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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : FINANCIAL MATHEMATICS
COURSE CODE : BWA 31603
PROGRAMME CODE : BWA
EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1** (a) A person owes RM 1,000 due in 1 year with interest at 14%. Two equal payments in 3 and 9 months, respectively, will be used to discharge this obligation. If the person and the creditor agree to use an interest rate of 14% and a focal date 1 year,
- (i) find the maturity value of the debt, and (2 marks)
 - (ii) determine the size of these payments. (3 marks)
- (b) A debt of RM 1,000 is due in 1 year with interest at 15%. The debtor pays RM 300 in 4 months and RM 200 in 10 months.
- (i) Construct a complete timeline to show this problem. (5 marks)
 - (ii) Determine the balance due in 1 year using Merchants' Rule. (10 marks)
- Q2** (a) A loan of RM 4,000 must be paid in six months time.
- (i) Determine the amount of money that you will receive now if a simple discount rate of 18% is applicable. (5 marks)
 - (ii) Determine the equivalent simple interest rate. (5 marks)
- (b) An investor lends RM 5,000 and receives a promissory note promising repayment of the loan in 90 days with 8.5% simple interest. This note is immediately sold to a bank that charges 8% simple interest.
- (i) Calculate how much does the bank pay for the note. (5 marks)
 - (ii) Determine how much is the investor's profit. (5 marks)
- Q3** (a) A man wants to accumulate a RM 200,000 retirement fund. He made the first deposit on 1st March 1994 and his plan calls for the last deposit to be made on 1st September 2015. Determine the size of each deposit needed if he makes the deposits semi-annually in a fund that pays 5% per annum compounded semi-annually. (10 marks)
- (b) People make regular deposits into an account, or regular payments on a loan, or regular withdrawals from a fund. These financial activities are closely related to annuity. Explain the definition of an annuity and provide three examples of annuities. (10 marks)

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- Q4** (a) You purchase a small apartment for RM 180,000 with a down payment (often referred to as deposit) of RM 45,000. You secure a mortgage loan with a bank for the balance at 18% per annum compounded monthly, with a term 20 years.
- (i) Calculate the amount of monthly payments. (4 marks)
- (ii) Construct an amortization schedule for the first six payments of the loan. (10 marks)
- (b) Mr. Ahmad wishes to borrow RM 50,000 for five years for a business venture. He is considering to choose a plan from either Bank A and B. Bank A is willing to lend him the money at 15% per annum if the debt is amortised by equal yearly payments. However, Bank B will lend the money at 14% per annum provided that a sinking fund is established with it, on which it will pay 11% per annum, to accumulate the principal by the end of the term, with equal annual deposits. Determine the annual payment offered by Bank A and Bank B. (6 marks)
- Q5** (a) You are given two n -year 1,000 par value bonds. Bond X has 14% semi-annual coupons and a price of RM 1,407.70 to yield i , compounded semi-annually. Bond Y has 12% semi-annual coupons and a price of RM 1,271.80 to yield the same rate i , compounded semi-annually.
- (i) Calculate the value of i . (5 marks)
- (ii) Compute the price of the Bond X to yield $i-1\%$. (5 marks)
- (b) A RM 1,000 bond paying interest 12% compounded semi-annually, matures on 1st July 2021. On 10th October 2004, it was purchased for RM 1,042.50 plus accrued bond interest (i.e. $q = 104.25$). On 8th February 2007, it was sold for RM 968.70 plus accrued bond interest (i.e. $q = 96.87$). Estimate the yield rate compounded semi-annually by method of averages. (10 marks)

-END OF QUESTIONS -

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FORMULAE

$$I = Prt$$

$$D = Sdt$$

$$S = P(1 + rt)$$

$$S = P(1 + i)^n = P\left(1 + \frac{r}{m}\right)^{mt}$$

$$S = Pe^{it}$$

$$S = P(1 - dt)^{-1}$$

$$S = P(1 - d)^{-n}$$

$$s_{\overline{n}|i} = \frac{(1 + i)^n - 1}{i}$$

$$a_{\overline{n}|i} = \frac{1 - (1 + i)^{-n}}{i}$$

$$A = \frac{R}{i}$$

$$P = Ra_{\overline{n}|i}$$

$$P = C + (Fr - C_i)a_{\overline{n}|i}$$

$$P = Fra_{\overline{n}|i} + C(1 + i)^{-n}$$

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THE NUMBER OF EACH DAY OF THE YEAR

Day	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	001	032	060	091	121	152	182	213	244	274	305	335
2	002	033	061	092	122	153	183	214	245	275	306	336
3	003	034	062	093	123	154	184	215	246	276	307	337
4	004	035	063	094	124	155	185	216	247	277	308	338
5	005	036	064	095	125	156	186	217	248	278	309	339
6	006	037	065	096	126	157	187	218	249	279	310	340
7	007	038	066	097	127	158	188	219	250	280	311	341
8	008	039	067	098	128	159	189	220	251	281	312	342
9	009	040	068	099	129	160	190	221	252	282	313	343
10	010	041	069	100	130	161	191	222	253	283	314	344
11	011	042	070	101	131	162	192	223	254	284	315	345
12	012	043	071	102	132	163	193	224	255	285	316	346
13	013	044	072	103	133	164	194	225	256	286	317	347
14	014	045	073	104	134	165	195	226	257	287	318	348
15	015	046	074	105	135	166	196	227	258	288	319	349
16	016	047	075	106	136	167	197	228	259	289	320	350
17	017	048	076	107	137	168	198	229	260	290	321	351
18	018	049	077	108	138	169	199	230	261	291	322	352
19	019	050	078	109	139	170	200	231	262	292	323	353
20	020	051	079	110	140	171	201	232	263	293	324	354
21	021	052	080	111	141	172	202	233	264	294	325	355
22	022	053	081	112	142	173	203	234	265	295	326	356
23	023	054	082	113	143	174	204	235	266	296	327	357
24	024	055	083	114	144	175	205	236	267	297	328	358
25	025	056	084	115	145	176	206	237	268	298	329	359
26	026	057	085	116	146	177	207	238	269	299	330	360
27	027	058	086	117	147	178	208	239	270	300	331	361
28	028	059	087	118	148	179	209	240	271	301	332	362
29	029		088	119	149	180	210	241	272	302	333	363
30	030		089	120	150	181	211	242	273	303	334	364
31	031		090		151		212	243		304		365

Note: For leap year, add 1 day to the tabulated number after 28 days

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