3×15 marks = 45 marks.
Candidates have to answer three questions out of six.

Part – C: Descriptive/Analytical/Problem Solving questions 1×29 marks = 29 marks.
Candidates have to answer one questions out of three.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A ²

Q.1 Explain First Law of Thermodynamics.

Q.2 What are the application of boilers?

Q.3 What is priming of pump?

Q.4 What is forging?

Q.5 Write the name of different types of power plant.

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PART - B

- Q.1 (i) What do you mean by steam boilers? How they are classified?
(ii) What is mountings and accessories of boiler? Write any two name & use of mountings & accessories.
- Q.2 Explain the working of centrifugal pump with suitable diagram.
- Q.3 What are the various types of pattern? Describe the materials used for making pattern.
- Q.4 Explain the process of extrusion and drawing of it with suitable diagram. Also, write its advantages & disadvantages.
- Q.5 Explain the following terms in detail-
(i) Electric Arc Welding
(ii) Gas welding
- Q.6 Explain the manufacturing process of cast iron & pig iron with suitable diagram. And also write the name of ores of iron.

PART - C

- Q.1 A refrigerating system operates on the reversed Carnot Cycle. The higher temperature of the refrigerant in the system is 35°C & lower temperature is -15°C . The capacity is to be 12 tonnes. Determine -
(i) Co-efficient of performance
(ii) Heat rejection from the system per hour
(iii) Power required.
- Q.2 (i) Explain major components of an engine & their function.
(ii) Differentiate between SI & CI engine.
- Q.3 (i) Differentiate between ferrous & non-ferrous metals. Also, explain the property & use of any three types of non-ferrous metals.
(ii) What is metal casting? Discuss at least four casting defects with suitable diagram.

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21N507

Roll No. _____

Total No. of Pages: 3

21N507

B. Tech. II - Sem. (New Scheme) (Main) Exam., (Academic Session 2021- 2022)

All Branch

**2FY2 – 07 Basic Electrical Engineering
Common to all Branches**

Time: 2 Hours

Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 5×3 marks = 15 marks.
Candidates have to answer **five** questions out of **ten**.

Part – B: Analytical/Problem solving questions 3×5 marks = 15 marks.
Candidates have to answer **three** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving questions 2×20 marks = 40 marks.
Candidates have to answer **two** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

Q.1 What are the passive elements in electrical circuits?

Q.2 Write the statement of Kirchhoff's Current Law.

Q.3 Draw leading and lagging of AC with respect to alternating voltage $V = V_{\max} \sin \omega t$ by an angle α and β respectively.

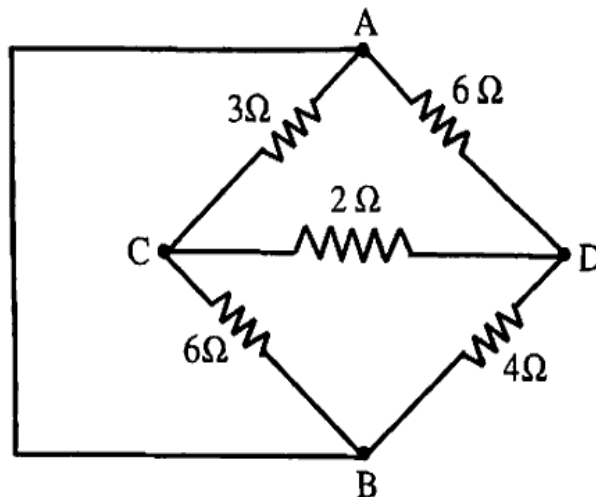
Q.4 What is the significance of reactive power?

Q.5 Why are some parts of a dc machine laminated?

- Q.6 Draw phasor diagram of ideal transformer at on-load.
- Q.7 Draw the V-I characteristics of a p-n junction diode and mention the cut in voltage and peak inverse voltage.
- Q.8 In a transistor, explain why base width is small?
- Q.9 What is multiplexing in communication system?
- Q.10 What do you understand by optical communication?

PART – B

- Q.1 Obtain equivalent resistance across AB in given figure by delta – star transformation.



- Q.2 For a single phase sinusoidal waveform, determine the average and rms values in terms of maximum value.
- Q.3 A voltage $V=200 \sin 100\pi t$ is applied to a coil having $R=200\Omega$ and $L=0.38H$. Find the expression for current and power taken from the supply.
- Q.4 Explain the functions of brushes and commutator in a dc machine.
- Q.5 A 125 kVA, transformer having voltage of 12500 volt at 50 Hz has primary 400 primary and 50 secondary turns. Assume an ideal transformer, calculate -
- (1) The full load primary and secondary currents

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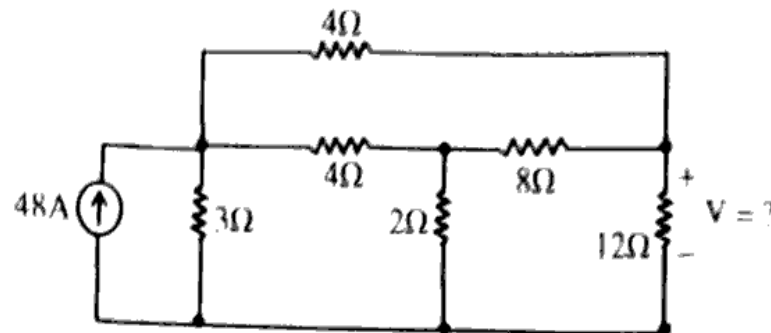
- (2) Secondary induced emf and
- (3) The maximum flux in the core

Q.6 Explain the operation and V-I characteristics of Uni Junction Transistor (UJT)

Q.7 Define AM and FM. Use sketches to explain these definitions.

PART - C

Q.1 Using nodal analysis, find the voltage across 12Ω resistance in the following circuit.



Q.2 If an AC power supply of 100V, 50Hz is connected across a load of impedance, $4+j8$ ohms. Calculate the current flowing through the circuit, active power, apparent power, reactive power and power factor.

Q.3 Derive the expression for ripple factor and efficiency of half wave rectifier.

Q.4 (a) What are the main parts of a dc machine? State function of each part of machine.

(b) An 8- pole lap-connected armature has 50 slots with 10 conductors per slot generates a voltage 440V. Determine the speed in rpm at which it is running if the flux per pole is 20 mWb.

Q.5 (a) How does the satellite communication work for the signal transmission?

(b) Explain the working of superheterodyne receiver with the help of block diagram.
