ST. HENRY'S COLLEGE KITOVU
PRE-MOCK EXAMINATIONS- 2007
ADDITIONAL MATHS 475/2
PAPER 2

S.4

Instructions:

- where necessary assume g = 9.8ms-2
- Attempt all questions.

1. ABCD is a square force of 8N, 10N; $15\sqrt{2}$ N and $9\sqrt{2}$ N act along the lines AB, BC, CA and DB respectively, in each case the direction of the force being given by the order of the letters. Given that CD is horizontal, find the

   (i) Magnitude of the resultant force.
   (ii) Inclination of the resultant to CD.

2. A uniform ladder AB weighing 165N and length 4.2m rests against a vertical rough wall. The bottom of the ladder B also rests against a rough ground. The coefficients of friction between the wall and the ladder, and the ground and the ladder are 0.3 and 0.4 respectively. The plane containing the ladder is perpendicular to the wall.

   Calculate the;
   (i) reactions at A and B,
   (ii) angle the ladder makes with the wall, when the ladder is about to slide.

3. A uniform beam AB of weight W can turn in a vertical plane about a hinge at A, and to the other end B is tied a rope which passes over a smooth pulley C vertically above A so that AC = AB.

   (i) Find the tension in of the rope necessary to keep the beam at an angle of 60^o with the horizontal.
   (ii) Find also the direction and magnitude of the reaction at the hinge.

4. A continuous random variable X is given by the probability density function

$$f(x) = \begin{cases} \dfrac{(x-1)^2}{c} & 1 < x < 3 \\ 0 & \textit{elsewhere} \end{cases}$$

   Determine (i) the value of the constant C
   (ii) the mean

(iii) the value of p such that $\int_{1}^{p} f(x)dx = 0.125$

(iv) $P(x > 1.5)$

5. The scores below are results of oral and written interview of eight applicants for a job in a certain financial institution.

Applicant	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Oral (X)	28	34	40	32	54	56	38	58
Written (Y)	39	47	60	44	52	54	58	65

(a) (i) Draw a scatter diagram for the two interviews

(ii) Describe the type of correlation between the oral and written interview.

(iii) From your diagram estimate the score an applicant would get in the written interview given that he scored 60% in the oral interview.

(b) Calculate the rank correlation coefficient between the oral and the written interview and comment on your result.

6. The lengths of leaves of a certain tree are normally distributed with mean 150mm and the variance 225mm^2 find,

(i) The proportion of leaves with length between 120 and 225mm.
(ii) The percentage of leaves with a length more than 180mm.
(iii) The probability of having 2 leaves with length less than 140mm in a random sample of 6 leaves.

END