

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER 2018

ENGINEERING MATHEMATICS – II

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions. Each question carries 2 marks.

1. Find a unit vector in the direction of the vector $2\vec{i} + \vec{j} - 2\vec{k}$.

2. Evaluate $\begin{vmatrix} 1 & 2 & -1 \\ 2 & 0 & 3 \\ -2 & -4 & 2 \end{vmatrix}$

3. If $A = \begin{bmatrix} 0 & 2 \\ -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 \\ 3 & -1 \end{bmatrix}$, find $(A+B)^T$

4. Find $\int (3x^2 - 2x + 1) dx$

5. Solve $\frac{d^2y}{dx^2} = \sin x$

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. The constant forces $2\vec{i} - 5\vec{j} + 6\vec{k}$, $-\vec{i} + 2\vec{j} - \vec{k}$ and $2\vec{i} + 7\vec{j}$ act on a Particle such that the particle is displaced from the position $4\vec{i} - 3\vec{j} - 2\vec{k}$ to $6\vec{i} + \vec{j} - 3\vec{k}$. Find the total work done.

2. Find the term independent of x in the expansion of $\left(3x^2 - \frac{1}{2x^3}\right)^{10}$

3. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, find $A^2 - 5A + 6I$

4. Find the inverse of the matrix $\begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$

5. Evaluate $\int_0^{\pi/8} \sin x \sin 3x \, dx$.
6. Find the area of a circle of radius 'r' units using integration.
7. Solve : $x(1+y^2) \, dx + y(1+x^2) \, dy = 0$ (5×6 = 30)

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Find the angle between the vectors $\vec{i} - 2\vec{j} + 3\vec{k}$ and $3\vec{i} - 2\vec{j} + \vec{k}$ 5
- (b) Find the value of λ for which the vectors $3\vec{i} + 2\vec{j} + 9\vec{k}$ and $\vec{i} + \lambda\vec{j} + 3\vec{k}$ are parallel. 5
- (c) Find the 10th term in the expansion of $(x^2 - \frac{20}{x^2})^{20}$ 5

- IV (a) Find $\vec{a} \times \vec{b}$ if

$$\vec{a} = 2\vec{i} + 3\vec{j} + 6\vec{k},$$

$$\vec{b} = 3\vec{i} - 6\vec{j} + 2\vec{k}$$

- (b) If $\vec{a} = 5\vec{i} - \vec{j} - 3\vec{k}$ and $\vec{b} = \vec{i} + 3\vec{j} - 5\vec{k}$ show that $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ are perpendicular. 5
- (c) Expand $(2x + 3y)^4$ using binomial theorem. 5

UNIT — II

- V (a) Solve for 'x' if $\begin{vmatrix} 2x-1 & x+1 \\ x+2 & x-2 \end{vmatrix} = 0$ 5

- (b) Find A and B if

$$A + B = \begin{bmatrix} 4 & 6 \\ 2 & 3 \end{bmatrix} \text{ and } A - B = \begin{bmatrix} -2 & 8 \\ 4 & -1 \end{bmatrix}$$

- (c) If A $\begin{bmatrix} 1 & 0 & 0 \\ -2 & 1 & -1 \\ 3 & 0 & 1 \end{bmatrix}$ Evaluate A^3 5

OR

VI (a) Solve using determinants $\frac{5}{x} + \frac{2}{y} = 4, \frac{2}{x} - \frac{1}{y} = 7$ 5

(b) For the matrices given below, compute AB and BA and show that $AB \neq BA$

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -4 & 5 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 \\ 2 & 4 \\ -1 & 1 \end{bmatrix} \quad 5$$

(c) Find the adjoint of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & -3 \\ -1 & 2 & 3 \end{bmatrix}$ 5

UNIT — III

VII (a) Evaluate $\int \frac{3 \cos x + 4}{\sin^2 x} dx$ 5

(b) Evaluate $\int \frac{1}{x \log x} dx$ 5

(c) Evaluate $\int_0^{\pi^2} x \sin x dx$ 5

OR

VIII (a) Evaluate $\int \sin^3 x \cos x dx$ 5

(b) Evaluate $\int x^2 e^{-x} dx$ 5

(c) Evaluate $\int_0^1 \frac{2x+1}{x^2+x+1} dx$ 5

UNIT — IV

IX (a) Find the area enclosed between the curve $y = x^2$ and the straight line $y = 3x + 4$ 5

(b) Find the volume generated by rotating the area bounded by $y = 2x^2 + 1$, the Y-axis and the lines $y = 3, y = 9$ about the Y-axis. 5

(c) Solve $x \frac{dy}{dx} + 3y = 5x^2$ 5

OR

X (a) Find the volume of a sphere of radius 'r' using integration. 5

(b) Solve $\frac{dy}{dx} = (1+x)(1+y^2)$ 5

(c) Solve $\frac{dy}{dx} + \frac{x\sqrt{1+y^2}}{y\sqrt{1+x^2}} = 0$ 5

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
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ENGINEERING GRAPHICS

[Time : 3 hours

(Maximum marks : 100)

- [Note :—1. A2 size drawing sheet to be supplied.
2. All drawing should be in first angle projections.
3. Both sides of the drawing sheet can be used.
4. Dimensioning as per BIS.
5. Sketches accompanied.]

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. What is reference line or xy line.
2. Give the names of the conic curves having eccentricity unity and eccentricity less than unity.
3. Give the length and width of the drawing boards designated as D0, D1, D2 and D3.
4. What is the difference between oblique view and isometric view ?
5. What are the uses of sectional views ?

(5×2 = 10)

PART — B

(Maximum marks : 30)

(Answer any *five* of the following questions. Each questions carries 10 marks)

- II Redraw the figure -1 and dimensions it as per BIS.
- III Draw a parabola, if the distances of its focus from the directrix is 60 mm. Draw a tangent and normal at any point on the parabola.
- IV Draw the projections of the following points in a common reference line.
 - (a) Point P is 12mm above HP and 20mm in front of VP.
 - (b) Point Q is 24mm below HP and 30mm behind VP.
 - (c) Point R is in HP and 32mm behind VP.
 - (d) Point S is 15mm below HP and 40mm in front of VP.
 - (e) Point T is in HP and in VP.

- V A line AB of length 80mm is inclined 45° to HP and 30° to VP. The end A of the line is 15mm above HP and 20mm in front of VP. Draw its projections.
- VI Draw the involute of a square of side 25mm.
- VII A hexagonal plane of side 30mm, has its one edge parallel to VP and 16mm in front of it. The plane is inclined 40° to VP and the lowest corner is 12mm above HP. Draw its projections.
- VIII The three orthographic views of an object is shown in figure 2. Draw the isometric view. (5×10=50)

PART — C

(Maximum marks : 40)

(Answer any *two* of the following questions. Each question carries 20 marks.)

- IX The isometric view of an object is shown in figure - 3. Draw its front view, top view and left side view.
- X The isometric view of a lever is shown in figure - 4. Draw the full sectional elevation and plan.
- XI Draw the development of the elbow shown in figure - 5. (2×20=40)

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
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ENGLISH FOR COMMUNICATION - II

[Time : 3 hours

(Maximum marks : 100)

PART — A

Marks

- I Read the following excerpts and answer the questions that follow
1. When he heard these words, something in him spoke : his father loved him!
 - (a) Who heard the words ? 1
 - (b) Which were the words heard by him ? 2
 - (c) What was the impact of those words on the hearer ? 4

 2. "It filled my thoughts day and night."
 - (a) What filled the narrator's thoughts ? 1
 - (b) Why he says so ? 2
 - (c) Explain the context. 4

 3. "You are the handicap you must face."
 - (a) Why does the poet say so ? 1
 - (b) How has God equipped us ? 2
 - (c) How can we overcome the obstacles along our path ? 4

 4. Semi conductors are exactly what the name implies.
 - (a) Which was the first semiconductor device to be invented ? 1
 - (b) Why is a semiconductor called so ? 2
 - (c) How semiconductors influenced later inventions ? 4

PART — B

- II 1. Students copied the answers.
- (a) Change the sentence into negative.
(b) Find the subject of the sentence. (2×1 = 2)
2. Choose the correct word from the brackets and fill in the blanks.
- (a) Don't forget to the door, when you go out.
(latch, loiter)
- (b) Manju tried to gain control of her car.
(curious, in vain) (2×1 = 2)
3. Combine the sentences using suitable relative clauses.
- (a) You recommended a movie. It is no longer playing.
(b) I received a letter from my friend. He is working in London. (2×1 = 2)
4. Your friend needs urgent medical aid. Write two sentences giving him/her advice. (2×1 = 2)
5. Write two sentences congratulating your cousin, who has scored high in the exam. (2×1 = 2)
6. Given below are dictionary entries of the word 'gentle'. Study it carefully and answer the questions that follow.

gentle. Adj

- (i) Having or showing a mild or tender temperament.
(ii) Moderate in action, effect.

gentleness n.

gently adv.

- (a) What is the adverb of the word 'gentle' ?
(b) Use 'gentle' in a sentence of your own.
(c) To which part of speech does 'gentle' belong.
(d) Gentleness is the form of gentle. (4×1 = 4)
7. Write the following words in their orthographic form (English).
- (a) /drɪŋk/ (b) /fɪʃ/ (c) /kli:n/ (d) /ʃi:p/
- 4×1 = 4

- III 1. Fill in the blanks using the correct words from the box given below.

rational, ushered, colleagues, carve, forbidden

- (a) Raj and Reena work in the same company. They are
- (b) Sculptors stone using chisels.
- (c) His father was a man. He didn't believe in ghosts.
- (d) Television in an era of entertainment. (4×1 = 4)

Marks

2. Pick out the word that is different from the others in meaning.
- | | | | | |
|----------------|---------------|--------|--------------|-----------|
| (a) remarkable | extraordinary | haste | unbelievable | |
| (b) equipment | handicap | gadget | device | |
| (c) tremble | shiver | shake | jovial | |
| (d) quickly | fast | grant | hastily | (4×1 = 4) |
3. The following sentence has four spelling errors. Correct and rewrite the passage.
- Dabney was **maid** (a) the **principle** (b) of the new school. He was **assined** (c) the duty of supervising the **devalopment** (d) programmes. (4×1 = 4)
4. Each line contains an error. Correct the error and write them down.
- Every day, I wakes up at 6 in the morning. a
- But yesterday, I waked up at 5 am. b
- as I have a lot of homework c
- I complete the homework yesterday itself. d (4×1 = 4)
5. Use the passive voice.
- (a) Patients by doctors. (treat)
- (b) Discipline..... in school. (teach)
- (c) He by a dog yesterday. (bite)
- (d) The work by 20th next month. (finish) (4×1 = 4)
6. Read the following dialogue and complete the paragraph.
- Mother : I have been waiting for you since 4 o'clock.
- Vijay : I went to my friend's house.
- Mother : Why did you go there ?
- Vijay : His mother is seriously ill.
- Mother told Vijay that she (a) Vijay said that he (b)
- His mother further enquired (c) Vijay sadly answered that (d) (4×1 = 4)

PART — C

- IV Describe the person whom you appreciate the most. Give attention to his/her physical appearance, character and so on. 5
- V You have purchased a mobile phone through an online shopping site. You realise that the product is not of the specifications you had asked for. Send an email to the customer care requesting for a replacement. 5
- VI Read the process given below and rewrite it in the format given in the help box. Use appropriate linkers. Choose the right baking pan. Allow the ingredients to reach room temperature. Preheat the oven to the correct temperature. Stir the ingredients with butter and sugar. Add beaten eggs. Put the mixture in the oven. 5

- VII You are in urgent need of your certificates submitted in the time of admission. Write a letter to the principal requesting him to return the certificates. 5
- VIII You are the senior manager of a reputed company. Study the schedule of your daily activity given below and prepare a report.
- | | | |
|----------|---------------------------------------|---|
| 9.00am | - attendance reporting | |
| 9.30 am | - evaluation of previous day | |
| 10.00 am | - meeting with sales representatives. | |
| 11.00 am | - calling up clients | |
| 12 noon | - checking bank transactions | |
| 1.30 pm | - preparing order chart | |
| 2.00 pm | - E-filing the orders | |
| 3.00 pm | - progress assessment for the day. | |
| 4.00 pm | - meeting with the production team | |
| 5.00 pm | - update work diary for the day | 5 |
- IX You are the Secretary of the nature club in your college. You organized a seminar on 'Environmental Pollution'. Prepare a vote of thanks to be delivered on the occasion. 5

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
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ENGINEERING PHYSICS – II

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Write the SI unit of angular velocity and angular acceleration.
2. Give two uses of geo-stationary satellites.
3. Ceiling fans have axes of rotation passing through its centre. Give reason.
4. Calculate the effective resistance of 2 resistors $R_1=2 \Omega$ and $R_2=3 \Omega$ in parallel.
5. What do you understand by the term “nuclear fusion” ? (5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Define angular momentum “L” and torque “ τ ” of an object in rotational motion and write SI unit of each quantity. What is the relationship between L and τ ?
2. Write three equations of translatory motion and explain the terms. Write the corresponding equations for rotational motion and explain each term.
3. Derive an expression for acceleration due to gravity at Earth’s surface starting from Newton’s law of gravitation. Find its value, considering earth as a sphere of radius 6400 km and mass 6×10^{24} kg. Take $G = 6.7 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$
4. Derive an expression for orbital velocity of a satellite in terms of acceleration due to gravity at earth’s surface.
5. Give the diagram of a metre bridge and explain its working principle. How is it used to find an unknown resistance ?
6. State and explain Biot and Savart law. A small current element is placed in north-south direction. What will be the magnetic field at a point 20 cm away and along north-east direction. The length of current element is 1cm and carries a current of 2 amperes.
7. Explain the characteristics of light from a laser source. Give three applications of laser.

(5×6 = 30)

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Explain the physics behind “banking of roads and rails”. 3
- (b) Derive an expression for moment of inertia of a circular disc about a perpendicular axis through the centre. 6
- (c) A particle is moving along the circumference of a circle of radius 3 m. If the angular velocity changes from 4 to 10 revolutions per second within 6 seconds, calculate the angular and linear acceleration. 6

OR

- IV (a) Explain the idea of centripetal force with one example. 3
- (b) Derive an expression for total kinetic energy of a circular disc rolling on a horizontal surface. 6
- (c) A wheel of mass 10kg and radius of gyration 2m makes 30 revolutions per minute. Calculate the torque required to increase the angular velocity to 60 revolutions per minute in 50 seconds. 6

UNIT — II

- V (a) What do you know about a polar-satellite ? 3
- (b) Define gravitational potential energy. What do you mean by gravitational potential of a heavy mass M . Calculate the gravitational potential energy of earth-moon system if mass of earth is 6×10^{24} kg, mass of the moon is 7.3×10^{22} kg and earth-moon distance is 384400 km. 6
- (c) Acceleration due to gravity at earth’s surface is 9.8 m/s^2 . Considering earth as a sphere of radius 6400 km, find acceleration due to gravity at an altitude 64 km. What will be the acceleration due to gravity at a depth 100 km from earth’s surface ? 6

OR

- VI (a) Calculate escape velocity from a star of mass 6×10^{26} kg and radius 9400 km. 3
- (b) With necessary theory derive an expression for escape velocity from earth’s surface. 6
- (c) We have 2 stars of masses 12×10^{30} kg and 15×10^{28} kg respectively, separated by a distance of 2×10^5 km. Find the gravitational force between them. What will be the potential energy ? 6

UNIT — III

- VII (a) Two aluminium wires have their lengths in the ratio 1:3 and radii in the ratio 2:3. Find the ratio of their resistances. 3
- (b) Draw the circuit diagram of Wheatstone's bridge circuit. Analyse the circuit using Kirchhoff's laws and obtain the balancing condition of resistances. 6
- (c) Using a circuit diagram, explain how galvanometer can be converted to a voltmeter. 6

OR

- VIII (a) Resistance of a wire of length 20m and radius 10 mm is $12\text{k}\Omega$. Find its resistivity and conductivity. 3
- (b) Draw the circuit diagrams for 2 resistors in parallel, connected to a potential difference "V". With necessary arguments, arrive at an expression for effective resistance R_p . 6
- (c) Give the circuit diagram and calculate the currents through the 2 resistors $2\ \Omega$ and $10\ \Omega$, if they are in parallel and connected to a potential difference of 6 volt. 6

UNIT — IV

- IX (a) Explain quantum theory of light. 3
- (b) What are the laws of photoelectric effect ? Explain them using Einstein's theory. 6
- (c) Light of wavelength 400 nm falls on a metal of work function 1.1 eV. Can we observe photoelectric effect ? If yes, what will be the maximum kinetic energy of the photoelectrons ? ($h = 6.626 \times 10^{-34}\ \text{Js}$) 6

OR

- X (a) What are the advantages of gas laser over solid state laser ? 3
- (b) Explain the principle and working of Ruby laser. 6
- (c) The threshold wavelength of a metal for photoelectric emission is 600 nm. Determine the kinetic energy (in joules) of the electrons emitted when light of wavelength 500 nm falls on the metal. ($h = 6.626 \times 10^{-34}\ \text{Js}$) 6

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
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PROGRAMMING IN C

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. State a Variable.
2. Define a function.
3. Write a statement to declare an array to store 5 integer numbers.
4. Write a library function to reverse a string.
5. Define a structure.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Describe the different relational and logical operators with examples.
2. Explain the syntax of for loop with example.
3. Describe recursion with an example.
4. Explain the features of Preprocessor statements.
5. Describe an array of pointers with an example.
6. Write a C program to find out the greatest element of an array of "N" elements.
7. Describe how to declare a string and write any two methods to read a string.

(5×6 = 30)

PART — C

Marks

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Explain the hierarchy of operations in C and also write the hierarchy of operators with examples. 9
- (b) Write a C program to find out the area of a right angled triangle ($\frac{1}{2} \times \text{base} \times \text{height}$) 6

OR

- IV (a) Write a C program to find out the greatest number from given three numbers. 8
- (b) Write a C program to find out the sum of digits of a given number. 7

UNIT — II

- V (a) Write a C program to find out the sum of first N Fibonacci elements; each element is find out by a recursive function [that function find out the Nth Fibonacci element of Fibonacci series (0, 1, 1, 2, 3, 5, 8, 13 etc..)] 9
- (b) Write a function to exchange the values of 2 variables using pointers. Also write main program to call the function. 6

OR

- VI (a) Distinguish between static and automatic variables. 8
- (b) Describe macro with an example. 7

UNIT — III

- VII (a) Write a C program to find out the smallest element of an MxN matrix and print its position. 9
- (b) Write a C program to print all the elements which is above the average of an Array of N numbers. 6

OR

- VIII (a) Write a C program to read numbers into an array; assign the array to a pointer and print the array using the pointer. 8
- (b) Write a function to find out the sum of all the elements in an array of N numbers. Also write main program to call the function. 7

UNIT — IV

- IX (a) Explain the string functions with example - strcmp(), strcpy() and strcat() 9
- (b) Describe a two dimensional array of characters and also describe how to initialise it. 6

OR

- X Write a program using an array of structure to read Item name, quantity, rate of "X" items in a shop and print the item name, quantity, rate and price of each items (price = quantity×rate) 15