

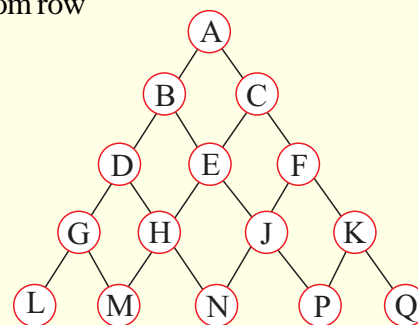
DISCRETE MATHS (Q 6 & 7, PAPER 2)

2011

- 6. (a)** Two adults and four children stand in a row for a photograph. How many different arrangements are possible if the four children are between the two adults?
- (b) (i)** Solve the difference equation $u_{n+2} - 6u_{n+1} + 8u_n = 0$, where $n \geq 0$, given that $u_0 = 0$ and $u_1 = 4$.
- (ii)** For what value of n is $u_n = 30(2^n)$?
- (c)** Five cards are drawn together at random from a standard pack of 52 playing cards. Find, in decimal form, correct to two significant figures, the probability that:
- (i)** all five cards are diamonds
 - (ii)** all five cards are of the same suit
 - (iii)** the five cards are the ace, two, three, four and five of diamonds
 - (iv)** the five cards include the four aces.

- 7. (a)** A team of four is selected from a group of seven girls and five boys.
- (i)** How many different selections are possible?
 - (ii)** How many of these selections include at least one girl?

- (b)** A marble falls down from A and must follow one of the paths indicated on the diagram. All paths from A to the bottom row are equally likely to be followed.



- (i)** One of the paths from A to H is A-B-D-H. List the other two possible paths from A to H.
 - (ii)** Find the probability that the marble passes through H or J.
 - (iii)** Find the probability that the marble lands at N.
 - (iv)** Two marbles fall from A, one after the other, without affecting each other. Find the probability that they both land at P.
- (c)** The real numbers a , b and c have mean μ and standard deviation σ .
- (i)** Show that the mean of the numbers $\frac{a-\mu}{\sigma}$, $\frac{b-\mu}{\sigma}$ and $\frac{c-\mu}{\sigma}$ is 0.
 - (ii)** Find, with justification, the standard deviation of the numbers $\frac{a-\mu}{\sigma}$, $\frac{b-\mu}{\sigma}$ and

$$\frac{c-\mu}{\sigma}.$$

ANSWERS

6 (a) 48

(b)(i) $u_n = 2(4)^n - 2(2)^n$ (ii) $n = 4$

(c) (i) 0.00050 (ii) 0.002 (iii) 0.00000038

(iv) 0.000018

7 (a) (i) 495 (ii) 490

(b)(i) A-B-E-H, A-C-E-H (ii) $\frac{3}{4}$ (iii) $\frac{3}{8}$ (iv) $\frac{1}{16}$

(c) (ii) 1