

**ACMT Education College**  
**SESSIONAL EXAMINATION -2016**  
**DIPLOMA 1<sup>ST</sup> YEAR**  
**APPLIED MATHEMATICS-I( DEN 101)**

**TIME: 2 HRS**

**M.M.: 50**

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**Attempt any five questions. Each question carries 10 marks.**

**Q.1:-** Solve the following equation:

(i)  $3x^2 + 15x - 2 = 2\sqrt{x^2 + 5x + 1}$                       (ii)  $x + 2y = 1$  ,  $x^2 + y^2 = 10$

**Q.2:-** (i) The Fibonacci sequence is defined by  $a_1 = 1 = a_2$  ,  $a_n = a_{n-1} + a_{n-2}$  ( $n > 2$ ) .

Find  $a_{n+1} \div a_n$  , for  $n = 1, 2, 3, 4, 5$ ,

(ii) which term of the A.P.  $8 - 6i$  ,  $7 - 4i$  ,  $6 - 2i$  , ..... is:-

(a) purely real (b) purely imaginary?

**Q.3:-**(i) If  $S_n$  denotes the sum of  $n$  terms of an A.P. whose common difference is  $d$  , show that

$$d = S_n - 2S_{n-1} + S_{n-2}, n > 2$$

(ii) Find the sum of first 50 natural numbers .

**Q.4:-** (i) Find the A.M. between 5 and 9.

(ii)  $m$  A.M.s have been inserted between 1 and 31 in such a way that the ratio of the 7<sup>th</sup> and the  $(m-1)$ th means is 5:9 . find the value of  $m$ .

**Q.5:-**(i) If the  $m$ th term of an A.P. be  $1/n$  and the  $n$ th term be  $1/m$  , then show that  $(mn)$ th term is 1.

(ii) If  $S_1, S_2, S_3, \dots, S_m$  be the sums of the first  $n$  terms of  $m$  A.P.s whose first terms are  $1, 2, 3, \dots, m$  respectively and common differences  $1, 3, 5, \dots, 2m-1$  respectively.

Show that ,

$$S_1 + S_2 + S_3 + \dots + S_m = mn(mn+1) \div 2$$

**Q.6:-**(i) find the value of  $k$  if  $-2/7, x, -7/2$  are in G.P.

(ii) The sum of two numbers is 6 times their geometric mean .show that the numbers are in the ratio  $3+2\sqrt{2} : 3-2\sqrt{2}$ .

**Q.7:-**(i) Find the value(s) of p if  $S_n$  for the G.P.  $,P,1/P,.....$ is  $25/4$  .

(ii) If A and G be the A.M. and G.M. between positive numbers a and b respectively ,then show that a and b are the roots of the equation  $x^2 -2Ax + G^2 = 0$  .

**Q.8:-** (i) Resolve the following fraction into partial fractions:

$$(5x^2+18x+17)/(1-x)^2(2x+3)$$

(ii) Find n if :

(a)  $(n+1)! = 12.(n-1)!$       (b)  $(n+2)! = 20. n!$

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