MODEL EXAMINATION 2011-12

MATHEMATICS(SCIENCE)

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) FindA^{I} and B^{I} (ii) Also find $(AUB)^{I}$ (iii)Verify that $(AUB)^{I}=A^{I}\cap B^{I}$ (1+1+2)

2. Let A={1,2,3,……,14} .R is a relation on a defined on A by
R={(x,y): 3x-y=0 , x,y ∈ A} (i) Write R in tabular form .
(ii) Find the domain and range of R (1+1)

3. In a survey of 400 students in a school, 100 were listed as taking apple juice , 150 as taking as orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice. (3)

4. (i) Convert $\frac{31\pi}{3}$ radian into degree measure

(ii) Find the value of $\sin(\frac{31\pi}{3})$

(iii) Find the general solutions of the equation $\sin x = -\frac{\sqrt{3}}{2}$ (1+1+2)

5.Show that (i) $\frac{\cos 7x+\cos 5x}{\sin 7x-\sin 5x} = \cot x$

(ii)Solve , $\sin 2x - \sin 4x + \sin 6x = 0$ (2+2)

6.Consider $P(n) = 1+3+5+\ldots\ldots\ldots\ldots+(2n-1)=n^2$

(i) Verify that P(1) is true .

(ii) Write P(k)

(iii) Verify that P(k+1) is true when P(k) is true. (1+1+2)

7. (i) Express the complex number $\frac{2-i}{(1-i)(1+2i)}$ in a+ib form.

(ii) Find the polar form of the complex number $-1+\sqrt{3}i$

(iii)Solve $27x^2-10x+1=0$ (2+2+2)

8. (i) Solve $2(2x+3)-10<6(x-2)$,when x is a real number.

(ii) S olve the following inequalities graphically

$2x+y \leq 24$, $x+y \leq 11$, $2x+5y \leq 40$, $x \geq 0, y \geq 0$ (2+3)

9. (i) (a)Find n,if ${}^{n-1}P_3 : {}^{n}P_4 = 1:9$ **OR** (b) Find r if ${}^{5}P_r = {}^{6}P_{r-1}$ (2)

(ii) (a)In how many different ways can the letters of the word '**MALAYALAM**' be arranged ?

OR

(b)In how many ways a team of 3 boys and 3 girls be selected from 5 boys and 4 girls ? (2)

10. (i) Write the general term in the expansion of $(\frac{3x^2}{2}-\frac{1}{3x})^6$

(ii) Find the term independentof x in the expansion of $(\frac{3x^2}{2}-\frac{1}{3x})^6$ (1+2)

11. (i) Find the sum of the sequence 7,77,777,7777,……..to n terms.
(ii) If AM and GM of two positive numbers a and b 10 and 8 ,respectively ,find the numbers. (2+3)

12. (i) Find the equation of a line perpendicular to the line x-2y +3=0 and passing through the point (1,-2)
(ii) Find the equations of the lines passing through the point (3,2) and inclined at 60^0 to the line $\sqrt{3}x+y=1$ (2+3)

13. Consider the circle $x^2+y^2+8x+10y-8=0$
(i) Find its centre and radius .
(ii) Find the equation of the circle with above centre and passing through the point (1,2). (1+2)

14. (i) Find the equation of the parabola with vertex at (0,0) and focus at (0,2)
(ii) Find the co-ordinate of the foci and length of the latus rectum of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ (1+2)

15. (i)Consider the points A(-2,4,7) and B(3,-5,8) (i) If P divides AB in the ratio K:1 ,then find co-ordinates of P.
(ii) Find the co-ordinates of the point where the line joining AB crosses the YZ-plane (1+2)

16. (i) Evaluate $\lim_{x\to 0}\frac{(x+1)^5-1}{x}$ (ii) $\lim_{x\to 0}\frac{x^4-81}{2x^2-5x-3}$ (iii)$\lim_{x\to\frac{\pi}{2}}\frac{\tan 2x}{x-\frac{\pi}{2}}$ (2+2+2)

17. (i)(a) Find the derivative of f(x) =$\sin^2 x$ using product rule.

OR

(b) Find the derivative of $\frac{x^2-\cos x}{\sin x}$

(ii)(a) Find the derivative of sinx from first principles.

OR

(b)Find the derivative of $\sqrt{x}$ using firsr principles (2+2)

18. (i) Write the contrapositive of the following statement:
"If a triangle is equilateral ,it is isosceles".
(ii) Prove by the method of contradiction, $\sqrt{3}$ is irrational (1+2)

19. Consider the following data: 6,8,10,12,14,16,18,20,22,24
Find (i)mean (ii) mean deviation about mean (iii) coefficient of variation (1+1+3)

20. (i) Three coins are tossed once .Write the sample space of the experiment.
(ii) One card is drawn from a well shuffled pack of 52 cards .If each outcome is equally likely ,calculate the probability that the card will be a diamond.
(iii) In a class of 60 students, 30 opted for NCC ,32 opted for NSS and 24 opted for both NCC and NSS. If a student is selected at random ,find the probability that the student has opted neither NCC nor NSS. (1+1+2)
