BUILDING STUDIES

SUBJECT 9187

PAPER 01

GENERAL COMMENTS

The paper was just the standard one for which the well prepared candidates attempted all the questions. The marks ranged from 21 up to 116. A good number of candidates had marks which showed that they had prepared for the candidates. In some few centres there was some indication that they knew nothing about group theory by the lack of attempt of the question.

SPECIFIC COMMENTS ON QUESTIONS

QUESTION 1

Various methods were used in solving the 3 simultaneous equations. Some candidates used matrix method which involved first the calculation of the inverse of the associated matrix. Some centres did not understand this method fully since they tried to work out the adjoint matrix directly, before writing down the transpose matrix. Those who tried the row operations method had most of them going wrong through incorrect algebraic simplifications. All in all the majority of the candidates had successful responses.

Ans: $x = \frac{15}{2}; y = \frac{-9}{4}; z = \frac{5}{2}$

QUESTION 2

This was also a popular question, with the majority of the candidates managing to get the correct integrating factor. A few of the candidates could not simplify

$e\ In\ (x-1) to\ (x-1)$

Ans: $ye^x(x-1) = \frac{1}{2}x^2 - x$

QUESTION 3

Most candidates were able to apply the factor theorem and factorise the cubic polynomial. The reducing to partial fractions had some pupils who did not apply the most economic methods. They wasted lot of time and paper by first expanding the constant equations and then compared the coefficients on l.h.s and r.h.s. This method increased the chance of marking errors. The majority of the candidates did not fully show all the steps up to the given answer of $2\frac{43}{140}$, and this caused loss of marks.

Ans: $(x+1)(x+2)(x+3)$

QUESTION 4

The greater majority of candidates had correct partial fractions structure, but a few of these had some lengthy method of calculating the constants. Those who managed to get the correct fractions had their integration much more simpler than that of those who had obtained wrong fractions. Pupils are reminded of the need to show all the steps leading to the given answer.

Ans: (a) $\frac{2}{1-2x}+\frac{3x}{x^2+2}-\frac{1}{1-x}$

QUESTION 5

Most candidates displayed good knowledge of vectors. They were able to reveal the skewness of lines and were able to find the shortest distance between the lines using various methods. There was a small minority of candidates who lacked knowledge of vectors and these did not make meaningful attempt of question.

Ans: $\frac{65}{\sqrt{443}}$

QUESTION 6

Part (a) was successfully proved by nearly all the candidates and they were able to use the result in (a) to find the integral solution. Many candidates did not comply with the requirement of expressing the answer as a logarithm of a single number.

Ans: hr(1.65)

QUESTION 7

Some candidates did not see that what the question demanded was to “form a differential equation which eliminates A and B”. This required proper procedure of finding $\frac{dy}{dx}\ and\ \frac{d^2y}{dx^2}$ and use these to eliminate A and B.

In part (b) some candidates were not aware that for this function as $x \to -\infty, y \to 0$. Thus a number of marks were lost due to lack of knowledge. Concerning the failure to distinguish the behaviour of $x^n\ and\ e^{kx}$ terms when x gets very large and negative.

QUESTION 8

In part (a) most candidates were able to construct the required table.

In part (b) most candidates were aware that they had to show that the 4 axioms of a group are satisfied. However some were not able to identify the inverse of element a . Some did not succeed in identifying the identity element of the group. The closure axiom was explained successfully by most of the candidates.

QUESTION 9

Part (i) was done successfully by many candidates. In part (ii) some worked out the area as $|a \times b|$ leaving out the factor $\frac{1}{2}$. Some worked out the area using $\frac{1}{2}\left|\underline{a}\right|\left|\underline{b}\right| \sin A\,\hat{O}B$.

In part (iii) some could not find the vector equation of the plane AOB and most of this could not proceed to part (iv) to find the distance and volume required.

Ans: (i) $-7i + j - 10k$

(ii) $\frac{1}{2}\sqrt{150}$

(iii) $r(-7i + j - 10k) = 0$

(iv) $\frac{1}{2}\sqrt{6}$; 7.5

QUESTION 10

Most candidates were able to use the correct A.Q.E and come up with the correct complementary function (CE). However, a few candidates had a wrong form for the CF. Candidates had also the correct form for the particular integral and worked it out correctly. Some lost marks due to algebraic errors which came up in the long calculation.

Ans: $y = -e^x \cos x + 2\cos x + \sin x$

QUESTION 11

The majority of the candidates knew that at the points of inflexion $\frac{d^2y}{dx^2}$=0

A number of these did go wrong when they found a wrong second derivative function, or made some algebraic errors. A small group of candidates were seriously wrong when they tried to find the points of inflexion by equating $\frac{dy}{dx}$ to zero. These scored very little for this question.

Some candidates did not write much, perhaps due to lack of time. However there were also some who worked out this sum completely well.

Ans: (-0.113, 1.235); (-0.887, 1.235)

And the point of intersection of the tangents:

(-0.5, 2.0575)