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1E3101

1E3101

B.Tech. I Sem. (Main) Examination, April/May - 2022

1FY2-01 Engineering Mathematics-I

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, five Questions out of seven questions from Part B and three questions out of five questions from Part C .

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

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

Part - A

(Answers should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. Define Beta function.
2. Write Euler's formula for a Fourier series.
3. Let $f = y^x$. What is $\frac{\partial^2 f}{\partial x \partial y}$ at $x=2, y=1$?
4. Consider a spatial curve in three-dimensional space given in parametric form by $x(t) = \cos t, y(t) = \sin t, z(t) = \frac{2}{\pi}t, 0 \leq t \leq \frac{\pi}{2}$. The length of the curve is.....
5. In the Taylor series expansion of e^x about $x=2$, the coefficient of $(x-2)^4$ is
6. Define the convergence of a power series.
7. The Directional derivative of the scalar function $f(x, y, z) = x^2 + 2y^2 + z$ at the point $P=(1,1,2)$ in the direction of the vector $\vec{a} = 3\hat{i} - 4\hat{j}$ is

8. Curl of vector $\vec{V}(x, y, z) = 2x^2\hat{i} + 3z^2\hat{j} + y^3\hat{k}$ at $x = y = z = 1$ is
9. Velocity vector of a flow field is given as $\vec{V}(x, y, z) = 2xy\hat{i} - 3x^2z\hat{j}$. The vorticity vector at $(1, 1, 1)$ is
10. The area enclosed between the curves $y^2 = 4x$ and $x^2 = 4y$ is

Part - B

(Analytical/Problem solving questions)

Attempt any five questions:

(5×4=20)

1. Evaluate the following integrals:

i) $\int_0^{\infty} x^4 e^{-x^4} dx$

ii) $\int_0^{\pi/2} \sin^6 \theta \cos^7 \theta d\theta$.

2. The region in the first quadrant enclosed by the y-axis and the graphs of $y = \cos x$ and $y = \sin x$ is revolved about the x-axis to form a solid. Find its volume.
3. Test the convergence/divergence of the series.

$$\frac{1.2}{3^2.4^2} + \frac{3.4}{5^2.6^2} + \frac{5.6}{7^2.8^2} + \dots$$

4. Find the Fourier series expansion of the following periodic function with period 2π :

$$f(x) = \begin{cases} \pi + x, & \text{if } -\pi < x < 0 \\ 0, & \text{if } 0 \leq x < \pi \end{cases}$$

5. Consider the function:

$$f(x, y) = \sqrt{\frac{e^{\sin(x)}}{x^{2014} + \sqrt{x^{2012} + 1}}} + \cos(xy). \text{ Find the second partial derivative } \frac{\partial}{\partial y} \left(\frac{\partial f}{\partial x} \right).$$

6. A scalar potential ϕ has the gradient $\nabla \phi = yz\hat{i} + xz\hat{j} + zy\hat{k}$. Evaluate the integral $\int_C \nabla \phi \cdot d\vec{r}$ on the Curve $C: \vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, if the curve C is parameterised as follows :
 $x = t, y = t^2, z = 3t^2, 1 \leq t \leq 3$.

7. Find the area of the region R in the xy-plane enclosed by the circle $x^2 + y^2 = 4$, above the line $y=1$, and below the line $y = \sqrt{3x}$.

Part - C

(Descriptive/Analytical/Problem solving/Design Questions)

Attempt any three questions.

(3×10=30)

1. If $f(x) = \begin{cases} \pi x, & 0 < x < 1 \\ \pi(2-x), & 1 < x < 2 \end{cases}$ using half range cosine series, show that
$$\frac{\pi^4}{96} = 1 + \frac{1}{3^4} + \frac{1}{5^4} + \dots$$
2. Show that $\text{div}(\text{grad } r^n) = n(n+1)r^{n-2}$, where $r = \sqrt{x^2 + y^2 + z^2}$. Hence, show that $\nabla^2\left(\frac{1}{r}\right) = 0$.
3. The pressure P at any point (x, y, z) in space is $P = 400xyz^2$. Find the highest pressure at the surface of a unit sphere $x^2 + y^2 + z^2 = 1$.
4. Find the work done by a force $\vec{F} = (y^2 \cos x + z^3)\hat{i} + (2y \sin x - 4)\hat{j} + (3xz^2 + z)\hat{k}$ in moving a particle from $P(0, 1, -1)$ to $Q\left(\frac{\pi}{2}, -1, 2\right)$.
5. Apply stoke's theorem to find the value of $\int_C (ydx + zdy + xdz)$. Where C is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$.

1E3102**1E3102****B.Tech. I Sem. (Main) Examination, April / May - 2022****1FY2-02 Engineering Physics****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates:**

Attempt all ten questions From Part A, five Questions out of seven questions from Part B and three questions out of five questions from Part C .

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

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

PART - A**(Answers should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. What will be the effect on Newton's rings if a plane mirror is placed instead of the glass plate below the plano convex lens?
2. What is the role of compensatory plate in Michelson interferometer?
3. Define optical fiber. What is the working principle of optical fiber?
4. Define coherence length and coherence time.
5. What are the essential requirements for producing laser action?
6. What are intrinsic and extrinsic semiconductors?
7. What is zero point energy for a particle trapped in one dimensional box?
8. Define divergence of electrostatic field and its physical significance.
9. Why visible light cannot be used in diffraction by a crystal?
10. What are the necessary conditions of physically acceptable wave function?

PART - B

(Analytical/Problem solving questions)

Attempt any five questions:

(5×4=20)

1. Light containing two wavelengths λ_1 and λ_2 falls normally on a plano-convex lens radius of Curvature R , resting on a glass plate. If the n^{th} dark ring due to λ_1 coincides with the $(n+1)^{\text{th}}$ dark ring due to λ_2 . Prove that the radius of the n^{th} dark ring of λ_1 is $\sqrt{\frac{(\lambda_1 \lambda_2 R)}{(\lambda_1 - \lambda_2)}}$.
2. LASER action occurs by stimulated emission from an excited state to a state of energy 30.5eV. If the wavelength of LASER light emitted is 690 nm, what is the energy of the excited one?
3. For intrinsic silicon, at room temperature the electrical conductivity is $4 \times 10^{-4} \Omega^{-1} m^{-1}$. The electron and hole mobilities are $0.14 m^2 V^{-1} s^{-1}$ and $0.040 m^2 V^{-1} s^{-1}$ respectively. Compute the intrinsic charge carrier density at room temperature.
4. A diffraction grating has total ruled width 5 cm for normal incidence. It is found that a line of wavelength 6000 \AA in a certain order superimposed on another line of wavelength 4500 \AA of the next highest order. If the angle of diffraction is 30° , how many lines are there in the grating?
5. Define numerical aperture of an optical fiber. Prove that the numerical aperture of a step index optical fiber is given by-
 $N.A. = \mu_{\text{core}} \sqrt{2\Delta}$, where symbols have their usual meanings.
6. Find the probability that a particle in a box of width a can be found between $x=0$ and $x=a/n$ when it is in the n^{th} state.
7. Derive an expression for resolving power of a grating.

PART - C

(Descriptive/Analytical/Problem solving/Design Questions)

Attempt any three questions.

(3×10=30)

1. Derive an expression for the intensity of diffracted light in the Fraunhofer's diffraction due to a single slit and show that the relative intensities of successive maxima are in the ratio:

$$1 : \frac{4}{9\pi^2} : \frac{4}{25\pi^2} : \frac{4}{49\pi^2} \quad (5+5)$$

2. Solve the schrodinger's equation for a free electron in 3-Dimensional box and find the energy eigen value and eigen functions of free electron. Find the lowest energy of the following states:
- i) Non-degenerate
 - ii) Triply degenerate for 3-Dimensional cubical box. (6+2+2)
3. With the help of suitable diagram, explain the principle, construction and working of He Ne laser. (2+4+4)
4. a) What is Hall effect? Show that for a n-type semiconductor the Hall coefficient is $R_H = \frac{-1}{ne}$. (5)
- b) Classify conductor, semiconductor, and Insulator based on energy band theory. (5)
5. a) Define poynting vector and derive poynting theorem. (5)
- b) State Ampere's circuital law and using Maxwell's correction, derive fourth Maxwell's equation. (5)
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1E3103**1E3103****B.Tech. I Sem. (Main) Examination, April/May - 2022****1FY2-03 Engineering Chemistry****Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates:**

Attempt all ten questions From Part A, five Questions out of seven questions from Part B and three questions out of five questions from Part C .

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

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

PART - A**(Answers should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. What principle is applied to remove the hardness of water by lime-soda process?(2)
2. Why do we express hardness of water in terms of calcium carbonate equivalent? (2)
3. What is sweetening of petrol? (2)
4. Why is net calorific value less than gross calorific value? (2)
5. What is pilling - Bedworth rule? (2)
6. A steel screw in a brass marine hardware corrodes. Give reason. (2)
7. What should be the flash-point of a good lubricant? (2)
8. What will happen, if gypsum is not added during grinding of clinkers? (2)
9. In S_N^1 reaction, racemization occurs if the reaction Occurs at a stereogenic centre. However, 50:50 mixture of enantiomers are rarely obtained , why? (2)
10. Why do substitution reactions occur in benzene? (2)

PART - B**(Analytical/Problem solving questions)****Attempt any five questions:****(5×4=20)**

1. Calculate the temporary and total hardness of a sample of water containing $Mg(HCO_3)_2 = 73mg/L$; $Ca(HCO_3)_2 = 162mg/L$, $MgCl_2 = 95mg/L$, $CaSO_4 = 136mg/L$. (4)
2. Calculate the gross and net calorific value of coal sample having the following composition:
C=80%, H=7%, O=3%, S=3.5%, N=2.1 and as h = 4.4% (4)
3. Iron does not rust if the zinc coating is broken in a galvanized iron pipe, but rusting occurs much faster if the tin coating over iron is broken. Explain. (4)
4. Under what situations greases are used? What are the main functions of soap in Greases? (2+2=4)
5. Write the chemistry of setting and hardening of cement. (4)
6. What is annealing of glass? Write significance of annealing of glass. (2+2=4)
7. Describe synthesis, properties and uses of Aspirin. (4)

PART - C**(Descriptive/Analytical/Problem solving/Design Questions))****Attempt any three questions.****(3×10=30)**

1.
 - a) Describe the calgon and phosphate conditioning of water to overcome the boiler feed problem.
 - b) Calculate the amount of lime and soda required for softening 100000 litres of water containing the following:
 $HCl = 7.3mg/L$, $Al_2(SO_4)_3 = 34.2mg/L$, $MgCl_2 = 9.5mg/L$,
 $NaCl = 29.25Mg/L$.
 Purity of lime is 90% and that of soda is 98%. 10% of chemicals are to be used in excess in order to complete the reaction quickly. (5+5=10)
2.
 - a) Describe the manufacturing of gasoline by Fisher-Tropsch method in detail. Draw neat and labelled diagram of the process.
 - b) A sample of coal was found to contain the following constituents; c = 81%, O=8%, S=1%, H = 5%, N=1%, ash=4%. Calculate the minimum weight and volume of air required for the complete combustion of 2 kg of coal.

(5+5=10)

3. a) Describe the mechanism of electrochemical corrosion by hydrogen evolution and oxygen absorption.
b) Explain impressed current cathodic protection method of controlling corrosion.

(7+3=10)

4. Write notes on:

- a) Extreme-pressure lubrication.
b) Chemical reaction involved during manufacture of portland - cement by rotary kiln method.
c) Borosilicate glass and glass wool.

(3+4+3=10)

5. Explain mechanism of electrophilic and free radical addition in alkenes. (5+5=10)
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1E3104	Roll No. _____	[Total No. of Pages : 3]
	1E3104	
	B.Tech. I Sem. (Main) Examination, April/May - 2022 1FY1-04 Communication Skills	
	Time : 3 Hours	Maximum Marks : 70

Instructions to Candidates:

Attempt any all ten questions From Part A, five Questions out seven questions from Part B and three questions out of five questions from Part C .

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

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

PART - A

(Answers should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. Define verbal communication.
2. State advantages of Effective Non-verbal communication.
3. Define Interpersonal communication.
4. Explain 'Linking words' with examples.
5. What do you understand by Reported speech?
6. State purpose of writing a Job Application Letter.
7. Mention main components of CV.
8. In the story 'The luncheon' what did the narrator order and why?
9. What does the poet mean by the words 'harvest' and 'war' in the poem No men are Foreign'?
10. According to the poem 'If', what are the qualities that one should possess to become a perfect man?

PART - B

(Analytical/Problem solving questions)

Attempt any five questions:

(5×4=20)

1. Distinguish between formal and Informal channels of Communication.
2. Complete the following conditional sentences by using suitable verbs _____.
 - a) If we had read the book, we _____ (understand) the movie.
 - b) I _____ (arrive) on time, if I had not missed the train.
 - c) If we win the lottery, we _____ (buy) a big house.
 - d) If I were you, I _____ (go) back.
3. Write a paragraph on 'Effective ways to enhance listening Ability.
4. How did the author describe the lady he was having luncheon with?
5. Give summary of the story 'The Night Train at Deoli' by Ruskin Bond.
6. Explain the line, 'they have eyes like our that wake or sleep, from the poem, 'No Men are Foreign.
7. Discuss the central idea of the poem, 'If' by Rudyard Kipling.

PART - C

(Descriptive/Analytical/Problem solving/Design Questions))

Attempt any three questions.

(3×10=30)

1. Describe various barriers of communication with examples.
2.
 - a) Change into passive voice _____.
 - i) Did you tell a lie?
 - ii) Why did you help her?
 - iii) Kindly go through this proposal.
 - iv) Work hard.
 - v) He will have completed this work.
 - b) Insert suitable modal _____.
 - i) _____ you send me a catalogue please? (Polite asking).
 - ii) This work _____ take more than a week (a weak possibility)
 - iii) You -drive carefully. (suggestion to do right)
 - iv) _____ I borrow your pen? (friendly permission)
 - v) You _____ send this report to head office by tomorrow. (Compulsion).

3. As a purchase officer of ABC Ltd. write a complaint letter to Ms. Unique suppliers, Jaipur. Pointing out the damage which was discovered after checking the consignment containing office stationery. Invent the necessary details.
 4. Give the character. Sketch of pahom, the protagonist of 'How much land Does a Man Need?'.
 5. Write the gist of the poem, 'Where the Mind is without Fear'. In your own words.
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	B.Tech. I Sem. (Main) Examination, April/May - 2022 1FY1-05 Human Values	
Time : 3 Hours		Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, five Questions out of seven questions from Part B and three questions out of five questions from Part C .

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. What is the meaning of value education?
2. What is the meaning of Natural Acceptance”?
3. Explain the meaning of self (I)?
4. Difference between intention and competence?
5. Define samman?
6. What is undivided society?
7. What is eco friendly production systems?
8. What is the meaning of harmony?
9. Difference between respect and differentiation?
10. Body is a material unit while the self is a conscious unit?

PART - B

(Analytical/Problem solving questions)

Attempt any five questions:

(5×4=20)

1. What is natural acceptance? How does it help in the process of self exploration?
2. What should be the basic guidelines for value education?
3. Differentiate between the needs of the 'self' and the 'Body'?
4. Define 'Sanyam' and 'swasthya'. How are they helpful in keeping harmony, between 'self' and 'Body'.
5. What is 'Justice'? How does it lead to mutual happiness?
6. 'Existence' is 'Co-existence'? Give your opinion?
7. Explain the ethical obligations of an employees in details?

PART - C

(Descriptive/Analytical/Problem solving/Design Questions))

Attempt any three questions.

(3×10=30)

1. a) Explain the process of self exploration with the help of a diagram?
b) What is corporate social responsibility? Explain with proper example?
2. Right understanding in the individuals is the basis for harmony in the family, which is the building block for harmony in the society. Give your comments. Explain difference between moral and Ethics.
3. Differentiate between the needs of the 'self' and the 'Body' Discuss the problems that are created by having desire, thoughts and expectation on the basis of pre conditioning? Also explain the concept of 'Sanyam' and 'Swasthya'. How are they helpful in keeping harmony between 'self' and 'Body'?
4. What is the need for value education in technical and other professional institutions?
5. Explain the process of self exploration with a diagram. "Process of self exploration leads to realisation and understanding" Explain with example.

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1E3106**1E3106**

B.Tech. I Sem. (Main) Examination, April/May - 2022
1FY3-06/Programming For Problem Solving

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all ten questions From Part A, five Questions out of seven questions from Part B and three questions out of five questions from Part C.

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

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

Part - A

(Answers should be given up to 25 words only)

All questions are compulsory.**(10×2=20)**

1. Differentiate between primary & Secondary memory?
2. What are the basic organization of computer? Explain using a block diagram.
3. What do you mean by pseudo code?
4. Justify the term assembly and low level language.
5. Name different type of assignment operators in C programming.
6. How a flow chart is different from algorithm?
7. How many types of access methods are present in computer system?
8. Define & Explain scanf() and printf() function.
9. Define pointers & statements in C programming.
10. Define switch case with pseudo code (with example)?

Part - B

(Analytical/Problem solving questions)

Attempt any five questions:

(5×4=20)

1. Draw a flowchart with algorithm & Write a C program to compute simple interest.
2. Write r's complement of the following numbers, where r is a radix(base) of these numbers with conversion-
 - i) $(1056)_{16}$ to $(?)_8$
 - ii) $(11672)_8$ to $(?)_{16}$
 - iii) $(2724)_8$ to $(?)_5$
3. Explain Von neumann architecture in detail with block diagram.
4. Explain the concept of file handling in 'C' language write a program to copy the data source file to destination file.
5. What do you mean by the term array also create an array? Find the Kth largest and Kth smallest number in an array.
6. Define algorithm with flow chart. Write algorithm for finding factorial of a number.
7. Write the difference between input device & output device in tabular form.

Part - C

(Descriptive/Analytical/Problem solving/Design Questions)

Attempt any three questions.

(3×10=30)

1. What are the data types in C programming? Explain with its definition Y pseudo code along with output. Write a C program to find Fibonacci series.
2. What do you mean by parameter passing in 'C' also write the important method of parameter passing example with code along with output.

3. Write a program in 'C' to print half pyramid of alphabets and *:

A

B B

C C C

D D D D

E E E E E

4. Write a program in C to display the first 10 natural numbers also find the sum of first 10 natural numbers.
5. Write a program in C to read 10 numbers from keyboard and find their sum and average using loops.
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1E3107	Roll No. _____	[Total No. of Pages : 2]
	1E3107	
	B.Tech. I Sem. (Main) Examination, April/May - 2022 1FY3-07 Basic Mechanical Engineering	

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all ten questions From Part A, five Questions out of seven questions from Part B and three questions out of five questions from Part C .

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)*

Part - A

(Answers should be given up to 25 words only)

All question are compulsory.

(10×2=20)

1. State the first law of thermodynamics.
2. What do you mean by slip in belt?
3. Which pump require priming ? What is the need for priming.
4. Differentiate between brazing and soldering.
5. Mention the steps involved in designing of a part (Product)
6. Differentiate between COP and efficiency of system.
7. Write two important properties of steam.
8. List the four important properties of molding sand.
9. Give the example of any two alloys and state their application.
10. Mention the different fields of mechanical engineering.

Part - B**(Analytical/Problem solving questions)****Attempt any five questions:****(5×4=20)**

1. Give the types of welding and explain any one type of welding with neat sketch.
2. Compare the working of two stroke and four stroke internal combustion engine.
3. How is steam produced in a fire tube boiler. Explain with a neat figure.
4. Discuss any five properties of engineering materials.
5. Write short notes on
 - i) Rolling
 - ii) Extrusion.
6. Explain any one type of boiler with neat sketch.
7. Mention the difference between open and cross belt drive.

Part - C**(Descriptive/Analytical/Problem solving/Design Questions)****Attempt any three questions.****(3×10=30)**

1. List out major components of an automobile with their function.
 2. Explain the different types of power transmission devices.
 3. Explain the working of air-conditioning system.
 4. Describe forging process with neat sketches.
 5. With a suitable sketch explain the working of reciprocating pump.
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1E3108**1E3108**

B.Tech. I Sem. (Main) Examination, April/May - 2022
1FY3-08 Basic Electrical Engineering

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all ten questions from Part A, five questions out of Seven questions from Part B and three questions out of Five questions Part C.

Schematic diagram must be shown wherever necessary. Any data you feel missing 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)*

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory

(10×2=20)

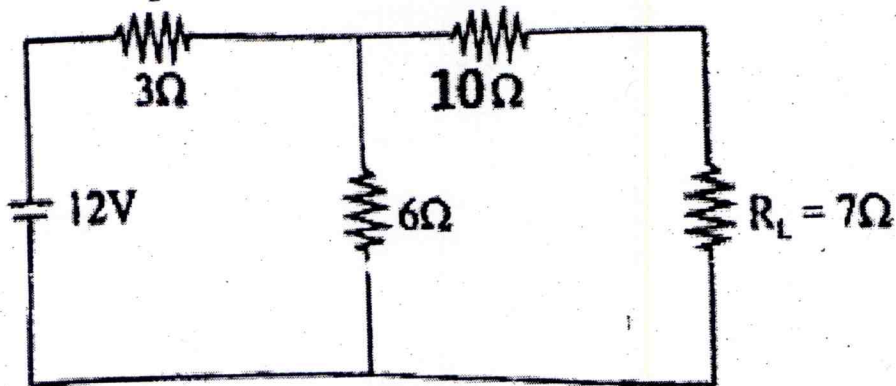
1. State and explain the Kirchhoff's Current Law.
2. Explain the RMS Value and peak value?
3. Discuss the classification of DC Generator.
4. What is the use of circuit breaker?
5. Define the transformer losses.
6. How does a transformer works.
7. What are the advantage and disadvantage of 3 - phase Induction Motor.
8. What are the advantage and disadvantage of DC Motor.
9. What is the different method to turn on the Thyristor.
10. What are the different types of earthing?

PART - B

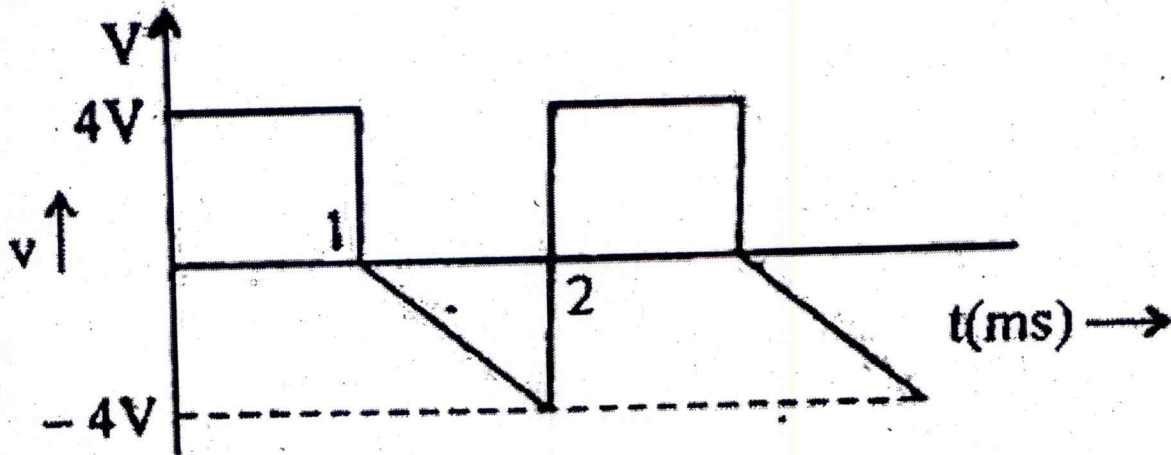
Attempt any five questions

(5×4=20)

1. Find the current in $R_L = 7 \text{ ohm}$ resistor using Thevenin's theorem.



2. Calculate the RMS and average value of the voltage wave shown below.



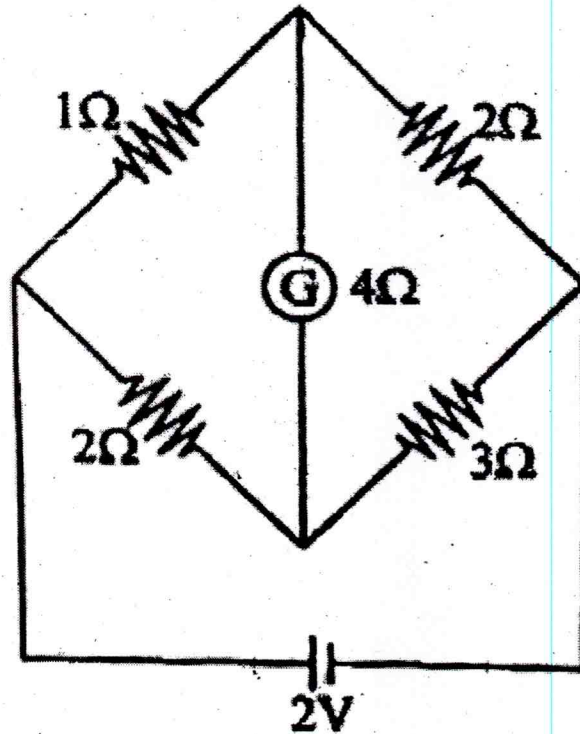
3. A voltage $e = 200 \sin(\pi t)$ is applied to a coil having resistor $R = 200 \text{ ohm}$ and $L = 0.38 \text{ H}$. Find the expression for current and power taken from the supply.
4. Explain in detail the construction, working principle and emf equation of a single phase transformers.
5. Briefly discuss the types of dc motors. What is the difference between differential compound and cumulative compound DC motor.
6. What is a SCR? Sketch static V-I characteristic of a thyristor. Label the various voltages, current and operating modes on this sketch.
7. What are the different types of Earthing systems used in Electrical Installation explain in details?

PART - C

Attempt any **Three** questions

(3×10=30)

1. Calculate the current through the galvanometer. (using Mesh analysis)



2. Explain two wattmeter method of measuring power of 3 - phase star connected load with the help of necessary phasor diagram and circuit diagram.
3. Explain in detail the construction and principle of working of a three - phase Induction motor.
4. Write short notes on :
- MCB.
 - Layout of LV Switchgear.
5. Two coils A and B having 1200 and 800 turns respectively are placed near to each other. 60% of the flux of each coil is linked with the other coil. A current of 5A in coil A produce a flux of 0.25 mWb while the same current in coil B produce a flux of 0.15 mWb. Determine the mutual inductance and coefficient of coupling between the two coils.

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1E3109**1E3109**

B.Tech. I Sem. (Main) Examination, April/May - 2022
1FY3-09 Basic Civil Engineering

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all ten questions From Part A, five Questions out seven questions from Part B and three questions out of five questions from Part C .

Schematic diagram must be shown wherever necessary. Any data you feel missing 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)*

PART - A

(Answers should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. What is the role of Civil Engineers in Transportation Engineering?
2. Explain relevance of Civil Engineering in the overall infrastructural development of the country.
3. Write any two characteristics of good scale.
4. What do you mean by 'Geodetic Surveying'?
5. What are the advantages of 'total station'?
6. A teacher wants to construct a double storied bungalow on a plot of 15m×20m. Front margin is 4.5 m. Rear margin is 3m. what will be the total built - up area? Also calculate FSI.
7. What is National Building Code?
8. What remedial actions should be taken while designing highway to avoid crash?
9. What do you mean by 'Ozone Depletion'?
10. What is the necessity of grit chamber in sewage treatment?

PART - B

(Analytical/Problem solving questions)

Attempt any five questions:

(5×4=20)

1. Enlist with brief description, the corrections to be applied to measurements made with steel tape.
2. Describe the characteristics of contour lines.
3. What is site plan? Which are the information to be included in a site plan?
4. Briefly explain the different components of building with neat figure.
5. Draw any five traffic signs and explain the meaning of each.
6. Explain different audiological, physiological and psychological effects of noise pollution.
7. Write short note on 'Sanitary Landfills'.

PART - C

(Descriptive/Analytical/Problem solving/Design Questions)

Attempt any three questions.

(3×10=30)

1. a) Draw and label the different parts of 'Dumpy Level'.
b) Define the following terms:
 - i) Axis of the telescope.
 - ii) Change point
 - iii) Parallax.
 - iv) Datum.
 - v) Height of instrument.
2. The bearings of the sides of a traverse ABCDE are as follows:

Side	Fore bearing	Back bearing
AB	107°15'	287°15'
BC	22°0'	202°0'
CD	281°30'	101°30'
DE	189°15'	9°15'
EA	124°45'	304°45'

Compute the interior angles of the traverse. Draw the sketch. Check the answer.

3. Differentiate between
- i) Load bearing structure and Framed structure. (4)
 - ii) Educational buildings and institutional buildings. (3)
 - iii) Sub-structure and super structure. (3)
4. Discuss in details the various modes of transport, their characteristics and criteria for choice of a particular mode of transport.
5. a) How is ecological balance disturbed due to human activities? (4)
- b) Write short note on
- i) Nitrogen cycle
 - ii) Rain water harvesting. (6)
-

Roll No. _____

[Total No. of Pages : 2]

1E2401

1E2401

B.Tech. I Sem. (Back) Examination, April/May - 2022

BSC

1FY2-01 Engineering Mathematics - I

Time : 3 Hours

Maximum Marks : 160

Min. Passing Marks : 56

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of Seven questions from Part B and Four questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory**(10×3=30)**

1. Prove that $\beta(m, n)$ is symmetric in m and n .
2. Test for the convergence of the series $\frac{1}{6} - \frac{2}{11} + \frac{3}{16} - \frac{4}{21} + \frac{5}{26} + \dots$
3. Let $f(x, y) = \frac{2xy}{x^2 + y^2}$. Test for the limit $\lim_{\substack{x \rightarrow 0 \\ y \rightarrow 0}} f(x, y)$.
4. Find the equation of tangent plane to $z = x\sqrt{x^2 + y^2} + y^3$ at $(-4, 3)$.
5. Find the directional derivative of $f(x, y, z) = 2x^2 + 3y^2 + z^2$ at the point $P(2, 1, 3)$.
6. Evaluate $\int_0^a \int_y^a \frac{xdxdy}{x^2 + y^2}$ by changing to polar coordinates.
7. Calculate the work done in moving a particle in the force field $F = (xy^2 + y^3)\hat{i} + (x^2y + 3xy^2)\hat{j}$ from point $A(1, 2)$ to $B(3, 4)$.
8. If $u = f(y - z, z - x, x - y)$, prove that $u_x + u_y + u_z = 0$.
9. Change the order of integration in $I = \int_0^{2a} \int_{x^2/4a}^{3a-x} f(x, y) dx dy$, $a > 0$.
10. Evaluate using the Green's theorem in plane : $\oint_C (x^2 - 2xy)dx + (x^2y + 3)dy$, where C is the boundary of the region bounded by $y^2 = 8x$ and $x = 2$.

PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions**(5×10=50)**

1. Evaluate $\int_0^{\infty} 2^{-9x^2} dx$ using Gamma function.
2. Find the volume of a spherical cap of height 'h' cut off from a radius of sphere a.
3. Discuss the Convergence of the series $\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^{-n^2}$.
4. If $u = \sin^{-1} \left(\frac{5x+2y+3z}{x^6+y^6+z^6} \right)$. Determine the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$.
5. For $\vec{v} = \frac{\vec{r}}{r}$, $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, $r = |\vec{r}|$. Find (i) Grad \vec{v} , (ii) $\nabla \times \vec{v}$.
6. Find the area of the region lying in the first quadrant enclosed by the circle $x^2 + y^2 = a^2$ and the line $x + y = a$ by double integration.
7. Show that the volume of the greatest circular cylinder which can be inscribed in the cone of height h and semi - vertical angle is $\frac{4}{27} \pi h^3 \tan^2 \theta$.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions**(4×20=80)**

1. Obtain the Fourier series of $f(x) = x + x^2$, $-\pi < x < \pi$. Also show that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \dots$
2. Find the maximum and minimum distance of the point (3,4,12) from the sphere $x^2 + y^2 + z^2 = 4$.
3. Find the volume of the wedge intercepted between the cylinder $x^2 + y^2 = 2ax$ and planes $z = mx, z = nx, a, m, n \in R, m \neq n$ is $\pi(m-n)/a^3$.
4. Verify Stoke's theorem for $F = (x^2 + y - 4)\hat{i} + 3xy\hat{j} + (2xz + z^2)\hat{k}$ over the surface of the hemisphere $x^2 + y^2 + z^2 = 16$ above the xy-plane.
5. Using double integration, find the centre of gravity of a lamina in the shape of the quadrant of the curve $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$, density being $\rho = kxy$, k being a constant.

1E2402	Roll No. _____	[Total No. of Pages : 2]
	1E2402	
	B.Tech. I sem. (Back) Examination, April / May - 2022 BSC 1FY2-02 Engineering Physics	

Time : 3 Hours

Maximum Marks : 160

Min. Passing Marks : 56

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of Seven questions from Part B and Four questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)*

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory

(10×3=30)

1. Define a wavefront.
2. Explain why Newton's rings are circular but air - wedge fringes are straight.
3. A free particle can have any energy. Does this statement hold for the free particle in a box?
4. What do you mean by normalised and orthogonal wave - functions? Comment on the statement : "A particle in a box possesses discrete energy states".
5. What do you mean by attenuation in optical fibers.
6. What do you mean by dispersion in optical fibers?
7. Write two main requirements for semiconducting laser material.
8. Write two important characteristics of a laser beam.
9. Comment on the statement that $\text{div} \vec{B}$ is always equal to zero.
10. Explain the physical significance of Curl.

PART - B

(Analytical/Problem solving questions)

Attempt any five questions

(5×10=50)

1. Show that function $V = \frac{A}{r} + B$ satisfies laplace's equation, where A and B are constant and r is the magnitude of position vector \vec{r} .

2. Hall voltage of 1.0 mV is found to be developed when a sample carrying a current of 10.0 mA is placed in a transverse magnetic field of 3 kilogauss. Calculate the charge carriers concentration of the sample. Given thickness of the sample along the direction of magnetic field is 0.3 mm.
3. Prove that in high frequency region laser action is not possible.
4. Newton's rings by reflection are formed between two biconvex lenses having equal radii of curvature being 100 cm each. Calculate the distance between the 5th and 15th dark ring using monochromatic light of wavelength 5400 Å.
5. An electron is confined to a one - dimensional box of side 1 Å. Obtain the first four eigenvalues of the electron in eV.
6. Light of wavelength 6000 Å has average wavetrain length of 20 waves. Determine its coherent time and Q - Value.
7. Write short notes on fermi dirac distribution function and fermi energy.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions

(4×20=80)

1. a. State Faraday's laws of electromagnetic induction. Derive integral form of Faraday's law i.e. $\text{Curl } \vec{E} = -\frac{\partial \vec{B}}{\partial t}$.
- b. Prove that $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$ where the terms have their usual meaning. (10+10=20)
2. Calculate the fermi energy in electron volts for sodium assuming that it has one free electron per atom. Given density of sodium = 0.97 g.cm⁻³, atomic weight of sodium 23. (20)
3. In the second order spectrum of a plane diffraction grating a certain spectral line appears at an angle of 10°, while another line of wavelength 5×10⁻⁹cm. greater appears at an angle 3° greater. Find the wavelength of the lines and the minimum grating width required to resolve them. (Given : sin 10° = 0.1736 and cos 10° = 0.9848). (20)
4. Derive both the time independent and time dependent Schrödinger equation for a non - relativistic particle. (10+10=20)
5. a. Explain the terms acceptance angle and numerical aperture. What is meant by single mode and multimode fibers?
- b. Give a block diagram showing how optical fiber communication can be made. (10+10=20)

1E2404	Roll No. _____	[Total No. of Pages : 2]
	1E2404	
	B.Tech. I sem. (Back) Examination, April/May - 2022 HSMC 1FY1-04 Communication Skills	

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions From Part A, four Questions out six questions from Part B and two questions out of three from Part C .

Schematic diagram must be shown wherever necessary. Any data you feel missing 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)

PART - A

(Answers should be given up to 25 words only)

All questions are compulsory.

(5×2=10)

1. What is non-verbal communication?
2. Give one example of conditional sentence.
3. What is a paragraph?
4. Did pahom get all the land he wanted?
5. What is the central theme of 'No men are Foreign'?

PART - B

(Analytical/Problem solving questions)

Attempt any four questions:

(4×10=40)

1. Explain the cycle of communication.
2. What is verbal communication? Discuss in detail giving advantages and limitations.
3. What are conditional sentences? Discuss the types of conditional sentences giving one example for each type.

4. What care should be taken while writing a paragraph?
5. Write a short summary of 'The Night Train at Deoli'?
6. What was Tagore's purpose of writing 'Where the Mind is without Fear'?

PART - C

(Descriptive/Analytical/Problem solving/Design Questions))

Attempt any two questions.

(2×15=30)

1. Discuss all the four types of communication that take place in an organisation. Also give advantages and limitations of each type.
 2. What do you understand by resume? How to write a good resume?
 3. 'Appearances are often deceptive?', Comment with reference to the story 'The Luncheon'.
-

Total No. of Questions:

Total No. of Pages:

Roll No. _____

B.Tech. I-Sem (Reback) Exam 2022**ESC****1FY1-05 Human Values****1E2405****Time: 2 Hours****Maximum Marks: 80****Min. Passing Marks: 28**

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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. _____

2. _____

Part A (Answer should be given up to 25 words only)**All questions are compulsory**

Q. 1 List the four dimensions of human being? How are they related?

Q.2 "The need for physical facility is Temporary "Explain

Q.3 What is the meant by continuity of happiness?

Q.4 List the four orders of nature?

Q.5 Define prosperity and give one example to illustrate?

5 x 2 = 10**Part B (Analytical/Problem solving questions)****Attempt any Four questions**

Q.1 List the three sources of imagination in the self and illustrate with example with a diagram, explain the harmony in the self?

Q.2 What do you mean by preconditioning? give one example

Q.3 Explain the complete meaning of ethical human conduct as discussed in the course?

Q.4. How, will you characterize the development of a society? Discuss in the light of comprehensive human goal?

Q.5 Write short notes on "nature submerged in space"?

Q.6 What do you understand by the term Swatva, Swatantra and swaragya?

4 x 10 = 40

Part C (Descriptive/Analytical/Problem Solving/Design question)
Attempt any two questions

Q. 1 What are the basic human aspirations? Explain the basic requirement for fulfilment of human aspirations? Which source has the potential to ensure continuity of happiness?

Q.2 Explain the feeling of Care and Guidance. What role do these feelings have in Parent's child relationship? What do you mean by happiness and prosperity? Also define the various types of wrong evaluation of relationship with example?

Q.3 What do you understand by profession? How do you apply the understanding you got in this course in your profession to ensure ethical living? Answer categorically? Differentiate between the activities of the self and the body with example?

2 x 15 = 30

1E2406	Roll No. _____	[Total No. of Pages : 2]
	1E2406	
	B.Tech. I Sem. (Back) Examination, April/May - 2022 ESC 1FY3 - 06 / Programming for Problem Solving	

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** (5×2=10)

1. Write an algorithm to find out the sum of digits of a 3 - digit number.
2. Write two differences between symbolic and high - level languages.
3. Write 7 - bit ASCII code for 0 to 9 digits.
4. Suppose A,B,C and E are integer variables, and D is a real variable. Their values are given as, A = 3, B = 2, C = 5, D = 10.0, and E = 4. Find out the solution of the statement : $A = A + B / C + D * E$.
5. Given the following definitions : `int num[2000] = {23, 3, 5, 7, 4, -1, 6};` Write two pointer expressions for the address of `num[0]`.

PART - B

(Analytical/Problem solving questions)

Attempt any **four** questions (4×10=40)

1.
 - a. Draw the architecture of the computer. Explain the functioning of all its components.
 - b. What is a flowchart? Draw a flowchart to find all the roots of a quadratic equation of the form, $ax^2 + bx + c = 0$, $a \neq 0$.
2.
 - a. Explain the computer memory organization. Draw suitable diagram. Describe primary and secondary storage.
 - b. Write a pseudo code to check whether a given string is palindrome or not.

3. Perform the following :
- $(0.674)_8 = (?)_{10}$
 - $(145A.3D)_{16} = (?)_8$
 - $(11101101.10101)_2 = (?)_{16}$
 - Subtract $(100011)_2$ from $(010010)_2$ using 2's complement.
 - Subtract $(5432)_{10}$ from $(7345)_{10}$ using 9's complement.
4. Write a program in 'C' language that copies a one - dimensional array of n elements into a two - dimensional array of k rows and j columns. The rows and columns must be a valid factor of the number of elements in the one - dimensional array, that is, $k*j = n$.
5. a. Explain the scope and lifetime of variables in 'C' functions. Explain them with suitable examples.
- b. Write a program in 'C' language using pointers that receives a floating - point number and sends back the integer and fraction parts.
6. a. What is the operator precedence in expression evaluation of 'C' language? Describe it.
- b. Write a program in 'C' language that takes a binary file of long integers and appends a new long integer at the end that is the sum of all integers in the original file.

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any **two** questions

(2×15=30)

1. a. Describe the storage classes in 'C' language in detail.
- b. Write a 'C' program that approximates Euler's number 'e' using a loop that terminates when the difference between two successive values of 'e' differ by less than 0.0000001.
$$e = \sum_{n=0}^{\infty} \frac{1}{n!} = \frac{1}{1} + \frac{1}{1} + \frac{1}{1.2} + \frac{1}{1.2.3} + \dots$$
2. Write a 'C' program called 'increment' using Structures that accepts a data structure with three fields. The first field contains the month. The second field is an integer showing the day in the month. The third field is an integer showing the year. The program increments the date by 1 day and returns the new date. If the date is the last day in the month, the month field must also be changed. If the month is December, the value of the year field must also be changed when the day is 31.
3. Consider two arrays, A and B, each containing 10 integers. Write a 'C' program that checks if every element of array A is equal to its corresponding element in array B. In other words, it must check if $A[0]$ is equal to $B[0]$, $A[1]$ is equal to $B[1]$, and so on. The program must accept only two pointer values and return a Boolean, 'true' for equal and 'false' for unequal.

1E2407	Roll No. _____	[Total No. of Pages : 3]
	1E2407	
	B.Tech. I Sem. (Reback) Examination, April / May - 2022 ESC 1FY3-07 Basic Mechanical Engineering	

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions From Part A, four Questions out of six questions from Part B and two questions out of three from Part C .

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(5×2=10)

1. What is closed system?
2. What is the efficiency of I.C. Engine?
3. What is circular pitch?
4. What is COP?
5. What is cross belt drive system?

PART - B

(Analytical/Problem solving questions)

Attempt any four questions:

(4×10=40)

1. a) What is welding? Name different methods of welding. Describe Electric Arc welding.
- b) Explain comparison of Impulse and Reaction turbine.

2. a) Explain all the strokes of 4 stroke petrol engine with diagram.
b) Explain computer Integrated Manufacturing system.
3. a) Find the length of Belt necessary to drive a pulley of 500 mm dia. running parallel at a distance of 12m. from the driving pulley of diameter 1600 mm.
b) Explain the tempering process in heat treatment.
4. An otto cycle has compression ratio (CR) 15:1. The intake air is at 100 kpa = 1 bar, 20°C, and the volume of the chamber is 500 cm³ prior to the compression stroke. The temperature at the end of adiabatic expansion is T₄ = 800K.
 - i) Specific Heat at constant pressure of air at atmospheric pressure and room temp: C_p = 1.01 kJ/kg.k
 - ii) Specific Heat capacity at constant volume of air at atmospheric pressure and room Temperature C_v = 0.718 kJ/kg.k
$$C_p/C_v = 1.4$$

Find:

 - a) Mass of Intake air
 - b) The temperature T₃
 - c) The pressure P₃.
 - d) The amount of heat added by burning of fuel air mixture.
 - e) The thermal efficiency of this cycle.
 - f) The MEP.
5. a) Write applications of Refrigeration and air conditioning systems.
b) Explain the zeroth law of thermodynamics with diagram.
6. a) Explain the various pattern allowances used in foundry.
b) Write short notes on different types of power plant.

PART - C**(Descriptive/Analytical/Problem solving/Design Questions)****Attempt any two questions.****(2×15=30)**

1. a) With neat sketch, explain working of the Refrigerator and a heat pump.
b) Define the following:
i) C_p ii) C_v iii) H
 2. a) Briefly explain different properties of Engineering materials which are required to know before manufacturing a engineering component.
b) Explain working of Reciprocating pump with neat sketches.
 3. a) Describe the procedure for making green sand mould with help of a sketch.
b) What is metal casting, describe different methods of metal casting.
-

1E2408	Roll No. _____	[Total No. of Pages : 3]
	1E2408	
	B.Tech. I Sem. (Reback) Examination, April/May - 2022	
	ESC	
1FY3-08 Basic Electrical Engineering		

Time : 2 Hours

Maximum Marks : 80

Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions From Part A, four Questions out six questions from Part B and two questions out of three from Part C .

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)*

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.

(5×2=10)

1. The current in 10Ω resistance is 2A. Find power and energy distributed in 5 sec.
2. Define voltage regulation of a transformer.
3. Define Form factor for an alternating quantity.
4. What is the function of commutator?
5. What do you mean by
 - i) Active region
 - ii) Saturation region for a BJT.

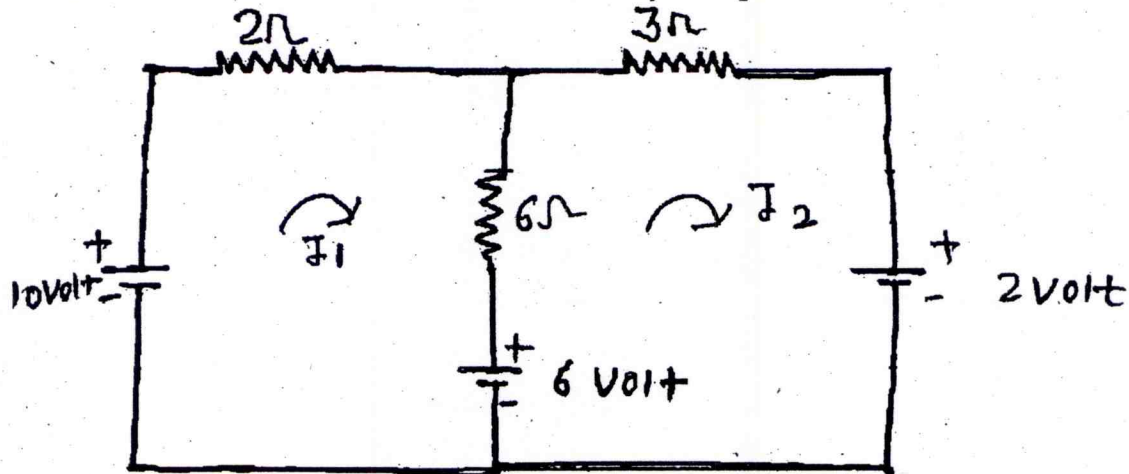
PART - B

(Analytical/Problem solving questions)

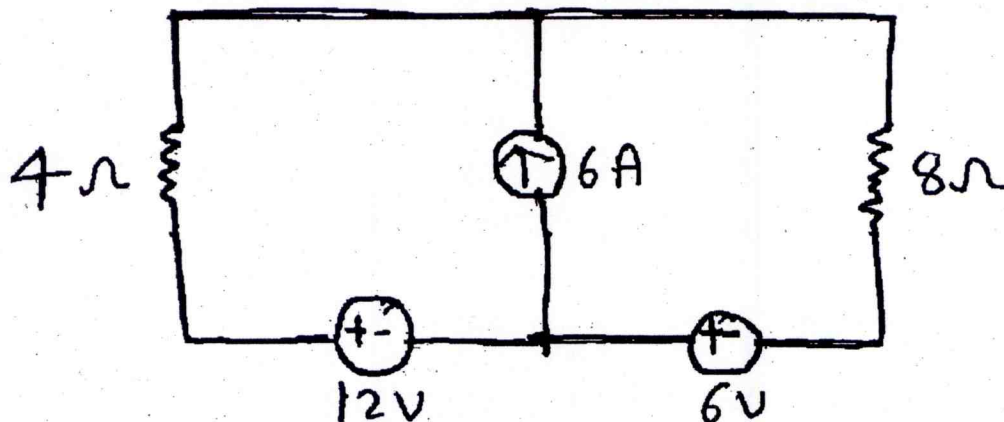
Attempt any four questions:

(4×10=40)

1. Using 100 p current method find the current J_1 and J_2 .



2. Calculate the current through 4Ω resistance by super position theorem.



3. Differentiate between core type and shell type transformer.
4. Determine the relation between line and phase quantities in Delta Connection.
5. Explain construction and working principle of synchronous generators.
6. What is the relation between α , β and γ in BJT.

PART - C

(Descriptive/Analytical/Problem solving/Design Questions)

Attempt any two questions.

(2×15=30)

1. a) State and explain Norton theorem. (8)
- b) A single -phase transformer is rated at 40 KVA. The transformer has full-load copper loss of 800 w and iron losses of 500 w. Determine the transformer efficiency at full load and 0.8 power factor. (7)

- 41
2. a) Find the following parameters of a voltage (8)

$$v = 200 \sin 314t$$

- i) Frequency
- ii) Form factor.
- iii) Peak factor.

- b) Explain SFU, MCB, ELCB. (7)

3. Write short notes on the following:

- a) Losses in transformers. (5)
 - b) V-I characteristics of SCR. (5)
 - c) Speed control of induction motor. (5)
-

1E2409	Roll No. _____	[Total No. of Pages : 2]
	1E2409	
	B.Tech. I Sem. (Reback) Examination, April/May - 2022 ESC 1FY3-09 Basic Civil Engineering	

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions From Part A, four Questions out six questions from Part B and two questions out of three from Part C .

Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)*

PART - A

(Answers should be given up to 25 words only)

All question are compulsory.

(5×2=10)

1. Define rainwater harvesting. (2)
2. Differentiate between prismatic and surveyor's compass. (2)
3. Define levelling and objects of levelling. (2)
4. Describe transportation and its various modes. (2)
5. Define watershed. (2)

PART - B

(Analytical/Problem solving questions)

Attempt any four questions:

(4×10=40)

1. List out the sub branches of civil Engineering. (10)
2. Discuss the objects of surveying. (10)
3. Write down the various tape correction applied in linear measurement. (10)

4. Write short notes on the following. (2.5×4=10)
- i) Bearing
 - ii) Representative fraction(R.F).
 - iii) Reduced level
 - iv) Fore and back Bearing.
5. Describe impact of infrastructural development on economy of country and role of Civil Engineer in society. (10)
6. Explain in details various causes of accidents and road safety measures. (10)

PART - C

(Descriptive/Analytical/Problem solving/Design Question)

Attempt any two questions. (2×15=30)

1. a) Explain the importance of a Civil Engineer in society. (5)
- b) The following readings are taken with the help of a leveling instrument; 0.775, 1.505, 1.225, 1.445, 1.775, 1.005, 1.695, 0.835, 1.445, 1.215, 2.110, 1.950, and 1.735. Instrument is shifted after third, fifth, seventh and eleventh reading. Enter the above reading in a level field book and compute the reduced level of all stations using rise and fall method. The first reading was taken when a staff was held at a benchmark of 77.855m (10)
2. a) Explain Hydrological cycle with neat sketch. (5)
- b) Write short notes on the following. (2.5×4=10)
 - i) Explain W.C.B and Q.B.
 - ii) Define plan and geodetic surveying.
 - iii) Define latitude and departure.
 - iv) Explain plinth area.
3. a) Convert the following bearings Q.B to W.C.B or W.C.B to Q.B. (5)
- b) Define total station? Explain the working of a total station. (10)

Roll No. _____

[Total No. of Pages : 2]

1E2002**1E2002**

B.Tech. I Sem. (Old Back) Examination, April / May - 2022
102 (O) Engineering Mathematics - I

Time : 3 Hours**Maximum Marks : 80****Min. Passing Marks : 26****Instructions to Candidates:**

Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)

UNIT - I

1. a) Show that the asymptotes of the curve $x^3 - 2y^3 + 2x^2y - xy^2 + y(x - y) + 1 = 0$ cut the curve in three points which lie on the line $x - y + 1 = 0$. (8)

- b) Show that the curvature at the point $\left(\frac{3a}{2}, \frac{3a}{2}\right)$ on the folium of Descartes

$$x^3 + y^3 = 3axy \text{ is } \left(\frac{-8\sqrt{2}}{3a}\right). \quad (8)$$

(OR)

1. a) Find the points of inflexion of the curve $y = (\log x)^3$. (8)
 b) Trace the curve $y^2(2a - x) = x^3$. (8)

UNIT - II

2. a) If $\theta = t^n e^{-r^2/4t}$, then find the value of n such that $\frac{1}{r^2} \frac{\partial}{\partial r} \left\{ r^2 \frac{\partial \theta}{\partial r} \right\} = \frac{\partial \theta}{\partial t}$. (8)

- b) If $u = \tan^{-1} \left(\frac{x^3 + y^3}{x + y} \right)$, then show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$. (8)

(OR)

2. a) Show that the maximum value of $\left(\frac{1}{x}\right)^x$ is $e^{1/e}$. (8)

- b) Find the maximum value of $x^m y^n z^p$ when $x + y + z = c$. (8)

UNIT - III

3. a) Find the volume of the solid generated by the revolution of the loop of the curve $(a+x)y^2 = x^2(a-x)$ about the x-axis. (8)
- b) Find the area of the surface of solid of revolution generated by revolving the parabola $y^2 = 4ax$; $0 \leq x \leq 3a$ about x-axis. (8)

(OR)

3. a) Change the coordinates into polar form and evaluate : $\int_0^a \int_y^a x \frac{dx dy}{x^2 + y^2}$. (8)
- b) Prove that $\int_0^{\pi/2} \tan^2 x dx = \frac{\pi}{2} \sec \frac{n\pi}{2}$. (8)

UNIT - IV

4. a) Solve : $(1+y^2) + (x - e^{-\tan^{-1} y}) \frac{dy}{dx} = 0$. (5)
- b) Solve : $x \frac{dy}{dx} + y = y^2 \log x$. (5)
- c) $(D^2 + 1)^2 y = 24x \cos x$; $D = \frac{d}{dx}$. Solve. (6)

(OR)

4. a) Solve : $x(x-1) \frac{dy}{dx} - y = x^2(x-1)^2$. (5)
- b) Solve : $y(2xy + e^x) dx = e^x dy$. (5)
- c) Solve : $(D^3 - 3D^2 + 2D)y = 12(x^2 - 2x + 4)$. (6)

UNIT - V

5. a) Solve : $\frac{d^2 y}{dx^2} + (\tan x - 3 \cos x) \frac{dy}{dx} + 2y \cos^2 x = \cos^4 x$. (8)
- b) Solve : $\frac{d^2 y}{dx^2} - 2 \tan x \frac{dy}{dx} + 5y = e^x \sec x$. (8)

(OR)

5. a) Solve : $(1-x^2) \frac{d^2 y}{dx^2} + x \frac{dy}{dx} - y = x(1-x^2)^{3/2}$. (8)
- b) Using the method of variation of parameters solve:
 $\frac{d^2 y}{dx^2} + (1 - \cot x) \frac{dy}{dx} - y \cot x = \sin^2 x$ (8)

1E2003	Roll No. _____	[Total No. of Pages : 2]
	1E2003	
	B.Tech. I Sem. (Old Back) Examination, April/May - 2022 103 (O) Engineering Physics - I	

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing 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)*

Unit - I

1. a) A Newton's ring arrangement is used with a source emitting two wavelength $\lambda_1 = 6 \times 10^{-5} \text{ cm}$ and $4.5 \times 10^{-5} \text{ cm}$ and it is found that n^{th} dark ring due to λ_2 coincides with $(n+1)^{\text{th}}$ dark ring for λ_1 . If radius of curvature of the curved surface is 90 cm, find the diameter of n^{th} dark ring for λ_1 . (12)
- b) How will you use Michelson's interferometer to determine the thickness of a thin transparent film or plate. (4)

(OR)

1. a) Explain the formation of Newton's rings what will happen if (a) white light is used (b) the lens is lifted slowly from the flat plate? (2+2+2)
- b) The movable mirror of michelson's interferometer is moved through a distance of 0.02603 mm. Find the number of fringes shifted across the cross wire of eye piece of the telescope, if a wavelength of 5206 A.U. is used. (10)

Unit - II

2. Plane polarised light of wave - length 6000 \AA is incident on a thin quartz plate cut with faces parallel to the optic axes. Calculate :
 - i. the ratio of the intensities of the ordinary and extra - ordinary light if the plane of vibration of two incident light makes an angle of 30° with the optic axis.
 - ii. the minimum thickness of the plate which introduces a phase differences 60° between the ordinary and extra - ordinary rays.
 - iii. the minimum thickness of the plate for which the ordinary and extra ordinary waves will combine to produce plane polarised light. {Given $\mu_o = 1.544$ and $\mu_e = 1.553$ }. (6+6+4)

(OR)

2. The faces of a quartz plate are parallel to the optical axis of the crystal.
- What is the thinnest possible plate that would serve to put the ordinary and extraordinary rays of $\lambda = 5890 \text{ \AA}$ a half - wave apart on their exit?
 - What multiples of this thickness would give the same result? The indices of refraction of quartz are $\mu_e = 1.553$, $\mu_o = 1.544$. (8+8)

Unit - III

3. A lens whose focal length is 40 cm forms a fraunhofer diffraction pattern of a slit 0.3 mm width. Calculate the distance of the first dark band and of the next bright band from the axis (wavelength of light used is 5890 \AA). (16)

(OR)

3. Calculate the number of lines on a plane transmission grating which when used on a spectrometer with telescope and collimator of aperture $3/4$ inch will just resolve the two D lines in the sodium spectrum in second order (16)

Unit - IV

4. Briefly describe an X - ray spectrometer used in the study of crystal structure. Stating Bragg's law explain how it is used in determining the structure of a cubic crystal. (16)

(OR)

4. Find the mobility of electrons in copper assuming that each atom contributes one free electron for conduction. (Resistivity of copper = 1.7×10^{-6} ohm cm, atomic weight = 63.54, density = 8.96 gm/cc. Avogadro's number = 6.025×10^{23} and electronic charge = 1.6×10^{-19} coulomb). (16)

Unit - V

- Derive a relativistic expression of Kinetic energy of a particle in terms of momentum and show that in the limit of small velocities the relativistic relation between kinetic energy and momentum tends to the classical relation. (8)
- Discuss the mass variation according to special theory of relativity. (8)

(OR)

- If the total energy of a particle is exactly thrice its rest energy, what is the velocity of the particle? (8)
- What is the time dilation in special relativity? Deduce an expression for time dilation, in regard to the interval between two events measured from two different inertial frames. (8)

1E2005

Roll No. _____

[Total No. of Pages : 3]

1E2005

B.Tech. I Sem. (Back) Examination, April/May - 2022
105(O) Basic Electrical & Electronics Engineering

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

Attempt any **five** questions. Selecting questions from each unit. All questions carry equal marks. Any data you feel missing 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)

Unit - I

1. a) State and explain Thevenin's Theorem with suitable example. (8)
- b) Find voltage across the 20Ω resistance in fig.1 using nodal method. (8)

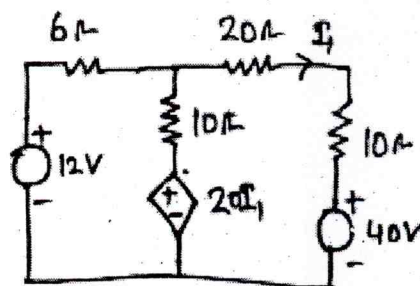


Figure - 1

(OR)

1. a) State and explain maximum power transfer theorem with suitable example. (8)
- b) Determine the current I in the circuit? By the superposition theorem. (8)

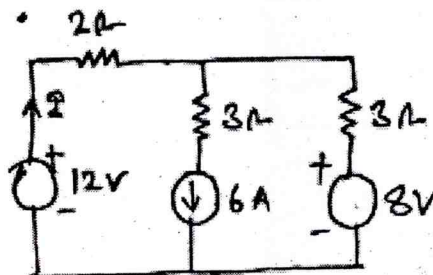


Figure - 2

Unit - II

2. a) An alternating current varying sinusoidally with a frequency of 50Hz has an rms value of 20A. Write down the equation for the instantaneous value and find the value
- 0.0025 second.
 - 0.0125 second after passing through a positive maximum value. At what time, measured from a positive maximum value, will the instantaneous current be 14.14 A? (8)
- b) Define average value effective value and form factor of an alternating current. Find the average and effective values of an isoscale triangular wave of maximum value 10A. (8)

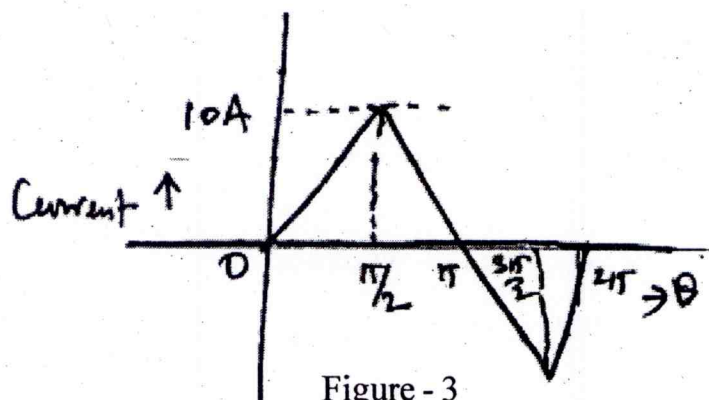


Figure - 3

(OR)

2. a) The Maximum values of the alternating voltage and current are 400v and 20A respectively in a circuit connected to a 50 Hz supply and these quantities are sinusoidal. The instantaneous values of voltage & Current are 283v and 10 A respectively at $t=0$ both increasing positively.
- Write down the expression for voltage & Current at time t .
 - Determine the power consumed in the circuit. (8)
- b) When resistor and an inductor in series are connected to 240v, 50Hz ac mains, a current of 3A flows lagging 37° behind the supply voltage, while the voltage across the inductor is 171v. Determine the resistance of the resistor and the resistance and reactance of the inductor. Draw the phasor diagram of the ckt. (8)

Unit - III

- a) What is the principle of operation of a d.c. generator? Why is a commutator and brush arrangement necessary for the operation of a d.c. generator? (8)
- b) Explain the working principle of d.c. machine & construction of d.c. machine. (8)

(OR)

3. a) Give the constructional difference between salient pole and cylindrical rotor synchronous machines. Why cylindrical rotor machine used in thermal power plant. (8)
- b) Explain the working principle of a
 - i) Synchronous motor
 - ii) Induction motor
 - iii) Synchronous generator
 - iv) Universal motor. (8)

Unit - IV

4. a) Explain P-N junction diode in forward and reverse bias. Explain V-I characteristics of a P-N Junction diode. (8)
- b) What is PN-Junction diode? How potential barrier is formed in a P-N junction diode. (8)

(OR)

4. a) Explain FET as an amplifier. Explain its five application in the field of engineering. (8)
- b) Why binary system is preferred in digital system. Discuss the importance of 1's & 2's complement numbers.

Unit - V

5. a) What is transducer? Give classification of transducers. Distinguish between active and passive transducers. (8)
- b) Write a short notes on
 - i) IEE spectrum for communication system.
 - ii) Amplitude v/s frequency modulation. (8)

(OR)

5. a) What is strain gauge? What is gauge factor? Explain. (8)
- b) Write short notes on:
 - i) Load cell
 - ii) Bimetallic strip. (8)