Register
Number

MATHEMATICS — Paper II

(New Syllabus)

Time Allowed : $2\frac{1}{2}$ Hours]　　　　　　　　　　[Maximum Marks : 100

PART – I

N. B. :　i)　This Part contains *two* Sections, **Section – A** and **Section – B**.

ii)　**Section – A** contains Multiple Choice Questions. Answer *all* the 20 questions. Each question carries *one* mark.

iii)　**Section – B** contains 15 questions. Answer any *ten* questions. Each question carries *two* marks.

SECTION – A

Choose the correct answer from the given alternatives :　　　　$20 \times 1 = 20$

1.　If A is ($m \times n$) matrix and B is ($n \times p$) matrix, where m, n, p are distinct natural numbers then BA is

　　a)　($m \times p$) matrix　　　　　　b)　($n \times n$) matrix

　　c)　not possible　　　　　　　　d)　($p \times m$) matrix.

2.　If A and B are two matrices which satisfy $A + B = B$ then A is

　　a)　row matrix　　　　　　　　b)　column matrix

　　c)　null matrix　　　　　　　　d)　diagonal matrix.

3. $X + \begin{pmatrix} 1 & 2 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 3 & 4 \\ 1 & 0 \end{pmatrix}$ then X is

a) $\begin{pmatrix} -1 & -2 \\ -1 & -2 \end{pmatrix}$

b) $\begin{pmatrix} 4 & 6 \\ 2 & 2 \end{pmatrix}$

c) $\begin{pmatrix} 2 & 2 \\ 0 & -2 \end{pmatrix}$

d) $\begin{pmatrix} 3 & 8 \\ 1 & 0 \end{pmatrix}$.

4. Two chords AB and CD of a circle intersect externally at P. If $AP = 10$ cm, $CP = 6$ cm and $PD = 5$ cm, then PB is

a) 10 cm

b) 3 cm

c) 5 cm

d) 6 cm.

5. If two circles of radii 4 cm and 6 cm touch each other internally, then the distance between their centres is

a) 10 cm

b) 2 cm

c) 24 cm

d) 6 cm.

6. In triangle ABC, DE is parallel to BC, $AD = 2$ cm, $AE = 4$ cm, $EC = 6$ cm then AB is

a) 3 cm

b) $\frac{1}{3}$ cm

c) 5 cm

d) 12 cm.

7. In triangle PQR, PS is the bisector of $\angle P$. If $PQ = 10$ cm, $PR = 6$ cm, $QS = 5$ cm, then RS is

a) 12 cm

b) 6 cm

c) 5 cm

d) 3 cm.

3. $X + \begin{pmatrix} 1 & 2 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 3 & 4 \\ 1 & 0 \end{pmatrix}$ then X is

a) $\begin{pmatrix} -1 & -2 \\ -1 & -2 \end{pmatrix}$

b) $\begin{pmatrix} 4 & 6 \\ 2 & 2 \end{pmatrix}$

c) $\begin{pmatrix} 2 & 2 \\ 0 & -2 \end{pmatrix}$

d) $\begin{pmatrix} 3 & 8 \\ 1 & 0 \end{pmatrix}$.

4. Two chords AB and CD of a circle intersect externally at P. If $AP = 10$ cm, $CP = 6$ cm and $PD = 5$ cm, then PB is

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6. In triangle ABC, DE is parallel to BC, $AD = 2$ cm, $AE = 4$ cm, $EC = 6$ cm then AB is

a)   3 cm

b) $\frac{1}{3}$ cm

c)   5 cm

d)   12 cm.

7. In triangle PQR, PS is the bisector of $\angle P$. If $PQ = 10$ cm, $PR = 6$ cm, $QS = 5$ cm, then RS is

a)   12 cm

b)   6 cm

c)   5 cm

d)   3 cm.

The corresponding sides of two similar triangles are in the ratio 4 : 9. The ratio of their areas is

a)   16 : 81

b)   2 : 3

c)   4 : 9

d) $\frac{1}{4} : \frac{1}{9}$.

. The area of a triangle formed by the points (0, 4), (4, 0) and origin is

a)   8 sq.units

b)   16 sq.units

c)   2 sq.units

d)   4 sq.units.

10. If $x - y = 3$ and $x + 2y = 6$ are the diameters of the circle, then the centre of the circle is

a)   (0, 0)

b)   (2, 2)

c)   (1, – 1)

d)   (4, 1).

11. The straight line given by the equation $y = 10$ is

a)   parallel to y-axis

b)   parallel to x-axis

c)   passing through the origin

d)   perpendicular to x-axis.

12. The X intercept of the line $4x - 7y + 28 = 0$ is

a)   7

b)   – 7

c) $\frac{1}{7}$

d) $-\frac{1}{7}$.

13. Centroid of a triangle whose vertices are (2, – 2), (3, – 1), (1, 0) is

a)   (1, 2)

b)   (– 1, 2)

c)   (2, – 1)

d)   (3, – 1).

14. $\dfrac{\sqrt{1 - \sin^2 \theta}}{\sin \theta} =$

a) $\cot \theta$

b) $\dfrac{\sin \theta}{2}$

c) $\tan \theta$

d) $\dfrac{1 + \sin \theta}{\sin^2 \theta}$.

15. If $\left(1 - \cos^2 \theta \right) = \frac{3}{4}$ then $\sin \theta =$

    a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{2}$

    c)   1   d)   0.

16. $\frac{\sin 30°}{\tan 45°}$ $(1 + \cos 60°) =$

    a) $\frac{3}{2\sqrt{2}}$ b) $\frac{3}{4}$

    c)   3   d)   1.

17. The value of $\sin^2 18° + \sin^2 72°$ is

    a) $- 1$ b)   18

    c)   72   d)   1.

18. When the angle of elevation of the sun is 45°, the length of the shadow of a tower of height 10 m is

    a) $\frac{10}{\sqrt{3}}$ m   b) $10 \sqrt{3}$ m

    c) $\frac{1}{\sqrt{3}}$ m   d)   10 m.

19. Range of first 20 odd natural numbers is

    a)   19   b)   38

    c)   20   d)   39.

20. Probability of an impossible event is

    a)   1   b)   5

    c)   0   d)   2.

SECTION – B

Answer any *ten* questions : $10 \times 2 = 20$

1. Construct a 3×2 matrix whose elements are given by $a_{ij} = 3i - 2j$.

2. Find the unknowns a, b, c and d in the following matrix equation :

$$\begin{pmatrix} d+1 & 10+a \\ 3b-2 & a-5 \end{pmatrix} = \begin{pmatrix} 2 & 2a+1 \\ b-5 & 4c \end{pmatrix}.$$

3. State SSS similarity theorem.

4. D and E are respectively the points on the sides AB and AC of ΔABC such that $AB = 2\cdot6$ cm, $AD = 1\cdot3$ cm, $AC = 3$ cm and $AE = 1\cdot5$ cm. Show that $DE \parallel BC$.

5. In the figure triangle $ABC \mathrel{|||} $ triangle AQP, if $BC = 4$ cm, $PQ = 3$ cm, $AP = 5\cdot7$ cm, $AQ = 3\cdot6$ cm, find AB and AC.
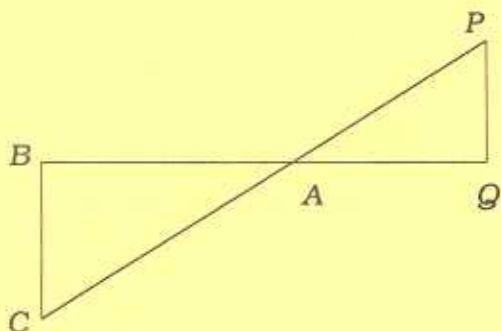
6. Find the area of the quadrilateral $ABCD$ whose $A\,(\,1,\,2\,)$, $B\,(\,-3,\,4\,)$, $C\,(\,-5,\,-6\,)$ and $D\,(\,4,\,-1\,)$.

7. $A\,(\,2,\,4\,)$, $B\,(\,0,\,4\,)$ and $C\,(\,-6,\,0\,)$ are the given points. Find the slope of the line passing through B and the mid-point of AC.

8. Write down the equation of the line perpendicular to $3x + 8y = 12$ and passing through the point $(\,-1,\,-2\,)$.

9. The line joining $(\,-2,\,4\,)$ and $(\,3,\,-5\,)$ is parallel to the line joining $(\,0,\,4\,)$ and $(\,-5,\,y\,)$. Find y.

30. Prove that $\dfrac{\tan^2 \theta}{\sec \theta + 1} = \sec \theta - 1$.

31. Using the formula $\cos 2\theta = 1 - 2 \sin^2 \theta$ find the value of $\cos 60°$, given that $\sin 30° = \dfrac{1}{2}$.

32. Evaluate $\tan(51° \, 15') + \cot(25° \, 18')$.

33. A tower is $\dfrac{100}{\sqrt{3}}$ m high. Find the angle of elevation of its top from a point 100 m away from its foot.

34. Find the standard deviation of 4, 6, 8, 12 and 15.

35. 3 coins are tossed simultaneously. Find the probability of getting at least one head.

PART – II

N. B. :　i)　This Part contains *four* Sections, **Section – C, Section – D, Section - E** and **Section – F**.

　　　　ii)　**Section – C** and **Section – E** contain 3 questions. Answer any *two* questions in each Section.

　　　　iii)　**Section – D** and **Section – F** contain 4 questions. Answer any *three* questions in each Section.

　　　　iv)　Each question carries *five* marks.

SECTION – C

Answer any *two* questions :　　　　　　　　　　　　　　　　　$2 \times 5 = 10$

36. State and prove basic proportionality theorem.

37. D is the midpoint of side BC of triangle ABC. DP bisects $\angle ADB$ meeting AB at P and DQ bisects $\angle ADC$ meeting AC at Q. Prove that $PQ \parallel BC$.

38. Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.

SECTION – D

Answer any *three* questions :

$3 \times 5 = 15$

39. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$, show that $A^2 - 5A + 7I_2 = 0$.

40. Find x and y if $2x + y = \begin{bmatrix} 4 & 4 & 7 \\ 7 & 3 & 4 \end{bmatrix}$ and $x - 2y = \begin{bmatrix} -3 & 2 & 1 \\ 1 & -1 & 2 \end{bmatrix}$.

41. Find the S.D. of the following :

x :	6	9	12	15	18
f :	7	12	13	10	8

42. A number is selected at random from 40 to 80. Find the probability that it is divisible by 6 or 9.

SECTION – E

Answer any *two* questions :

$2 \times 5 = 10$

43. Prove that $\dfrac{\sin \theta}{1 + \cos \theta} + \dfrac{1 + \cos \theta}{\sin \theta} = 2 \cosec \theta$.

44. Find the area of a right-angled triangle with hypotenuse 8 cm and one of the acute angles 57°.

45. The angle of elevation of a tower at a point is 45°. After going 20 m towards the foot of the tower the angle of elevation of the tower becomes 60°. Calculate the height of the tower.

SECTION – F

Answer any *three* questions :

$3 \times 5 = 15$

46. The vertices of a triangle ABC are $A(1, 8)$, $B(-2, 4)$ and $C(8, -5)$. M and N are the midpoints of AB and AC. Show that MN is parallel to BC and $MN = \dfrac{1}{2} BC$.

47. Find the equation of the straight line which is concurrent with the lines $x - y - 2 = 0$ and $3x + 4y + 15 = 0$ and is perpendicular to the line joining the points (2, 3) and (1, 1).

48. The diameters of a circle are $2x + 5y - 25 = 0$ and $5x + 4y - 20 = 0$. Find the radius of the circle which passes through the point (3, 4).

49. Find the circumcentre of the triangle whose vertices are A (4, 2), B (3, 1) and C (3, 3).

PART – III

N. B. : i)   The **Section – G** of this Part contains 2 questions. Answer any *one* question.

ii)   Each question carries *ten* marks.

SECTION – G

Answer any *one* question :

$1 \times 10 = 10$

50. Draw a circle of radius 9 cm. Take a point P outside the circle. Without using the centre of the circle draw two tangents to the circle from the point P. Calculate the length of the tangents and verify it.

51. Construct a triangle ABC such that $AB = 6$ cm, $\angle C = 40°$ and altitude from C to AB is of length 4 cm. Measure the length of the median through C.