PVG's

Muktangan English School & Jr. College, Pune - 9

Unit Test - I (2024-25)

Standard - XII

Subject - MATHEMATICS | **Marks - 25**
Date - 24-7-2024 | **Time - 10.15 a.m. to 11.30 a.m.**

General Instructions :

The question paper is divided into four sections.

1) Section A : Q.1 contains two multiple choice questions carrying two marks each.
   Q.2 contains three very short answer type questions carrying one mark each.
2) Section B : contains six short answer type questions carrying two marks each.
   (Attempt any four)
3) Section C : contains three short answer type questions carrying three marks each.
   (Attempt any two)
4) Section D : contains two long answer type questions carrying four marks each.
   (Attempt any one)
5) Use of log table is allowed. Use of calculator is not allowed.
6) Figures to the right indicate full marks.
7) For each MCQ only first attempt will be considered for evaluation.

SECTION - A

Q.1 Select and write the most appropriate answer from the given alternative for each subquestions. (2 marks each) **(4)**

i) If pvq is T and p∧q is T then the truth values of p and q are

(a) T,T (b) T, F (c) F,T (d) F, F

ii) If $y = x^x$, then $\frac{dy}{dx}$ = ?

(a) $x^x (1 + \log x)$ (b) $x^x (1 + \frac{1}{x})$ (c) $x\ x^{x-1}$ (d) $x^x \log x$

Q.2 Answer the following. (1 Mark each) **(3)**

i) Write the dual of the following statement : $(p \wedge t) \vee (c \wedge \sim q)$

ii) Differentiate w.r.t. x : $\sin(x^2+a^2)$

iii) Show that the function $\frac{1}{x}$ is a decreasing function.

SECTION - B

Attempt any four of the following questions. (2 marks each) (08)

Q.3 Rewrite the following statement without using if..... then.
If a man is a judge then he is honest.

Q.4 Construct the switching circuit of the following : $(\sim p \wedge q) \vee (p \wedge \sim r)$

Q.5 Differentiate w.r.t. : $x : [\log [\log (\log x)]]^2$

Q.6 Find $\frac{d^2y}{dx^2}$ of the following : $x = 2at^2$, $y = 4at$

Q.7 Find the approximate value of $\sqrt{64.1}$

Q.8 Check the validity of Rolle's theorem for
$f(x) = \sin x - \cos x + 3, x \in [0, 2\Pi]$

SECTION - C

Attempt any two of the following questions. (3 marks each) (6)

Q.9 Without using truth table prove that $(p \wedge q) \vee (\sim p \wedge q) \vee (p \wedge \sim q) \equiv pvq$

Q.10 Differentiate w.r.t $x : \cos^{-1}\left(\sqrt{\frac{1 + \cos x}{2}}\right)$

Q.11 Find the equation of tangent and normal to the curve at the point on it
$y = x^2 + 2e^x + 2$ at $(0, 4)$

SECTION - D

Attempt any one of the following questions. (4 marks each) (4)

Q.12 Examine whether the following statement pattern is a tautology or a contradiction or a contingency.
$(p \wedge \sim q) \leftrightarrow (p \rightarrow q)$

Q. 13 If $x = \sin t$ and $y = e^{mt}$ then show that

$$(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - m^2y = 0$$

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