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MM 80

Mathematics Mock Test X Sep 2011

Time 3 Hours

Section A 1 Mark Each

Paper prepared by

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- Sum of a rational and irrational number is always _____
(a) rational (b) irrational (c) may be rational or irrational (d) none of these
- If $(x - 1)$ and $(x + 3)$ are the factors of $x^3 + 3x^2 - x - 3$. Then the third factor is
(a) $x + 1$ (b) $x - 1$ (c) $x + 3$ (d) $x - 2$
- In ΔABC , $DE \parallel BC$ intersecting AB at D and AC at E , $DB = 8$, $AE = 25$, $EC = 10$. $AB =$
(a) 16 cm (b) 28 cm (c) 20 cm (d) 12.5 cm
- If $\sin 3\theta = \cos(\theta - 6^\circ)$, where 3θ and $\theta - 6^\circ$ are both acute angles, then $\theta =$
(a) 18° (b) 24° (c) 36° (d) 30°
- The value of $\frac{\cos^2 70^\circ - \cos^2 20^\circ}{\sin^2 20^\circ - \sin^2 70^\circ}$
(a) $\frac{1}{2}$ (b) $\sqrt{2}$ (c) 1 (d) 2
- If $\cos(\theta + \Phi) = 0$ then $\sin(\theta - \Phi)$ can be reduced to
(a) $\cos \theta$ (b) $\cos 2\Phi$ (c) $\sin \Phi$ (d) none of these
- The polynomial _____ is not formed by zeros 4 and -5
(a) $x^2 + x - 20$ (b) $2x^2 + 2x - 40$ (c) $3x^2 + 3x - 60$ (d) $2x^2 - 2x + 40$
- The pair of linear equations $5x + 7y = 3$, $7x + 5y = 4$
(a) One solution (b) Two solutions (c) Many solutions (d) No solution
- $\sin^4 \theta - \cos^4 \theta =$
(a) $\sin^2 \theta - \cos^2 \theta$ (b) $2 \sin^2 \theta - 1$ (c) $1 - 2\cos^2 \theta$ (d) all of these
- Product of HCF and LCM of 35 and 20 is
(a) 70 (b) 700 (c) 15 (d) 55

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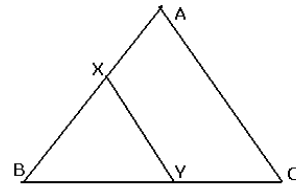
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Section B 2 Marks Each

11. Is $13 \times 7 \times 5 \times 3 \times 2 + 13 \times 7 \times 5$ a composite number? justify your answer.
12. Can the quadratic polynomial $x^2 + bx + b$ have equal zeros for some odd integer $b > 1$
13. In ΔABC , D and E are points on sides AB and AC respectively such that $\angle ADE = \angle C$. Is $\Delta ADE \sim \Delta ACB$? why?

14. If $7 \sin^2 \theta + 3 \cos^2 \theta = 4$, show that $\tan \theta = \frac{1}{\sqrt{3}}$



15. In ΔABC , line segment $XY \parallel AC$, XY divides triangular region ABC into two parts equal in area. Determine $\frac{AX}{AB}$

16. In ΔABC , D lies on BC and $AD \perp BC$. If $BD = \frac{1}{3} CD$. Prove that $2CA^2 = 2AB^2 + BC^2$

17. The following distribution gives the daily income of 50 workers of a factory:

Daily income (in Rs)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Write the above distribution as more than type cumulative frequency distribution.

18. Find the mode of the data

X	0-20	20-40	40-60	60-80	80-100	100-120
F	8	20	30	15	17	8

Section C 3 Marks Each

19. Show that any positive integer a is of the form $3q$, $3q + 1$ or $3q + 2$ for some integer q.
20. Prove that $\sqrt{7}$ is irrational.

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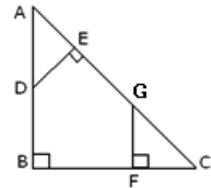
Time 3 Hours

21. A person rowing a boat at the rate of 5km/hour in still water, he takes thrice as much time in going 40km upstream as in going 40 km downstream. Find the speed of stream.
22. If $\sec \theta = x + \frac{1}{4x}$, prove that $\sec \theta + \tan \theta = 2x$ or $\frac{1}{2x}$

23. Show that $\frac{1}{\sec x - \tan x} - \frac{1}{\cos x} = \frac{1}{\cos x} - \frac{1}{\sec x + \tan x}$

24. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, show that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$

25. In figure, $AB \perp BC$, $FG \perp BC$ and $DE \perp AC$. Prove that $\triangle ADE \sim \triangle GCF$



26. ABC is a right triangle right angled at B. D and E be points on AB and BC respectively. Prove that $AE^2 + CD^2 = AC^2 + DE^2$

27. The mean of the following data is 53. Find missing frequencies x and y.

Age (in years)	0-20	20-40	40-60	60-80	80-100	total
Number of people	15	x	21	y	17	100

28. Find the median of the following data

Classes	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	3	4	3	3	4	7	9

Section D 4 Marks Each

29. Find other zeroes of the polynomial $p(x) = 2x^4 + 7x^3 - 19x^2 - 14x + 30$ if two of its zeroes are $\pm\sqrt{2}$
30. Prove that ratio of the areas of two similar triangles is equal to the ratio of squares of their corresponding sides.

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31. Prove that: $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$
32. If $\sec \theta + \tan \theta = p$, prove that $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$
33. Determine graphically co-ordinates of the vertices of triangle, the equations of whose sides are $y = x$, $3y = x$, $x + y = 8$
34. Draw an less than and more than Ogive from the following data and find out the median wage:

Weekly wages (Rs.)	0-20	20-40	40-60	60-80	80-100
No. of workers	40	51	60	38	7

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