Makawanpur Multiple Campus.

Grade:11 (Science Arts & Education) Second Term Exam.(2080) F.M: 7

P.M: 2

Sub: Mathematics. Time:3 hrs.

Group:A (11x1=11)

Write the correct answer.

1) A The disjunction p v q is true only when
   a) p is true b) q is true c) p or q are true d) none

2) The sum of the series: $1/2 + 1/4 + 1/8 + \ldots\ldots\ldots \infty$ is
   a) 0 b) 1/2 c) 1 d) 2

3) The number of proper subsets of the set S = {2,3,4} is
   a) 5 b) 6 c) 7 d) 8

4) the multiplicative inverse of $-3-4i$ is
   a) $\left(\frac{2}{25}+\frac{3i}{50}\right)$ b) $\frac{2}{25}+\frac{3i}{25}$ c) $3+4i$ d) none

5) If the equation $5x^2 - px + 45 = 0$ have equal roots then the value of p is
   a) ± 10 b) ± 20 c) ± 30 d) none

6) The value of $\lim_{x\to a}\frac{\sin(x-a)}{x^2-a^2}$ is
   a) 1 b) a c) 1/a d) 1/2a

7) The limit of the function: $\lim_{x\to 5}\frac{|x-5|}{x-5}$ is
   a) 1 b) -1 c) 0 d) does not exist

8) The derivative of e^{2x} with respect to e^x is
   a) $2e^x$ b) e^x c) 1 d) none

9) Determine whether the function $f(x) = 2x^3 - x^2 + 5$ is increasing or decreasing at x = 3.
   a) increasing b) decreasing c) both d) none

10) The value of $\int_0^{\frac{\pi}{2}} sec^2x\, dx$ is
   a) 0 b) 1 c) $\sqrt{2}$ d) $\sqrt{3}$

11) The value of $\int \frac{\cos(lnx)dx}{x}$ is
   a) sin|lnx| b) cos|lnx| c) tanx d) none

Group:B (8x5 = 40)

12) a) For any three sets A,B and C, prove that $A - (B \cup C) = (A - B) - C$.
   b) State and prove De morgan's law.

13) a) Solve the inequality: $x^2 + 7x + 10 \leq 0$.
   b) Solve the inequality. $|x - 1| \geq 1$

OR

a) Show that the function f: R → R defined by f(x) = 5x + 3 is one – one and onto.

b) If $\frac{lnx}{y-z} = \frac{lny}{z-x} = \frac{lnz}{x-y}$ then prove that $x^x y^y z^z = 1$.

14) a) If a , b , c are in A.P. , b , c , d in G.P. and c , d , e in H.P.then prove that a , c , e are in G.P.

b) Sum to infinity of the series: $1 + 3x + 5x^2 + 7x^3 + \ldots\ldots\ldots\ldots$

15) a) Prove: $\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ b+c & c+a & a+b \end{vmatrix} = (b-c)(c-a)(a-b)(a+b+c)$

b) Prove that the matrices $\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$ and $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$ are inverse of each other.

16) a) If $\sqrt{x-iy} = a - ib$ then prove that $\sqrt{x+iy} = a + ib$

b) Find the square root of $5 + 12i$.

17) a) The sum of the roots of a quadratic equation is 1 and sum of their square is 13, find the equation.

b) IF the equation $x^2 + qx + pr = 0$ and $x^2 + rx + pq = 0$ have a common root, prove that

$P + q + r = 0$.

18) a) If one root of the equation $ax^2 + bx + c = 0$ is thrice the other, then. show that

$3b^2 = 16ac$.

b) If $x + iy = \sqrt{\frac{1+i}{1-i}}$ then show that $x^2 + y^2 = 1$.

19) Define critical point.Find the local maxima or local minima and point of inflection of the function. $Y = 4x^3 - 6x^2 - 9x + 1$.

Group:C **(3x8 = 24)**

20) a) Evaluate the limit: $\lim_{x\to\theta} \frac{x\sin\theta - \theta\sin x}{x-\theta}$.

b) Define the continuity of a function at a point. A function f(x) is defined by

$$f(x) = \begin{cases} 3+2x & for \quad -3/2 \le x < 0 \\ 3-2x & for \quad 0 \le x < 3/2 \\ -3-2x & for \quad x \ge 3/2 \end{cases}$$

Show that f(x) is discontinuous at $x = 3/2$.

21) a) Find from ist principle the derivative of $\cos(ax + b)$.

b) Find dy/dx , when $y = \ln t + \sin t$, $x = e^t + \cos t$.

22) a) Evaluate , $\int \tan^4 x\, dx$. b) Evaluate , $\int \frac{1}{x\sqrt{9+x^2}}\, dx$.

THE END