

Scheme - I

Sample Question Paper

Program Name: All Branches of Diploma in Engineering and Technology.

Program Code : CE/CR/CS/CH/PS/CM/CO/IF/CW/DE/EJ/EN/EQ/ET/EX/IE/MU/EE/EP  
/EU/IS/IC/AE/FG/ME/PG/PT/DC/TX/TC

Semester : First

22103

Subject Title : Basic Mathematics

Marks : 70

Time: 3 Hours

---

Instructions:

1. All Questions are Compulsory.
2. Answer each next main Question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Q.1 Attempt any FIVE of the following

10 Marks

- a) Find the value of  $\log\left(\frac{225}{32}\right) - \log\left(\frac{25}{81}\right) + \log\left(\frac{64}{729}\right)$
- b) Find the area of the triangle whose vertices are (4, 7) (1, 3) (5, 1)
- c) Without using calculator find the value of  $\sin(-765^\circ)$
- d) The area of rectangle with one side 8 cm is  $172\text{cm}^2$ . Find length of the other side.
- e) A cone has a circular base of radius 10 cm and slant height of 30 cm. Calculate the surface area.
- f) If mean is 82.5 and standard deviation is 7.2 find coefficient of variance.
- g) Find range and coefficient of range for the data: 3, 6, 10, 1, 15, 16, 21, 19, 18.

Q.2 Attempt any THREE of the following

12 Marks

- a) If  $A = \begin{bmatrix} -2 & 0 & 1 \\ 1 & 2 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 1 \\ 2 & 3 \\ 1 & 1 \end{bmatrix}$  show that AB is non-singular matrix
- b) Resolve into partial fractions  $\frac{x-5}{x^3 + x^2 - 6x}$
- c) Following equations are obtained as a result of an experiment.

$p_1 + p_2 - p_3 = 0$ ;  $2p_1 + p_2 + p_3 = 26$ ;  $p_2 + p_3 = 14$  Find  $p_1, p_2$  and  $p_3$  by using Cramer's rule.

d) Compute Standard Deviation of the data 19, 23, 16, 07, 18, 35, 14, 24

**Q.3 Attempt any THREE of the following**

**12 Marks**

a) Simplify:  $\frac{\cos^2(180^\circ - \theta)}{\sin(-\theta)} + \frac{\cos^2(270^\circ + \theta)}{\sin(180^\circ + \theta)}$

b) Prove:  $\frac{1 + \sin 2A + \cos 2A}{1 + \sin 2A - \cos 2A} = \cot A$

c) Prove:  $\frac{\sin 7A + \sin A}{\cos 5A - \cos 3A} = \sin 2A - \cos 2A \cdot \cot A$

d) Prove:  $\tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) = \cot^{-1}\left(\frac{9}{2}\right)$

**Q.4 Attempt any THREE of the following**

**12 Marks**

a) If  $\left\{ 3 \begin{bmatrix} 3 & 1 \\ 4 & 0 \\ 3 & -3 \end{bmatrix} - 2 \begin{bmatrix} 0 & 2 \\ -2 & 3 \\ -5 & 4 \end{bmatrix} \right\} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$  Find x, y and z.

b) Resolve in to partial fractions:  $\frac{x^2 + 23x}{(x+2)(x^2+1)}$

c) Prove:  $\sin(20^\circ) \cdot \sin(40^\circ) \cdot \sin(60^\circ) \cdot \sin(80^\circ) = \frac{3}{16}$

d) If  $\tan\left(\frac{A}{2}\right) = \frac{1}{\sqrt{3}}$  Find the value of  $\cos A$

e) If  $\angle A$  &  $\angle B$  are both obtuse angles and  $\sin A = \frac{12}{13}$  and  $\cos B = \frac{4}{5}$ . Find  $\sin(A+B)$ .

**Q.5 Attempt any TWO of the following**

**12 Marks**

a) Attempt the following:

i) Find length of perpendicular from the point  $P(3, 4)$  on the line  $3x + 4y - 5 = 0$

ii) Find the equation of line passing through (1, 7) and having slope 2 units.

b) Attempt the following:

i) Find the equation of line passing through the point (4, 5) and perpendicular to the line

$$7x - 5y = 120,$$

ii) Find the acute angle between the lines  $y = 5x + 6$  and  $y = x$

c) Attempt the following:

- i) A square grassy plot is of side 100 metre. It has a gravel path 10 metres wide all round it on the inside. Find the area of the path
- ii) The internal measures of a cuboidal room are  $12\text{ m} \times 8\text{ m} \times 4\text{ m}$ . Find the total cost of whitewashing all four walls of a room, if the cost of white washing is ` 8 per  $\text{m}^2$ . What will be the cost of white washing if the ceiling of the room is also whitewashed?

**Q.6 Attempt any TWO of the following**

**12 Marks**

a) Find the mean and standard deviation and coefficient of variance of the following data.

Class - Interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
frequency	14	23	27	21	15

b) Attempt the following:

i) The weight of the students is given below. Calculate the range and coefficient of range for the same.

Weight (Kg.)	60 - 62	63 - 65	66 - 68	69 - 71	72 - 74
No. of Students	5	18	42	27	8

ii) In two factories A and B engaged in the same Rundhati industrial area, the average weekly wages (in `.) and the S.D. are as follows:

Factory	Average wages	S.D.
A	34.5	5.0
B	28.5	4.5

Which factory A or B is more consistent?

c) Solve the following equations by matrix inversion method

$$3x + y + 2z = 3, \quad 2x - 3y - z = -3, \quad x + 2y + z = 4$$

Scheme - I

Sample Test Paper

Program Name: All Branches of Diploma in Engineering and Technology.

Program Code : CE/CR/CS/CH/PS/CM/CO/IF/CW/DE/EJ/EN/EQ/ET/EX/IE/MU/EE/EP  
/EU/IS/IC/AE/FG/ME/PG/PT/DC/TX/TC

Semester : First

22103

Subject Title : Basic Mathematics

Marks : 20

Time: 1 Hours

Q.1 Attempt any Four of the following

08 Marks

a) Find the value of  $\begin{vmatrix} 2 & 4 & -4 \\ 3 & -2 & 1 \\ -2 & -4 & 1 \end{vmatrix}$

b) Find the area of the triangle whose vertices are (4, 7) (1, 3) (5, 1)

c) If  $A = \begin{bmatrix} 5 & 3 \\ -1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$  find  $2A - 3B$ .

d) Resolve into partial fractions  $\frac{1}{1-x^2}$

e) Prove:  $\log\left(\frac{p^2}{qr}\right) + \log\left(\frac{q^2}{rp}\right) + \log\left(\frac{r^2}{pq}\right)$

f) Find the value of  $\sin(-330^\circ)$

Q.2 Attempt any THREE of the following

12 Marks

a) Resolve into partial fractions  $\frac{x^2+1}{x(x^2-1)}$

b) Following equations are obtained as a result of an experiment.

$p_1 + p_2 - p_3 = 0$ ;  $2p_1 + p_2 + p_3 = 26$ ;  $p_2 + p_3 = 14$  Find  $p_1, p_2$  and  $p_3$  by using Cramer's rule.

c) Solve the equations by matrix method

$x + 3y + 2z = 6$ ;  $3x - 2y + 5z = 5$ ;  $2x - 3y + 6z = 7$

d) Simplify:  $\frac{\cos^2(180^\circ - \theta)}{\sin(-\theta)} + \frac{\cos^2(270^\circ + \theta)}{\sin(180^\circ + \theta)}$