

**DISCRETE MATHS (Q 6 & 7, PAPER 2)**

**2006**

- 6 (a) (i) How many different teams of three people can be chosen from a panel of six boys and five girls?
- (ii) If the team is chosen at random, find the probability that it consists of girls only?
- 6 (b) (i) Solve the difference equation  $6u_{n+2} - 7u_{n+1} + u_n = 0$ , where  $n \geq 0$ , given that  $u_0 = 8$  and  $u_1 = 3$ .
- (ii) Verify that the solution to part (i) also satisfies the difference equation  $6u_{n+1} - u_n - 10 = 0$ .
- 6 (c) There are thirty days in June. Seven students have their birthdays in June. The birthdays are independent of each other and all dates are equally likely.
- (i) What is the probability that all seven students have the same birthday?
- (ii) What is the probability that all seven students have different birthdays?
- (iii) Show that the probability that at least two have the same birthday is greater than 0.5?

- 7 (a) The password for a mobile phone consists of five digits.
- (i) How many passwords are possible?
- (ii) How many of these passwords start with a 2 and finish with an odd digit?
- 7 (b) For a lottery, 35 cards numbered 1 to 35 are placed in a drum. Five cards will be chosen at random from the drum as the winning combination.
- (i) How many different combinations are possible?
- (ii) How many of all the possible combinations will match exactly three numbers with the winning combination?
- (iii) How many of all the possible combinations will match exactly three numbers with the winning combination?
- (iv) Show that the probability of matching at least three numbers with the winning combination is approximately 0.014.

- 7 (c) The mean of the integers from  $-n$  to  $n$ , inclusive, is 0. Show that the standard

deviation is  $\sqrt{\frac{n(n+1)}{3}}$ .

**ANSWERS**

6 (a) (i) 165                      (ii)  $\frac{2}{33}$

6 (b) (i)  $2 + (\frac{1}{6})^{n-1}$

6 (c) (i)  $\frac{1}{30^6}$                       (ii)  $\frac{2639}{5625}$

7 (a) (i) 100,000                      (ii) 5,000

7 (b) (i) 324,632                      (ii) 150                      (iii) 4,350