Exam Paper

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Test / Exam Name: REVISION TEST | Standard: 12TH SCIENCE | Subject: MATHEMATICS
Student Name: ---------- | Section: ---------- | Roll No.: ----------

Questions: 15	Time: 60 Mins	Marks: 62

Q1. If $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & -1 & -1 \\ 0 & -2 & 1 \end{bmatrix}$ find A^{-1} and use it to solve the following system of equations: **5 Marks**

x - 2y = 10, 2x - y − z = 8, - 2y + z = 7

Q2. A relation R is defined on a set of real numbers R as **5 Marks**
R = {(x, y) : x . y is an irrational number}.
Check whether R is reflexive, symmetric and transitive or not.

Q3. Find the value of $\sin\left(\cos^{-1}\frac{4}{5} + \tan^{-1}\frac{2}{3}\right)$. **4 Marks**

Q4. Solve the following L.P.P. graphically: **4 Marks**

Minimise Z = 5x + 10y
Subect to x + 2y ≤ 120
Constraints x + y ≥ 60
x − 2y ≥ 0
and x, y ≥ 0

Q5. If $y = (\sin x)^x + \sin^{-1}\left(\sqrt{1-x^2}\right)$, then find $\frac{dy}{dx}$. **4 Marks**

Q6. Find the value of $\cot\frac{1}{2}\left[\cos^{-1}\frac{2x}{1+x^2} + \sin^{-1}\frac{1-y^2}{1+y^2}\right]$, $|x| < 1, y >$ 0 and xy < 1. **4 Marks**

Q7. A ladder 13m long is leaning against a vertical wall. The bottom of the ladder is dragged away from the wall along the ground at the rate of 2cm/sec. How fast is the height on the wall decreasing when the foot of the ladder is 5m away from the wall? **4 Marks**

Q8. If $y = e^{x^2}\cos x + (\cos x)^x$, then find $\frac{dy}{dx}$. **4 Marks**

Q9. If $y = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$ show that **4 Marks**
$(1-x^2)\frac{d^2y}{dx} - 3x\frac{dy}{dx} - y = 0$.

Q10. If = $y = (\sin^{-1} x)^2$, prove that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - 2 = 0$. **4 Marks**

Q11. Prove that : **4 Marks**

$\tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right] = \frac{\pi}{4}+\frac{1}{2}\cos^{-1}x^2; -1 < x < 1$

Q12. Find the intervals in which the function f given by $f(x) = 4x^3 - 6x^2 - 72x + 30$ is: **4 Marks**

i. Strictly increasing.

ii. Strictly decreasing.

Q13. If $y = (\tan^{-1}x)^2$, show that $(x^2+1)^2\frac{d^2y}{dx^2} + 2x(x^2+1)\frac{dy}{dx} = 2$. **4 Marks**

Q14. Solve for x: **4 Marks**

$2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$.

Q15. Maximise Z = x + 2y **4 Marks**

subject to the constraints

$x + 2y \geq 100$

$2x - y \leq 0$

$2x + y \leq 200$

$x, y \geq 0$

Solve the above LPP graphically.