FINAL EXAMINATION
FIRST SEMESTER SESSION 2011/2012

COURSE CODE / NAME : SQQM3063 / MATHEMATIK PERNIAGAAN
DATE : 6 JANUARY 2012 (FRIDAY)
TIME : 8.30 – 11.00 P.M. (2 1/2 HOURS)
VENUE : DMS

INSTRUCTION :
1. This book script contains TWELVE (12) questions in THIRTEEN (13) printed pages excluding the cover page and attachments.
2. This book script also contains TWO (2) ATTACHMENTS printed on pages 14 and 15.
3. Answer ALL questions in the space provided.
4. You are NOT ALLOWED to remove the examination paper from the examination hall.

MATRIC NO : ________________
( with word )

IDENTIFICATION CARD NO. :

LECTURER :

GROUP : ☐ TABLE NO. :

DO NOT OPEN THIS EXAMINATION PAPER UNTIL INSTRUCTED

CONFIDENTIAL
QUESTION I (8 MARKS)

a) Lina buys an apartment and she agrees to pay RM3,000 at the end of the first year, RM3,500 at the end of the second year, RM4,000 at the end of the third year, and so on. How much does she pay for the apartment if she makes 20 payments?

(4 marks)

b) Given $t_5 = \frac{1}{20}$ and $r = \frac{1}{4}$, determine

i) $r_i$

(2 marks)

ii) $S_5$

(2 marks)
QUESTION 2 (12 MARKS)

a) Define an equation of value (equation of equivalence).  

(2 marks)

b) Peter owes Sam RM10,000 due in 5 years and RM15,000 due in 10 years. He must pay his debts by a single payment at the end of 7 years with interest at 7.5% per annum. Find the required payment

i) the focal date is 7 years from today.  

(5 marks)

ii) the focal date is now.  

(5 marks)
QUESTION 3 (5 MARKS)

The accumulated interest for a mutual fund deposit of RM20,000 is RM10,500 over 60 months. Determine

i) the continuous rate of increase.  

(3 marks)

ii) the annual effective rate of increase. 

(2 marks)
QUESTION 4 (10 MARKS)

UUM College of Art and Sciences (UUM CAS) needs RM1,000,000 to build a new building for School of Quantitative Sciences. If UUM CAS made the first deposit on 1 June 2011 and the last deposit will be made on 1 December 2020. Find the size of each deposit if

i) UUM CAS makes the deposits every 3 months in a fund that earns 18% per annum compounded quarterly.

(5 marks)

ii) UUM CAS makes the deposits monthly in a fund that earns 18% per annum compounded monthly.

(5 marks)
QUESTION 5 (8 MARKS)

Given data of three series payments:

<table>
<thead>
<tr>
<th></th>
<th>Payment at End of Year</th>
<th>Accumulated Value at End of Year 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Series A</td>
<td>240</td>
<td>200</td>
</tr>
<tr>
<td>Series B</td>
<td>0</td>
<td>360</td>
</tr>
<tr>
<td>Series C</td>
<td>Y</td>
<td>600</td>
</tr>
</tbody>
</table>

Assume interest is compounded annually, calculate $Y$.

(8 marks)
QUESTION 6 (6 MARKS)

Doreen bought a car on 1 September 2006 by paying RM4,000 down and agreed to make 36 monthly payments of RM350, which first due on 1 December 2006. If interest is at 12% compounded monthly, determine the equivalent cash price.

(6 marks)
Erika deposited RM100 monthly in a fund earning \( j_{12} = 6\% \). The first deposit was made on 1 June 1996 and the last deposit on 1 November 2006.

i) Determine the value of the fund on 1 September 2001 (after the payment is made).

(2 marks)

ii) Determine the value of the fund on 1 December 2008.

(3 marks)
From 1 May 2011, she planned to draw down the fund with monthly withdrawals of RM1,000. Determine the date and the size of the smaller concluding withdrawal one month after the last RM1,000 withdrawal. (Hint: use procedure 2) 

(6 marks)
QUESTION 8 (9 MARKS)

a) What is a perpetuity? (1 mark)

b) A company is expected to pay RM 0.90 every 3 months on a share of its preferred stock. What should a share of the stock be selling for, if money is worth
   i) \( j_4 = 6\% \) (4 marks)
   
   ii) \( j_4 = 8\% \) (4 marks)
QUESTION 9 (10 MARKS)

A couple purchases a home and signs a mortgage contract for RM200,000 to be paid in equal monthly payments over 25 years with interest at 6.6% compounded semiannually. Determine the monthly payment and make out a partial amortization schedule showing the distribution of the first three payments together with interests and repayments of principal.

(10 marks)

<table>
<thead>
<tr>
<th>Payment number</th>
<th>Monthly Payment</th>
<th>Interest Payment</th>
<th>Principal Payment</th>
<th>Outstanding Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
QUESTION 10 (9 MARKS)

A loan of RM10,000 with interest at 12% compounded monthly is to be amortized by equal payments at the end of each month over a period of 30 months. Determine the outstanding balance at the end of 12 months:

i) using the retrospective method.  

(5 marks)  

ii) using the prospective method.  

(4 marks)
QUESTION 11 (6 MARKS)

A corporation decides to issue 20-year bonds in the amount of RM30,000,000. Under the contract, interest payments will be made at the rate of 12% compounded semiannually. The bonds are priced to yield 9% compounded semiannually to maturity.

i) Find the issue price of the bond.  

(4 marks)

ii) Find the price of a RM1,500 bond to yield 9% compounded semiannually.  

(2 marks)
QUESTION 12 (6 MARKS)

Ali Baba company has RM50,000 dividends to distribute. There are 25,000 shares of preferred stock which earns dividends at RM0.80 per share and 75,000 shares of common stock.

i) How much money goes to preferred stockholders?  

(2 marks)

ii) How much money goes to common stockholders?  

(2 marks)

iii) How much per share does a common stockholder receive in dividends?  

(2 marks)

END OF QUESTIONS
LIST OF FORMULA

Arithmetic sequence:

\[ t_n = a + (n - 1)d \quad \text{or} \quad S_n = \frac{n}{2}(a + t_n) \]

Geometric sequence:

\[ t_n = ar^{n-1} \]

\[ S_n = a \left( \frac{1 - r^n}{1 - r} \right) \quad \text{or} \quad S_n = a \left( \frac{r^n - 1}{r - 1} \right) \]

Simple Interest:

\[ I = Prt \]

\[ S = P(1 + rt) \]

Simple Discount:

\[ P = S(1 - dt) \]

\[ r = \frac{d}{1 - dt} \]

Compound Interest:

\[ S = P \left(1 + \frac{j_m}{m}\right)^n \]

Equivalent Rates:

\[ 1 + rt = \left(1 + \frac{j_m}{m}\right)^n \]

\[ \left(1 + \frac{J_M}{M}\right)^M = \left(1 + \frac{j_m}{m}\right)^n \]

Annuity-immediate:

\[ A = Ra_n = R \left[ \frac{1 - (1+i)^{-n}}{i} \right] \]

\[ S = Rs_n = R \left[ \frac{(1+i)^n - 1}{i} \right] \]

Annuity-due:

\[ A = Ra_n(1+i) \]

\[ S = Rs_n(1+i) \]
Deferred Annuity:

\[ A = R a_{n,} (1+i)^{-k} \quad \quad S = R s_{n,} (1+i)^{k} \]

Payment Less Frequent Than Interest

Annuity-immediate: \[ A_n = R \frac{a_{n,}}{s_{k,}} \]

Annuity-due: \[ A_n = R \frac{a_{n,}}{a_{k,}} \]

\[ S_n = R \frac{s_{n,}}{s_{k,}} \]

\[ S_n = R \frac{s_{n,}}{a_{k,}} \]

Payment Varying In Geometric Progression:

\[ S_{n, (\text{var})} = R \left[ \frac{(1+i)^{n} - (1+r)^{n}}{i-r} \right] \]

\[ A_{n, (\text{var})} = R \left[ \frac{1 - \left( \frac{1+r}{1+i} \right)^{n}}{i-r} \right] \]

Bond:

\[ P = C + (F - Ci)a_n \]

\[ I = kF_r \]

\[ Q = P - I \]

\[ P = P_o (1+i)^k \quad \text{or} \quad P = P_o (1+ki) \]