1E3101

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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 $x(t)=\cos t, y(t)=\sin t, z(t)=\frac{2}{\pi}t, 0 \le t \le \pi/2$. 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 $\bar{a}=3\hat{i}-4\hat{j}$ 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.

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

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

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

5. Consider the function:

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

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

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 $\frac{\pi^4}{96}=1+\frac{1}{3^4}+\frac{1}{5^4}+....$

2. Show that $div(grad\, r^n)=n(n+1)r^{n-2}$, 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

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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 $(n+1)^{th}$ 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 $4\times10^{-4}\Omega^{-1}m^{-1}$. The electron and hole mobilities are $0.14 m^2V^{-1}s^{-1}$ and $0.040\, m^2V^{-1}s^{-1}$ 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 $6000\ \mathring{A}$ in a certain order superimposed on another line of wavelength $4500\ \mathring{A}$ 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-

   $N.A. = \mu_{core}\sqrt{2\Delta}$, 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:

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

1E3103

Roll No. _____ [Total No. of Pages : 3

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:

   $HCl = 7.3mg/L$, $Al_2(SO_4)_3 = 34.2\ mg/L$, $MgCl_2 = 9.5mg/L$, $Nacl = 29.25\,Mg/L$.

   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)

1E3104

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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.

1E3105

Roll No. _____ [Total No. of Pages : 2]

1E3105

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.

1E3106

Roll No. _____ [Total No. of Pages : 3]

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 may 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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1E3109

Roll No. _____ [Total No. of Pages : 3

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 bunglow 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)
