Common Entrance Exam for Admission into Polytechnic
Model Paper - 2012

Time: 60 Min **Marks : 60**

SECTION - I (MATHEMATICS)

1. **An example for a contradiction is**
   1) $p \wedge q$ 2) $p \vee \sim p$ 3) $p \wedge \sim p$ 4) $p \Rightarrow \sim p$

2. **Which of the following statement is false?**
   1) $x + 3 = 5 \Rightarrow x = 2$ 2) $x^2 + 1 = 0 \Rightarrow \forall\, x \in N$
   3) $x^2 - 1 = 0 \Rightarrow \forall\, x \in R$ 4) $x^2 - 9 = (x+3)(x-3) \forall\, x \in R$

3. **The law $p \vee p = p$ is known as**
   1) Nilpotent 2) Idempotent 3) Commutative 4) None

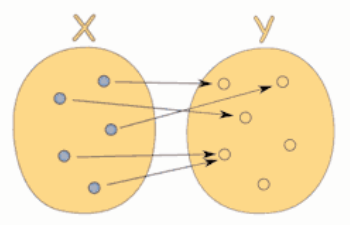
4. **$A = \{x : x \leq 4, x \in N\}$; $B = \{2, 3, 6, 8\}$; $A \cap B$ =**
   1) {2, 3} 2) {1, 2, 3, 4} 3) { } 4) {1, 4}

5. **If $A \subset B$; then $A' \cup B$ =**
   1) μ 2) A–B 3) B–A 4) B

6. **If $f : R \to R$, $g : R \to R$ are functions defined by $f(x) = 3x-2$, $g(x) = x^2+1$, then $(gof)^{-1}(2)$ = _____**
   1) 9/25 2) 25/9 3) 4/3 4) 3/4

7. **If $f(x) = x^2 + x + 2$, then 14 is the image of**
   1) 2 2) 21 3) 5 4) 3

8. **The figure represents _____ function:**



   1) Onto 2) Bijection 3) Into 4) Constant

9. $f(x) = x + 2$, $g(x) = x^2 + x + 2$, $x \in R$, value of $\frac{g(1)+g(2)+g(3)}{f(1)+f(2)+f(3)}$ is _____

1) 3/7 2) 1/7 3) 13/6 4) 7/3

10. If $\alpha_1\beta$ are the roots of $x^2 - p(x + 1) - c = 0$ then $(1 + \alpha)(1 + \beta) =$

1) c 2) (1–c) 3) c^2 4) (2+c)

11. $1^3 + 1^2 + 1 + 2^3 + 2^2 + 2 + 3^3 + 3^2 + 3 + \ldots\ldots\ldots + n^3 + n^2 + n =$ _____

1) $\frac{n^2(n-1)}{2}$ 2) $\frac{n(n-1)(3n^2-7n+8)}{2}$

3) $\frac{n(n+1)(3n^2+7n+8)}{12}$ 4) $\frac{n(n+1)(3n^2-7n+8)}{12}$

12. In Which of the following the value of x lies between 1 and 3?

1) $x^2 - 4x + 3 > 0$ 2) $x^2 - 4x + 3 < 0$

3) $x^2 + 4x - 3 = 0$ 4) $x^2 + 4x - 3 < 0$

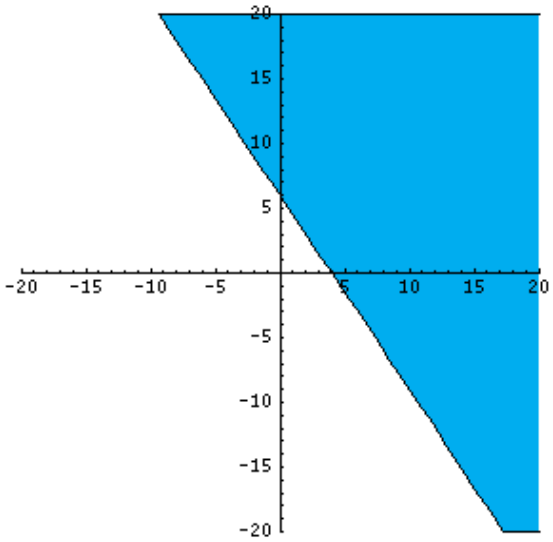
13. If $^{20}c_x = {}^{20}c_{x-4}$ then the value of $^{15}c_x$ = _____

1) 155 2) 225 3) 455 4) 355

14. $\sqrt{2011+\sqrt{2011+\sqrt{2011+\ldots\ldots\ldots+\infty}}}$ = _____

1) $\frac{1+\sqrt{8045}}{2}$ 2) $\frac{1-\sqrt{8045}}{2}$ 3) 3 3) $\sqrt{5}$

15. The inequation representing the shaded region in the figure is _____



1) $x + y > 0$ 2) $x - y < 0$ 3) $x + y \leq 0$ 4) $x + y = 0$

16. The point which does not belong to the region $2x + 7y - 14 < 0$ is _____

1) (1, 1) 2) (6, 1) 3) (0, 2) 4) (–1, 1)

17. $x \geq 0, y \geq 0, x + y \leq 1, 3x + y \leq 1$. The maximum value of the objective function $f = 2x + 3y$ is _____

1) 1/3 2) 2 3) 4/3 4) 3

18. $\sqrt[3]{16} \times \sqrt[3]{4} =$ _____

1) 4 2) –4 3) 6 4) 3

19. $\lim_{n \to \infty} \frac{\left(1^2 + 2^2 + 3^2 + \ldots\ldots + n^2\right)^2}{(1+2+3+\ldots\ldots+n)\left(1^3 + 2^3 + 3^3 + \ldots\ldots + 4^3\right)} =$ _____

1) 9/8 2) 4/3 3) 8/9 4) $-\frac{4}{3}$

20. One of the solution of the equation $4^{1+x} + 4^{1-x} = 10$ is _____

1) 1/2 2) 1/3 3) 1/5 4) 1/7

21. $\lim_{x \to \sqrt{2}} \frac{x^3 - \sqrt{8}}{x - \sqrt{2}} =$ _____

1) 12 2) 24 3) 18 4) 6

22. $\lim_{n \to \infty} \left[1 + \frac{1}{3} + \frac{1}{3^2} + \ldots\ldots\infty\right] =$ _____

1) 1/2 2) 2/3 3) 3/2 4) 1/3

23. The sum of the 'n' terms of the G.P. 1, a, a^2, a^3..... (a>1) is _____

1) $\frac{a^n - 1}{1 - a}$ 2) $\frac{1 - a^n}{a - 1}$ 3) $\frac{a^n - 1}{a - 1}$ 4) $\frac{a^n - 1}{a^n + 1}$

24. The sum of four terms of an A.P. is 16, then its first term is _____

1) 4 2) can't be determined

3) –4 4) 8

25. Common difference of the A.P. $\frac{1}{1+\sqrt{x}}, \frac{1}{1-x}, \frac{1}{1-\sqrt{x}}, \ldots$

1) $\frac{\sqrt{x}}{1-x}$ 2) $\sqrt{\frac{x}{1-x}}$ 3) $\frac{x}{\sqrt{1-x}}$ 4) $\frac{1}{1-x}$

26. If $t_n = 2^n$, then sum of 5 terms is _____

1) 73 2) 66 3) 69 4) 62

27. The third term of H.P. is 1/7, 7^{th} term is 1/5, 15^{th} term of that H.P. is _____

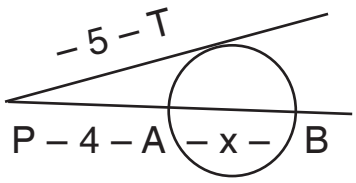
1) –1 2) 1 3) 0 4) 15

28. In ΔPQR, lines QS, QT trisects $\angle Q$, If QS, QT meet PR at S and T, then .....

1) $\frac{PS}{TR} = \frac{PT}{SR} \cdot \frac{QS}{QT}$ 2) $\frac{PS}{TR} = \frac{PT}{SR}$

3) $\frac{PS}{TR} = \frac{PQ}{QT} \cdot \frac{QS}{QR}$ 4) $\frac{PS}{TR} = \frac{PQ}{QP}$

29. From the below figure the value of x is _____



1) $2\frac{1}{4}$ 2) 2.5 3) 3 4) $2\sqrt{2}$

30. If the ratio of corresponding sides of two similar triangles is $1:\sqrt{3}x$, then the ratio of their areas is _____

1) 1 : 9x 2) 9x : 1 3) 3x : 1 4) None

31. In ΔABC, $\angle B$ $\angle 90°$, and $AD \perp BC$; then AC^2 = _____

1) $AB^2 + BC^2 + BC.BD$ 2) $AB^2 + BC^2 - 2BC.BD$

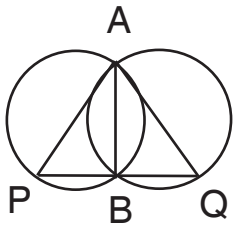
3) $AB^2 + BC^2 - BC.BD$ 4) $AB^2 + BC^2 + 2BC.BD$

32. Length of transverse common tangent is _____

1) $\sqrt{d^2 - (R+r)^2}$ 2) $\sqrt{d^2 - R^2 - r^2}$

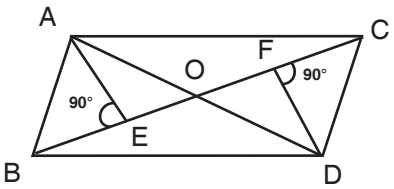
3) d–(R + r) 4) $\sqrt{d^2 - (R-r)^2}$

33. AP, AQ are tangents to the circles at A
$\angle ABP = 30°$, $\angle ABQ$ = _____



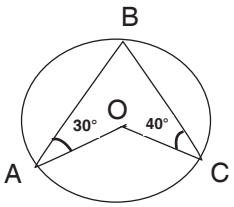
1) 70° 2) 60° 3) 15° 4) 30°

34. **As in the figure ∠AEO = ∠DFC = 90°, 'O' is the point of intersection of AD and BC, then AE/DF = _____**



1) AC/BD 2) AB/BD 3) AO/DO 4) AC/CD

35. **From the adjacent figure,**



∠BAO = 30°, ∠BCO= 40° then ∠AOC = _____

1) 100° 2) 110° 3) 130° 4) 140°

36. **The distance between the parallel lines 8x + 6y + 5 = 0 and 4x + 3y – 25 = 0 is _____ units.**

1) 2/11 2) 25/2 3) 11/2 4) 2/25

37. **The point which divides the line segment joining (–2, 4) (2, 7) in the ratio 2:1 externally is _____**

1) (6, 10) 2) (2, 10/3) 3) (–4/3, 2/3) 4) (2/3, 6)

38. **If $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are perpendicular, then**

1) $a_1a_2 - b_1b_2 = 0$ 2) $a_1b_2 - a_2b_1 = 0$

3) $a_1a_2 + b_1b_2 = 0$ 4) $a_1b_2 + a_2b_1 = 0$

39. **If (0, 0); (a, 0); (b, c) form a parallelogram, its 4^{th} vertex is _____**

1) (b, c–a) 2) (b–a, c) 3) (b–c, c–a) 4) (c, b–a)

40. **If 1/p + 1/q = 1, then the line x/p + y/q = 2 passes through**

1) (1, 1) 2) (1, 2) 3) (2, 1) 4) (1/2, 1/2)

41. **The equation of a line whose intercepts a, b are such that a+b = 2 and ab = 1 is _____**

1) x – y = 2 2) x + y = 1 3) x – y = 1 4) x + y = 2

42. Area of the triangle formed by the line $x\cos\infty + y\sin\infty = p$ with the coordinate axes is _____

1) $\frac{p^2}{\sin\infty}$ 2) $\frac{p^2}{\sin\infty\cos\infty}$ 3) $\frac{p^2}{\cos\infty}$ 4) $\frac{p^2}{2\sin\infty\cos\infty}$

43. If (k, 2k), (2k, 3k), (3, 1) are collinear then k = _____

1) –2 2) 2 3) –3 4) 3

44. If $\cot\theta + \cos\theta = m$, and $\cot\theta - \cos\theta = n$, then $m^2 - n^2$ = _____

1) 4mn 2) $\sqrt{4mn}$ 3) $4\sqrt{mn}$ 4) $\sqrt[4]{mn}$

45. If $\tan\theta = a/b$ then $\sin\theta$ = _____

1) $\frac{a^2}{a^2+b^2}$ 2) $\frac{a^2}{\sqrt{a^2+b^2}}$ 3) $\frac{a}{\sqrt{a^2+b^2}}$ 4) $\frac{a^2}{a^2-b^2}$

46. Express $\sin\theta$ in terms of $\sec\theta$ is _____

1) $\sqrt{\frac{1-\sec^2\theta}{\sec\theta}}$ 2) $\sqrt{\frac{\sec^2\theta-1}{\sec\theta}}$ 3) $\sqrt{\frac{\sec^2\theta+1}{\sec\theta}}$ 4) None

47. The tops of two poles of heights 20m and 14m are connected by a wire. If the wire makes an angle of 30° with the horizontal, the length of the wire in meters in between two poles is _____

1) 8 2) 14 3) 10 4) 12

48. $\cos1°.\cos2°.\cos3°.\cos4°$ ..... $\cos 100°$ = _____

1) ∞ 2) –1 3) 0 4) 1

49. $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}+\frac{1+\sin\theta+\cos\theta}{1+\sin\theta-\cos\theta}$ = _____

1) $2\cos\theta$ 2) $2\operatorname{cosec}\theta$ 3) $2\sec\theta$ 4) $2\sin\theta$

50. $\frac{\sin A\sqrt{1+\cos A}}{\sqrt{1-\cos\theta}\,(1+\cos A)}$ = _____

1) 1 2) 2 3) 3 4) 0

51. $\frac{\cos\theta}{1-\sin\theta}+\frac{\cos\theta}{1+\sin\theta}=4$ then θ = _____

1) 45° 2) 60° 3) 90° 4) 30°

52. $\sin^2 30°, \sin^2 45°, \sin^2 60°$ are in _____

1) A.P 2) G.P 3) H.P 4) A.G.P

53. **The average of natural numbers from 11 to 20 is _____**

1) 14.5 2) 15.5 3) 11 4) 20.5

54. **The median of the following data is _____**

Marks	0-5	5-10	10-15	15-20	20-25
No.of students	10	18	42	23	7

1) 12 2) 12.3 3) 12.6 4) 12.7

55. **A.M of 8, 6, 4, x, 3, 6, 0 is 4, then the value of x is = _____**

1) 1 2) 4 3) 6 4) 7

56. **The arithmetic mean of the following data is _____**

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No.of students	5	7	15	8	3	2

1) 22.5 2) 23.5 3) 24.5 4) 25.75

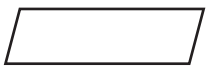
57. **If** $A = \begin{bmatrix} \cos\infty & -\sin\infty \\ \sin\infty & \cos\infty \end{bmatrix}$ **then** A^{-1} _____

1) $\begin{bmatrix} \cos\infty & \sin\infty \\ -\sin\infty & \cos\infty \end{bmatrix}$ 2) $\begin{bmatrix} \cos\infty & -\sin\infty \\ \sin\infty & \cos\infty \end{bmatrix}$ 3) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ 4) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

58. **If** $A = \begin{bmatrix} 8 & 9 \\ 6 & 2 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 8 \\ 9 & 4 \end{bmatrix}$, **then** $B^T - A^T =$ _____

1) $\begin{bmatrix} 6 & -3 \\ 1 & 2 \end{bmatrix}$ 2) $\begin{bmatrix} 6 & 1 \\ -3 & -2 \end{bmatrix}$ 3) $\begin{bmatrix} -6 & -1 \\ 3 & 2 \end{bmatrix}$ 4) $\begin{bmatrix} -6 & 3 \\ -1 & 2 \end{bmatrix}$

59. **Which of the following is a decision box**

1)  2)  3)  4) 

60. **The central processing unit of a computer consists of _____**

1) Input unit 2) Flow chart 3) Memory unit 4) Output unit

KEY
SECTION - 1
MATHEMATICS

1) 3	2) 2	3) 2	4) 4	5) 4	6) 2	7) 4	8) 1
9) 3	10) 2	11) 3	12) 2	13) 3	14) 1	15) 1	16) 2
17) 1	18) 1	19) 3	20) 1	21) 4	22) 3	23) 3	24) 2
25) 1	26) 4	27) 2	28) 3	29) 1	30) 4	31) 2	32) 1
33) 4	34) 3	35) 4	36) 3	37) 1	38) 3	39) 2	40) 4
41) 2	42) 4	43) 1	44) 3	45) 3	46) 2	47) 4	48) 3
49) 2	50) 1	51) 2	52) 1	53) 2	54) 3	55) 1	56) 4
57) 1	58) 4	59) 1	60) 3				