

國立中央大學 108 學年度碩士班考試入學試題

所別：土木工程學系營建管理碩士班 不分組(一般生)

共2頁 第1頁

科目：工程經濟與統計

問答題及計算題

本科考試可使用計算器，廠牌、功能不拘

*計算題需計算過程，無計算過程者不予計分

I. 工程統計 (50 分)

- 一、從某家不良率為 0.10 的預鑄工廠產品線中，隨機抽取 5 個預鑄混凝土板為樣本，請問在樣本中有 1 個不良品的機率為何？2 個以上不良品的機率為何？(每小題 8 分，共 16 分)
- 二、請指出以下各點關於相關係數(correlation coefficient, r)描述中錯誤之處(每小題 4 分，共 12 分)
 1. 台灣營造業從業人員的性別與收入之間有很高的相關係數。
 2. 公共工程業主對某家營造廠的評價與私人工程業主對該營造廠的評價之間的相關係數 r 為 1.08。
 3. 建設公司高階主管的年齡與收入之相關係數 r 為 0.52 歲。
- 三、在某營建工地外量測該工地之噪音等級，將量測結果整理成以下的次數分配表(單位為分貝)(每小題 6 分，共 12 分)。

組中點	次數
148	2
139	3
130	8
121	11
112	27
103	35
94	43
85	33
76	20
67	12
58	6
49	4
40	2

1. 請根據該表計算平均數。
 2. 請繪製直方圖。
- 四、何謂顯著性水準(significance level)? (4 分)試舉一個例子說明顯著性水準於工程上的應用(6 分)。

注意：背面有試題

參考用

國立中央大學 108 學年度碩士班考試入學試題

共 2 頁 第 2 頁

所別： 土木工程學系營建管理碩士班 不分組(一般生)

科目： 工程經濟與統計

本科考試可使用計算器，廠牌、功能不拘

II. 工程經濟 (50 分)

You have been asked to provide business suggestions for an engineering consulting company. The following information may be required to carry out your work: (1) the corporate tax is at 17%; (2) the total asset for the company is \$10 million NTD (New Taiwan Dollars) and has zero debt currently; (3) the interest rate for its short term loan is at 8% for the first \$8 million NTD and the increase at 8% for the next \$8 million NTD; (4) the investors demand for 12% of return from consulting company-related stock; (5) the company currently has \$2 million NTD cash on hand for coming-up projects; (6) the rate of returns for 5 coming-up projects (A~E) that potentially will be awarded are at 8%, 10%, 14%, 16%, and 20%; (7) the contract price for A~E projects are at \$16, \$8, \$8, \$4, \$2 million NTD, respectively.

Please answer the following questions:

- (a) Before taking any projects, what is the current and most-likely before-tax Minimum Attractive Rate of Return (MARR) for the company (10 pt)? Please describe your reason(s) (5 pt).
- (b) Considering the result from (a), the opportunity cost viewpoint, and 5 coming-up projects, please plot a chart with x-axis of annual rate of return and y-axis of cumulative investment amount (20 pt). The chart must have, at least, the corporate cost of capital curve.
- (c) Based on the results from (b), which project(s) can be taken to maximize the corporate profits (15 pt)?

** To find Present value given Future value (P/F) at the first 15 period discount rate:

	i=8%	i=10%	i=12%	i=14%	i=16%	i=18%	i=20%
Period 1	.9259	.9091	.8929	.8772	.8621	.8475	.8333
Period 2	.8573	.8264	.7972	.7695	.7432	.7182	.6944
Period 3	.7938	.7513	.7118	.6750	.6407	.6086	.5787
Period 4	.7350	.6830	.6355	.5921	.5523	.5158	.4823
Period 5	.6806	.6209	.5674	.5194	.4761	.4371	.4019
Period 6	.6302	.5645	.5066	.4556	.4104	.3704	.3349
Period 7	.5835	.5132	.4523	.3996	.3538	.3139	.2791
Period 8	.5403	.4665	.4039	.3506	.3050	.2660	.2326
Period 9	.5002	.4241	.3606	.3075	.2630	.2255	.1938
Period 10	.4632	.3855	.3220	.2697	.2267	.1911	.1615
Period 11	.4289	.3505	.2875	.2366	.1954	.1619	.1346
Period 12	.3971	.3186	.2567	.2076	.1685	.1372	.1122
Period 13	.3677	.2897	.2292	.1821	.1452	.1163	.0935
Period 14	.3405	.2633	.2046	.1597	.1252	.0985	.0779
Period 15	.3152	.2394	.1827	.1401	.1079	.0835	.0649

** To find Present value given Annuity (P/A) at the first 15 period discount rate:

	i=8%	i=10%	i=12%	i=14%	i=16%	i=18%	i=20%
Period 1	0.9259	0.9091	0.8929	0.8772	0.8621	0.8475	0.8333
Period 2	1.7833	1.7355	1.6901	1.6467	1.6052	1.5656	1.5278
Period 3	2.5771	2.4869	2.4018	2.3216	2.2459	2.1743	2.1065
Period 4	3.3121	3.1699	3.0373	2.9137	2.7982	2.6901	2.5887
Period 5	3.9927	3.7908	3.6048	3.4331	3.2743	3.1272	2.9906
Period 6	4.6229	4.3553	4.1114	3.8887	3.6847	3.4976	3.3255
Period 7	5.2064	4.8684	4.5638	4.2883	4.0386	3.8115	3.6046
Period 8	5.7466	5.3349	4.9676	4.6389	4.3436	4.0776	3.8372
Period 9	6.2469	5.7590	5.3282	4.9464	4.6065	4.3030	4.0310
Period 10	6.7101	6.1446	5.6502	5.2161	4.8332	4.4941	4.1925
Period 11	7.1390	6.4951	5.9377	5.4527	5.0286	4.6560	4.3217
Period 12	7.5361	6.8137	6.1944	5.6603	5.1971	4.7932	4.4392
Period 13	7.9038	7.1034	6.4235	5.8424	5.3423	4.9095	4.5327
Period 14	8.2442	7.3667	6.6282	6.0021	5.4675	5.0081	4.6106
Period 15	8.5595	7.6061	6.8109	6.1422	5.5755	5.0916	4.6755

參考用

注意：背面有試題