A000172(014)

B. Tech. (First Semester) Examination
Nov.-Dec. 2021
(AICTE Scheme)
ENGINEERING MATHEMATICS-I
(Basic Science)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) of each question. Include suitable header file in all your program. The figure in the right-hand margin indicates marks.

Unit-I

1. (a) Define different types of Improper integrals and prove

   that $\int_1^\infty e^{-x^2}\,dx$ is convergent.

[4]

(b) Define the importance of divergence of vector? Verified Gauss's divergence theorem and prove that

$$\iint \left[\left(x^3 - yz \right) i - 2x^2 yj + 2k \right] . ndS = \frac{a^5}{3}, \text{ Where } S$$

is a surface of cube bounded by the plane $x = 0$, $x = a$, $y = 0$, $y = a$, $z = 0$, $z = a$.

(c) Define Stoke's Theorem? Write the application of Curl of vector field. Verified the Stoke's theorem, when $\vec{F} = \left(2x - y \right) i - yz^2 j - y^2 zk$, where S is upper half surface of $x^2 + y^2 + z^2 = 1$. And C is circle.

(d) Prove that $\operatorname{div} \left(r^n \vec{r} \right) = \left(n + 3 \right) r^n$; if $r^n \vec{r}$ is solenoidal then find the value of n. What is importance of gradient of scalar field.

Unit-IV

4. (a) If $u = x^2 - y^2$, $v = -\dfrac{y}{x^2 + y^2}$, then u and v both

[5]

are satisfied Laplace equation, but $f(z) = u + iv$, not analytic function of z.

(b) Write the necessary condition for $f(z)$ to be analytic. Suppose $f(z) = u + iv$, is analytic on domain D. Then prove that $f(z)$ is constant in D, if it satisfied one of the following condition

(i) $f'(z)$ is identically to zero in D

(ii) $R \left(f(z) \right) = u = \text{constant}$

(iii) $\left| f(z) \right| = \text{constant}$

(c) State that Milne Thomson's method. Find the analytic function, its real part

$$e^{-x} \left\{ \left(x^2 - y^2 \right) \cos y + 2xy \sin y \right\}$$

(d) Define Harmonic function. Prove that

$$u = \frac{\log\left(x^2 + y^2\right)}{2}, \text{ is harmonic function. And also}$$

find its harmonic conjugate.

Unit-V

5. (a) Find Fourier series of function

$$f(x) = x^2, -\pi < x < \pi.$$

(b) Find the Fourier Series, where function defined as

$$f(x) = \begin{cases} -1, & -3 < x < 3 \\ 0, & x = 0 \\ 1, & 0 < x < 3 \end{cases}$$

(c) Define Fourier Series of even and odd functions.
And find Fourier Series for $f(x) = x, -\pi < x < \pi$.

(d) What about half range Fourier Series? Find Cosine
series of $f(x)$ in half range

$(0, \pi)$ Where $f(x) = \begin{vmatrix} \frac{\pi x}{4}, & 0 \leq x \leq \frac{\pi}{2} \\ \frac{\pi(\pi - x)}{4}, & \frac{\pi}{2} < x \leq \pi \end{vmatrix}$

And also deduct

$$\frac{\pi^2}{32} = \frac{1}{2^2} + \frac{1}{6^2} + \frac{1}{10^2} + \dots$$

100]

Roll No. : 3000 1287 1042

A000177(046)

B. Tech. (First Semester) Examination, Nov.-Dec. 2021

(AICTE Scheme)

(Humanities Branch)

LANGUAGE & WRITING SKILLS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Clearly understand and follow the instructions in each unit.

1. Attempt any **two** : $\frac{5}{10}$

(a) What is the importance of communication skills for Engineers?

(b) How is non-verbal communication different from verbal communication?

(c) What are the physical barriers that impede effective communication?

2. Attempt any **five** from (a) to (f) :

$\frac{9}{20}$

(a) Fill in the blanks with the correct option given in brackets :

(i) The man .... at that boy for last five minutes.

(has stared/has been staring)

(ii) The guards .... him while he was trying to intrude the place.

(stops/were stopping)

(b) Join the sentences with appropriate conjunction :

(i) Shantanu is late today. He didn't get the bus on time.

(ii) Ayush played a lot. He is very tired.

(c) Select the appropriate preposition :

(i) She usually travels .... bus, but today her father dropped her.

(in/by/with)

(ii) Did you see the boy going .... the lobby?

(in/upon/into)

(d) Change the sentences into in direct speech :

(i) He said, "Do you know me?"

(ii) Raj will say, "You are not wise".

(e) Arrange the jumbled words into a meaningful sentence :

(i) Tasks/result/perform increasingly/today/a/machines/complex/as/can

(ii) Irksome/files/was/the/stored/information/in/all/and/unwidely

(f) Convert the complex sentence into simple sentence :

(i) That he is honest in known to all.

(ii) He is so weak that he cannot walk.

3. Attempt any **two** :

$\frac{10}{20}$

    (a) Explain the four step listening process.

    (b) What are the various listening barriers? Explain any one of them.

    (c) What are the various techniques to improve listening efficiency?

4. Attempt any **five** from (a) to (f) :

$\frac{5}{10}$

    (a) Make sentences with the given idioms justifying its meaning :

      (i) Spill the beans

      (ii) Go down in flames

    (b) Make sentences with the given Business terms :

      (i) Arbitration

      (ii) Ballot

    (c) Give Synonym of the following words :

      (i) Dodge

      (ii) Target

    (d) Give Antonym of the following words :

      (i) Initial

      (ii) Strange

    (e) Make sentences with the Homonym 'Ground' to show its different uses.

    (f) Make sentences with the given words :

      (i) Deepfake

      (ii) Shero

5. Attempt any **two** :

$\frac{10}{20}$

    (a) What is the purpose of Group Discussion? What are the various qualities judged in a candidate during Group Discussion?

    (b) What are the various audio-visual aids used to make effective presentations? What are the do's and don'ts of making PowerPoint presentation?

(c) Draft a one minute speech on 'Importance of Practical Education'.

6. Attempt any two :

19/20

(a) Explain in detail the principles of effective writing.

(b) Draw a suitable reply to a customer who has complained about the faulty performance of the laptops supplied by you. Assume necessary details.

(c) Write a report of a committee appointed to look into the demands of the workers of the factory including a higher percentage to bonuses and the threatened strike by the workers.

A000171(028)

B. Tech. (Hon's) (First Semester) Examination
Nov.-Dec. 2021

(Computer Science Engg.)

FOUNDATION of ELECTRONICS ENGINEERING

(Artificial Intelligence/Data Science)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Answer any **three** questions from each unit. Question number 1 is mandatory in each unit.

Unit-I

1. (a) What are 2 and 3 terminal devices? Explain with an example.

   (b) Explain the P-N homojunction diode with its forward biased and reverse biased VI characteristics in brief.

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(c) How a depletion region is formed in a PN Junction diode. Explain forward biased and Reversed biased PN Junction diode in brief.

(d) (i) Differentiate between linear and non-linear devices with example.

   (ii) Write down the applications of diodes

Unit-II

2. (a) Derive the Eberse Moll Model equations.

(b) Explain n-p-n Common Emitter Bipolar Junction transistor with its input & output characteristics in brief.

(c) Explain n-p-n Common Base Bipolar junction transistor with its input & output characteristics in brief.

(d) (i) If the base current in a transistor in $20\,\mu A$ when the emitter current is 6·4 mA, what are the values of α and β. Also calculate the collector current.

   (ii) Calculate the values of collector current and base

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current for a transistor with $\alpha = 0.99$, $I_{CBO} = 10\,\mu A$. Emitter current as 8 mA.

Unit-III

3. (a) Explain Field Effect transistor is a voltage-controlled device.

(b) Explain the construction and working principle of P-channel JFET with its characteristics.

(c) (i) Explain N-channel JFET Transfer characteristics with its characteristics equation.

   (ii) Datasheet for a JFET Indicates that $I_{DSS} = 10$ mA and $V_{GS(cut\,off)} = -4V$. Determine the drain current for $V_{GS} = 0V, -1V$ and $-4V$.

(d) (i) What do you understand by MOSFET? Explain its construction.

   (ii) Explain Drain and Transfer characteristics of n-channel Enhancement-MOSFET.

Unit-IV

4. (a) Write down the relationship between α, β & γ of BJT.

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(b) Explain the common emitter amplifier in brief.

(c) Explain the common source amplifier in brief.

(d) What is a discrete transistor amplifier? Explain Emitter and source follower.

Unit-V

5. (a) What is a semiconductor? Explain Extrinsic and Intrinsic semiconductors.

(b) Explain Poisson's and continuity equation of a semiconductor.

(c) Explain Boltzmann's approximation to the Fermi-Dirac Statistics.

(d) What is Fermi level? Explain the Fermi Dirac Statistics equation.

A000175(020)

B. Tech. (First Semester) Examination
Nov.-Dec. 2021

(Civil Engg. Branch)

ENVIRONMENTAL SCIENCE

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

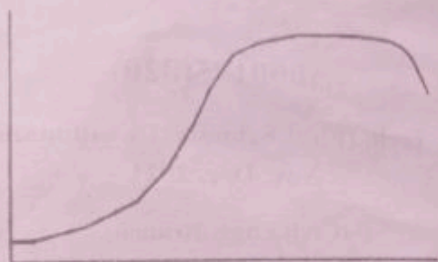*Note :* Solve any **two** from each question with suitable diagram.

Unit-I

1. (a) "It is said that due to constgant interaction between man and the environment, major urban areas face a number of environment problems." Comment on this statement. 8

(b) (i) Label the axis with units and show phases on the following growth curve.   4

(ii) How long would it take for an initial population of 6 to reach a size of 12,288 bacteria? Use the model, $N(t) = N_a e^{kt}$, and assume the population doubles very 3 hours.   4

(c) Is it necessary to culture bacteria until exponential phage before being enriched for phage isolation.   8

Unit-II

2. (a) Can you think of any examples of economically valuable, potentially renewable resources that have not been severely depleted through excessive use of inappropriate management? Explain your answer.   8

(b) Describe at least two case studies of the degradation of potentially renewable resources and explain why those damages occured.   8

(c) Outline the ways that appropriate management practices can increase the harvest of biological resources.   8

Unit-III

3. (a) Distinguish between abiotic and biotic components. What are their main components? What functions do they perform?   2+3+3

(b) What is Food Chain? What is food web? Describe briefly how energy and nutritents flow enough food webs.   2+2+4

(c) The pH of "Solution 1" is 3.5 and the pH of "Solution 2" is 3.8. How many times more acidic is solution 1 than solution 2?   8

Unit-IV

4. (a) What response options can conserve biodiversity and promote human wel-being?   8

(b) Comment on the importance of wild life and sanctuaries in preserving biological diversity. 8

(c) How can environment protection and biodiversity be improved by using current ecological technologies? 8

Unit-V

5. (a) Provide an example of an activity that can adversely impact the air environment and suggest an appropriate mitigation action. 8

(b) Write the methodology for assessment of ground water characteristics in the study area? Explain the various kinds of impact mitigation? Also explain in detail the objectives and methods of mitigation with an example. 2+3+3

(c) Discuss about methodologies for identification of potential environmental impact of typical engineering projects. 8

Unit-VI

6. (a) Explain what is meant by social assessment? Why socioeconomic impacts are important in

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Environmental Impact Assessment (EIA) of a major development project. 5+5

(b) Name some important environment-protection Act is India. 10

(c) What are the goals and purposes of Environmental Management System (EMS)? What is the ISO 14000 standard for EMS? Give its advantages 3+4+

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A000176(046)

B.Tech. (Hon's) (First Semester) Examination Nov.-Dec. 2021

(Humanities Branch)

PROFESSIONAL ETHICS and LIFE SKILLS

(Artificial Intelligence)

Time Allowed : Three hours

Maximum Marks : 50

Minimum Pass Marks : 18

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any *two* parts from (b), (c) and (d).

Unit-I

1. (a) List the human values and explain any 1 of them in detail.   2

    (b) Define work ethics. Give 4 examples of unethical practices in work place.   4

(c) Explain with example the principal of Caring and Sharing.

(d) Write short notes on :   4

(i) Empathy   4

(ii) Yoga and Stress Management

Unit-II

2. (a) Mention the various types of inquiry.   2

(b) Describe about various ethical senses that an Engineer should possess with example.   4

(c) Bring out the basic difference between Kohlberg's theory and Gilligan's theory on moral development.   4

(d) Mention the various uses of Ethical theories.   4

Unit-III

3. (a) Define Risk and Safety in work place.   2

(b) Would knowledge of risk help you to have better safety standards or safe products? Give one example.   4

(c) Write short notes on :   4

(i) Risk Benefit Analysis

(ii) Respect for Authority

(d) Explain the intellecutal property rights with example. 4

Unit-IV

4. (a) Mention the various values of value education.   2

(b) What are the personal values? What are its strengths and weaknesses?   4

(c) Describe the moral values in life one should remember while dealing with people in life.   4

(d) Write short notes on :   4

(i) Humility

(ii) Gratitude

Unit-V

5. (a) Define society and mention its units.   2

(b) Describe the difference between ancient communities and modern communities with example.   4

(c) What do you mean by responsibility? Discuss moral and professional responsibility in detail.   4

(d) What is desire to comfort and how to ease the sense of belonging?   4

A000173(022)

B. Tech. (First Semester) Examination, Nov.-Dec. 2021

(New AICTE Scheme)

(Computer Science and Engineering Branch)

LEARNING PROGRAMMING CONCEPT with C

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

*Note : Each question contains **four** part. Part (a) of each question is compulsory. Attempt any **two** part from (b), (c) and (d) of each question. Include suitable header file/s in all your program. The figure in the right-hand margin indicates marks.*

Unit-I

1. (a) What is the output of the following program. Explain the output.   4

```
void main ( ) {
    int m, n, p;
    for (m = 0; m < 3; m++)
        for (n = 0; n < 3; n++)
            for (p = 0; p < 3; p++)
                if (m + n + p == 2)
                    goto print;
    print :
    printf ("%d, %d, %d", m, n, p);
}
```

(b) List the operators in C and explain conditional, logical and bitwise operators in brief. 8

(c) Explain the structure of the C program with the help of an example. 8

(d) Write a C program to find the area of a triangle if its three sides are given. Also, draw its flowchart. 8

[Formula : area = $\sqrt{s(s-a)(s-b)(s-c)}$]

Unit-II

2. (a) What is the output of the following program? Explain the output. 4

```
void main ( ) {
    char string [ ] = "HELLO WORLD";
    int m;
    for (m = 0; string [m] != '0'; m++)
        if ( (m%2) == 0)
            printf ("%c", string [m]);
}
```

(b) Explain any three string functions in brief. Write a program using the three string functions explained before. 8

(c) Explain declaration and initialization of a one-dimensional integer array. Write a function to search an element in an array. 8

(d) Write a program to multiply two matrices and print the result in matrix form. 8

Unit-III

3. (a) The function test is coded as follows. What will be the values of x and y when the following statements are executed? Explain the output. 4

```
int x = test (135);
```

```
int y = test (246);
    int test (int number) {
        int m, n = 0;
        while (number) {
            m = number % 10;
            if (m % 2)
                n = n + 1;
                number = number/10
        }
        return (n);
    }
```

(b) What is recursion? Write a program that calculates factorial for a given number using recursive function. 8

(c) Write a function to calculate the trace of a matrix. [Trace of a matrix is define as the sum of the main diagonal elements.] 8

(d) Write a program to calculate the factorial of a given number using recursion. 8

Unit-IV

4. (a) What is the output of the following program? Also, explain the output. 4

```
int f (char *p)
void main ( ) {
    char str [ ] = "ANSI";
    printf ("%d", f(str));
}

inf f (char *p) {
    char *q = p;
    while (*++p);
    return (p–q);
}
```

(b) Explain with suitable examples the concept of call by value and call by reference and differentiate between them. 8

(c) Explain Dynamic Memory Allocation using malloc (), calloc (), free (), and realloc () 8

(d) Explain command-line argument with an example. 8

Unit-V

5. (a) Explain the difference between structure and union. 4

(b) Explain structure within a structure with the help of an example. 8

(c) Declare a structure named class with student id, name, and marks as members. Write a program to declare two class variables and compare them.　　8

(d) Write a program in C to copy the content of a file to another file.　　8

A000174(028)

B. Tech. (First Semester) Examination Nov.-Dec. 2021

(New Scheme)

FUNDAMETALS of COMPUTATIONAL BIOLOGY

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : *Question no. 1 from all the unit is compulsory. Attempt any **two** parts of each unit. All section carries equal marks. Draw neat labelled diagrams wherever necessary. Scientific calculators and graph papers can be used for numerical problems.*

Unit-I

1. (a) State Bacterial growth model in details.   4

   (b) Describe the mathematical formulation of stationary phase in bacteria. Find out the number of bacterial

cells after 15 hours of incubation, when the division time is given as 30 min. Note that the initial cells were 100 in numbers?

$2+6$

(c) What do you understand by mathematical modeling? Solve the given ODE equation using Integration factor method.

$$\frac{dy}{dx} + 6y = e^{4x}$$

Given that $f(0) = 1/3$.

$2+6$

(d) For any enzyme kinetic reactions, derive the expression for velocity of the reaction. Find out the velocity of reaction when V_{max} and km of the reaction are 1·2 and 0·6 respectively. Given substrate concentration are 10 mM, 7·5 mM and 2 mM.

$4+4$

Note : You need to find out velocity for different the concentrations provided in the question.

Unit-II

2. (a) What do you understand by cancer spread? In brief explain in cell cycle of a cancer cell. $1+3$

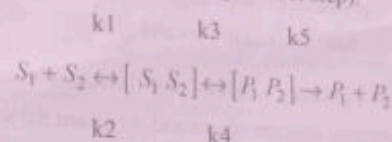(b) Derive the ODE expression for each component of

following reaction. Note that the product formation step is an enzymatic process (use enzyme kinetics while modeling the last step). $4+4$

$$S_1 + S_2 \overset{k1}{\underset{k2}{\leftrightarrow}} [S_1 S_2] \overset{k3}{\underset{k4}{\leftrightarrow}} [P_1 P_2] \overset{k5}{\to} P_1 + P_2$$

(c) Explain Lotka-Volterra model in detail. Also write the mathematics expression for prey and predator concentrations by using appropriate constants.

Using steady state approximation find out steady state concentration of prey and predators. Use following parameters for estimation of prey and predators.

$4+4$

Rate of birth of prey	= 1
Rate of birth of predator	= 0·4
Rate of death of prey	= 0·25
Rate of death of predator	= 0·1
Rate of predation of predator	= 0·2

(d) In detail explain the concept of infectious disease spread. Discuss the SIR and SIS models with examples and mathematical expression. $3+5$

Unit-III

3. (a) Write short notes on distribution plot. State the role and importance of random, gaussian and exponential distributions with examples and plots. **4**

    (b) For an enzymatc process, plot the rate of reaction vs substrate concentrations and determine the values of V_{max} and Km using Lineweaver Burk plot. The substrate and rates are given below : **8**

[S] mM	0·14	0·22	0·29	0·56	0·76	1·46
V μM	0·15	0·17	0·23	0·32	0·39	0·49

    (c) Write the basic MATLAB codes required for plotting Line plot with X and Y as vectors containing elements of X and Y. Also write the codes for changing the following properties of plots. **8**

(a) Axis title	(b) Legends	(c) Axis color
(d) Marker type and color	(e) Axis font size	(f) Axis thickness

    (d) Write down the script for creating and calling a function along with an example of solving a prey-predator equations in MATLAB. Also write down

command for plotting populations of prey and predators. **8**

Unit-IV

4. (a) What is difference between breathing and respiration? **4**

    Note : Attempt any **one** part :

    (b) In detail, describe the process of cellular respiration. In brief explain the fick's law of diffusion and mathematical expression associated with Fick's law. **12+4**

    (c) In details, describe the circulatory system in humans. What do you understand by streamline and turbulent flow?

    State continuity equation and find out the exit velocity of a fluid flowing in pipe when the diameter is reduced from 100 mm to 80 mm. Given that velocity of fluid at entry point is 0·6 m/s. **8+4+4**

Unit-V

5. (a) What do understand by molecular switch? Provide appropriate examples. **4**

    Note : Attempt any **one** part :

    (b) Explain what is mutation and its role in evolution.

[6]

Also, how mutational studies are performed in a population.

8+8

(c) What do you understand by flux balance analysis? What is the use of flux balance analysis? Give an appropriate example how can one formulate and solve the flux balance.

4+4+8