

**MODEL EXAMINATION 2011-12****MATHEMATICS(COMMERCE)****Maximum Score 80**Time :  $2\frac{3}{4}$  hrs**HSE I**

(Including cool off time 15minutes)

**General Instructions**

- You are not allowed to write answers or discuss anything with others during cool off time.
- Cool off time is for familiarizing questions and planning answers.
- All questions are compulsory and only internal choice is allowed.
- When you select a question all sub questions must be answered from the same question itself.

1. Consider  $U=\{1,2,3,4,5,6,7,8\}$ ,  $A=\{2,4,6,8\}$  and  $B=\{2,4,8\}$   
 (i) Find  $A^c$  and  $B^c$  (ii) Also find  $(A \cup B)^c$  (iii) Verify that  $(A \cup B)^c = A^c \cap B^c$   
 (iv) If X and Y are two sets such that  $n(X) = 17$ ,  $n(Y) = 23$  and  $n(X \cup Y) = 38$   
 then find  $n(X \cap Y)$  (1+2+2+2)
- 2.(a) Given  $A=\{1,2,3\}$  and  $B=\{4,5\}$ , find  
 (i)  $A \times B$  (ii) the number of relations from A to B  
 (iii) Represent  $A \times B$  and  $B \times A$  graphically (1+1+2)
- OR**
- (b) Let  $f(x) = x^2$  and  $g(x) = 2x+1$  be two real valued functions. Then find  
 (i)  $(f+g)(x)$  (ii)  $(f-g)(x)$  (iii)  $(fg)(x)$  (iv)  $\left(\frac{f}{g}\right)(x)$  (1+1+1+1)
3. (i) Find the radius of the circle in which the central angle of  $60^\circ$  intercepts  
 an arc of length 37.4 cm (use  $\pi = \frac{22}{7}$ )  
 (ii) Prove  $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = -\frac{1}{2}$  (2+2)
4. Consider the statement  $P(n)$ : " $9^n - 1$  is a multiple of 8" where  $n \in \mathbb{N}$   
 (i) Is  $P(1)$  is true ?  
 (ii) If  $P(k)$  is true then prove that  $P(k+1)$  is true.  
 (iii) Is the statement true for all 'n'? justify your answer. (1+2+1)
5. (i) Express  $\frac{1-i}{1+i}$  in a+ib form (ii) Express  $\frac{1-i}{1+i}$  in polar form. (2+3)
6. (i) Solve the inequality  $2(2x+3) - 10 < 6(x-2)$  where x is a real number.  
 (ii) Solve graphically  $x - 2y \leq 4$ ,  $3x + 4y \geq 12$ ,  $x \geq 0$ ,  $y \geq 0$  (2+4)
7. Consider the expansion of  $\left(\frac{x}{2} + \frac{1}{x}\right)^6$   
 (i) Write the general term (ii) Find the middle term (1+3)
8. (a) (i) In how many different ways can the letters of the word  
 '**MALAYALAM**' be arranged ?  
 (ii) Find if  ${}^{n-1}P_3 : {}^n P_4 = 1:9$  (3+3)
- OR**
- (b) (i) If  ${}^n C_8 = {}^n C_2$  then find  ${}^n C_3$  and  ${}^n C_4$   
 (ii) In how many ways can a team of 3 boys and 3 girls be selected  
 from 5 boys and 4 girls ? (3+3)
9. (i) Find the 10<sup>th</sup> term of the sequence -4,-1,2,.....  
 (ii) Find the sum of all natural numbers between 100 and 1000 which are  
 multiples of 5. (1+3)

10. (i) Find the value of  $x$  in which the numbers  $-\frac{2}{7}$ ,  $x$ ,  $-\frac{7}{2}$  are in G.P.  
(ii) The sum of three consecutive terms of a G.P is 26 and their product is 216 .  
Find the numbers. (1+3)
- 11.(i)Find the slope of the line passing through the points (3,-2) and (-1,4)  
(ii) Consider the straight line  $3x-4y+12=0$ .Reduce it to the slope - intercept form and to the intercept form. (1+4)
12. Consider the ellipse  $4x^2+9y^2=36$   
(i) Find the eccentricity (ii) Find the latus rectum. (1+1)
13. Let A (2,1,3) , B( 1,2,1) and C(3,3,2) be the vertices of a triangle  
(i) Find the centroid of triangle ABC (ii) Find the mid point of the side BC (1+1)
14. (i) Write the negation of the statement “  $\sqrt{2}$  is irrational”  
(ii) Write the component statements of the compound statement “ All prime numbers are either even or odd”  
(iii)Write the converse of the statement “If a number  $n$  is even,then  $n^2$  is even”(1+2+1)
- 15.(i) Evaluate  $\lim_{x \rightarrow -1} \frac{x^2-5x+6}{x-1}$  (ii) Find  $f'(x)$ , given  $f(x) = \frac{\cos x}{1 + \sin x}$  (2+3)

16.Consider the following frequency table

x	3	6	9	12	13	15	21	22
f	3	4	5	2	4	5	4	3

- (i)Write the cumulative frequencies (ii) Find the median  
(iii) Find the mean deviation about the median (1+1+2)
17. The following are calculated in respect of the heights and weights of the students of class XI

	Height	Weight
Mean	150 cm	48 kg
Variance	144cm	36 kg <sup>2</sup>

- (i)Find standard deviation of the height and weight  
(ii)Find the coefficient of variation of the heights and weights  
(iii)Among the heights and weights, which shows more variability?why? (1+2+1)
18. (a) A bag contains 4 red, 3white, and 2 green balls.If a ball is drawn at random find the probability that it is (i)a white ball (ii) a green ball (iii) either white or green (iv) not white and not green (1+1+2+2)

**OR**

- (b) If A and B are two events such that  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{1}{2}$  and  $P(A \text{ and } B) = \frac{1}{8}$ , find  
(i)  $P(A \text{ or } B)$  (ii)  $P(\text{not } A \text{ and not } B)$  (iii)  $P(A \text{ and not } B)$  (iv)  $P(\text{not } A \text{ and } B)$   
(1+2+3)

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