Department of Mechanical Engineering

UNIVERSITY OF BATH

EXAM ASSESSMENT GENERIC FEEDBACK FORM		
UNIT NUMBER AND TITLE	**ME20021** Modelling Techniques 2	**UNIT CONVENOR(S)** Dr D N Johnston Dr D A S Rees
DATE	**15th May 2018**	
QUESTION 1	(a) Mixed bag. Simple examples include symmetry, insulation, free liquid surface. (b) Mainly good. Use ≈ instead of = for approximation to gradient. (c) and (d) A mixed bag. Don't forget to use K instead of Celcius. Allowance made for any confusion due to typo in question. (e) The key point is that the non-linear $(u_{nx}^{n+1})^4$ term cannot be expressed in a linear matrix equation. Iterative methods need to be used instead.	
QUESTION 2	Most chose this question, but it had the lowest average mark of the four. (a) Generally good. Best not to regurgitate points from notes without thinking and putting them into context. (b) Mainly good. The key point is that you have to cancel the first derivative term. (c) Few got this completely right. The key point is that the unequal spacing equation only applies at i=2; the equation at i=3 should use equal spacing and Neumann boundary due to symmetry. (d) Despite this being the simplest possible double integration (of a constant!), many over-complicated it, and many forgot the integration constant. The subtlety, which very few spotted, is that the answer should be exactly the same as the numerical answer, since the numerical error depends on $\frac{\partial^3 u}{\partial x^3}$, which is zero as $\frac{\partial^2 u}{\partial x^2}$ = constant. Perhaps the most insightful (and my favourite) answer was: "I would not expect the numerical and analytical solutions to be the same, because my integration is stupid"	

QUESTION 3	This question was generally answered very well indeed. There were very few mistakes. The chief error was not mentioning that the quarter-range series must take odd values of *n*. The strangest (and perhaps the most worrying) error was from those who used either a half range Fourier sine series or a half range Fourier cosine series in part (a), and who then went on to answer part (b) correctly *without* subsequently correcting part (a).
QUESTION 4	This entire question was covered in one of the lectures. This question too was done well, although there were a few common errors. One of these involved the solution of $\Theta'' - \omega^2\Theta = 0$, which should have been $\Theta = C(\omega)\, e^{-|\omega|y}$ to ensure decaying solutions for both positive and negative values of ω. The final part (showing that the desired contour was the appropriate circle) was often answered correctly but either without any workings or with incorrect works! I notice these things!