



# UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Second Semester – 2019

PAPER: Calculus-II

Course Code: MATH-123 / MTH-12333 Part – I (Compulsory) Time: 30 Min. Marks: 10

Roll No. in Fig. ....

Roll No. in Words. ....

Signature of Supdt.: .....

**ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.**

**Division of marks is given in front of each question.**

**This Paper will be collected back after expiry of time limit mentioned above.**

**Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)**

1. The sum of first six terms of the series  $1+7+13+\dots$  is
  - E. 12
  - F. 24
  - G. 48
  - H. 96
  
2.  $H_1, H_2, \dots, H^n$  are said to be  $n$  harmonic means between  $a$  and  $b$  if  $a, H_1, H_2, \dots, H^n, b$  form
  - E. H.P
  - F. A.P
  - G. G.P
  - H. Harmonic series
  
3. If  $a$  and  $d$  are the first term and the common difference of the A.P respectively, then the  $n$ th term of corresponding H.P is
  - E.  $a^n = a+(n-1)d$
  - F.  $a^n = 1/a+(n-1)d$
  - G.  $a^n = a/1+(n-1)d$
  - H.  $a^n = a/a+(n-1)d$
  
4. The sum of an infinite geometric series exist only if the condition on the common ratio  $r$  is
  - E.  $-1 < r < 1$
  - F.  $-1 \leq r \leq 1$
  - G.  $r < -1, r > 1$
  - H.  $r \leq -1, r \geq 1$
  
5. The sum of the series  $1+1/2+1/2^2+\dots$  is
  - E. 2
  - F.  $\frac{3}{2}$
  - G.  $\frac{4}{3}$
  - H.  $\frac{10}{9}$

P.T.O.

6. 1,8,15,22,29,36,... is

- A. G.P
- B. A.P
- C. Geometric series
- D. arithmetic series

7. The A.P whose nth term is  $2n-1$  is

- A. 1,3,6,...
- B. 2,3,5,...
- C. 1,3,5,...
- D. 5,3,1,...

8. The arithmetic mean between a and b is

- A.  $a-b/2$
- B.  $b-a/2$
- C.  $a + b/2$
- D.  $\pm\sqrt{ab}$

9. If  $a^{n+2} + b^{n+2}/a^{n+1} + b^{n+1}$  is the geometric mean between a and b, then n =

- A. -1
- B. 1
- C. -2
- D. -0.5

10. The geometric mean between -2i and 8i are

- A.  $\pm 4$
- B.  $\pm 3$
- C.  $\pm 2$
- D.  $\pm 1$



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Question no: 2

Attempt all short questions.

(2 X 10 = 20)

- 1. If u = arc.tan [(x^3+y^3)/(x-y)], show that:

x \* du/dx + y \* du/dy = Sin 2u

- 2. If u = Sin^-1 [(x+y)/(sqrt(x)+sqrt(y))]; show that x du/dx + y du/dy = 1/2 (tan u)
3. Define Ratio Test and Cauchy's Root Test.
4. What do you know about Homogeneous Functions? Explain.
5. Prove that the given series is convergent. Also find out its limiting value:

Sum from 1 to infinity of 1/(9n^2 + 3n - 2)

- 6. Determine whether the sequence converges or diverges:

Sum from 1 to infinity of n^3 \* e^-n^4

- 7. Define sequence and series. Explain with examples.
8. Determine whether the sequence converges or diverges:

Sum from 1 to infinity of n \* (pi/n)^n

- 9. Define direct comparison and Limit comparison test.
10. Find dy/dx in the 3(x^2 + y^2)^2 = 25(x^2 - y^2).

Question no: 3

Attempt all long questions.

(3 X 10 = 30)

- 1. State and Prove the Euler's Theorem.
2. Investigate the behavior of the series:

Sum from 1 to infinity of (n/(2n+1))^n

- 3.
(a) State and Proof any theorem regarding the differentiable implicit functions.
(b) Find the slope of the tangent to the hyperbola x^2 = 4xy-3y^2-9 at the point (2, -1).