

**I B.Pharmacy I Semester Supplementary Examinations, Feb. 2015  
MATHEMATICS-I**

Time: 3 hours

Max Marks: 75

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) Find the value of  $9P_4$ ,  $7P_3$ , and  $5P_2$ .  
 (b) . Evaluate  $\begin{vmatrix} 2 & 9 & 1 \\ 0 & 3 & 0 \\ 5 & -2 & 2 \end{vmatrix}$  [8+7]
  
2. (a) Find the terms independent of x in the expansion  $\left(3x - \frac{x^3}{6}\right)^7$   
 (b) Solve the following equations by using Cramer's Rule  $x+2y-z=1$ ,  $3x+5y-2z=5$ ,  
 $2x+6y+3z=-2$  [8+7]
  
3. (a) If  $\alpha$  and  $\beta$  are complementary angles such that  $q \sin \alpha = p$ , then find the value of  $(\sin \alpha \cos \beta - \cos \alpha \sin \beta)$ .  
 (b) If  $3A$  is not an odd multiple of  $\frac{\pi}{2}$ ,  $\tan 3A = \frac{3 \tan A - \tan^3 A}{1 - 3 \tan^2 A}$ . [8+7]
  
4. (a) Suppose that  $x = \tan A$ ,  $y = \tan B$ ,  $z = \tan C$  and none of  $A - B$ ,  $B - C$ ,  $C - A$  is an odd multiple of  $\frac{\pi}{2}$ . Then prove that  $\sum \left(\frac{x-y}{1+xy}\right) = \prod \left(\frac{x-y}{1+xy}\right)$ .  
 (b) Prove that  $\sin \frac{\pi}{5} \cdot \sin \frac{2\pi}{5} \cdot \sin \frac{3\pi}{5} \cdot \sin \frac{4\pi}{5} = \frac{5}{16}$  [8+7]
  
5. (a) Find the orthocenter of the triangle with the vertices  $(-2,-1)$ ,  $(6,-1)$  and  $(2,5)$   
 (b) If  $\theta$  is the angle between the lines  $\frac{x}{a} + \frac{y}{b} = 1$  and  $\frac{x}{b} + \frac{y}{a} = 1$  then find the value of  $\sin \theta$  when  $a > b$  [8+7]
  
6. (a) Find the circumcenter of the triangle whose sides are  $3x - y - 5 = 0$ ,  
 $x + 2y - 4 = 0$  and  $5x + 3y + 1 = 0$ .  
 (b) Find the equation of the locus of a point which is at a distance 3 from  $(-1,3)$  in a plane. [8+7]
  
7. (a) Show that  $f(x) = [x]$  ( $x \in R$ ) is continuous at only those real numbers that are not integers  
 (b) If  $X = a \cos^3 t$ ,  $Y = a \sin^3 t$  then find  $\frac{dy}{dx}$  [8+7]
  
8. (a) Is  $f$  continuous at  $X=0$  where  $f(x) = \begin{cases} \frac{\sin 2x}{x} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$   
 (b) If  $Y = \tan^{-1} \sqrt{\frac{1-x}{1+x}}$  ( $|x| < 1$ ) then find  $\frac{dy}{dx}$  [8+7]

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