UNIVERSITI TUN HUSSEIN ONN MALAYSIA

PEPERIKSAAN AKHIR
SEMESTER I
SESI 2010/2011

NAMA KURSUS	:	REKABENTUK UNTUK PEMBUATAN DAN PEMASANGAN
KOD KURSUS	:	BDD 4013
PROGRAM	:	4 BDD
TARIKH PEPERIKSAAN	:	NOVEMBER / DISEMBER 2010
JANGKA MASA	:	3 JAM
ARAHAN	:	BAHAGIAN A : JAWAB **SEMUA** SOALAN BAHAGIAN B : JAWAB **TIGA (3)** SOALAN SAHAJA DARIPADA EMPAT (4) SOALAN YANG DIPERUNTUKKAN

KERTAS SOALAN INI MENGANDUNGI TUJUH (7) MUKA SURAT

PART A: Answer **ALL questions** for this part.

Q1 List SIX (6) approach, the Design for Assembly (DFA) to reduce the cost and time assembly by simplifying the product and process.

(6 marks)

Q2 Discuss the differences between convergent and divergent thinking in product development.

(6 marks)

Q3 List out SIX (6) features affecting manual handling time significantly.

(6 marks)

Q4 With an illustration, give THREE (3) examples of part that may require tweezers for handling.

(6 marks)

Q5 Write SIX (6) conclusions drawn from effects of chamfer design on insertion operation.

(6 marks)

Q6 Derive the condition for the part to be free from jamming during assembly.

(6 marks)

Q7 List out SEVEN (7) design guidelines in machining operation.

(7 marks)

Q8 How much machining time will be required to reduce the diameter of a cast iron rod from 120 mm to 116 mm by turning using carbide insert.
Assume, $N_w = 200$ rev/min , $f = 0.2$ mm/rev.

(6 marks)

Q9 Why the reciprocating screw is better design compared to the conventional cylinder and plunger type of injection unit?

(6 marks)

Q10 What are the advantages of using the cut-off operation design in producing parts process and what is the meaning of manufacturing scrap in this cut-off operation?

(6 marks)

PART B: Please answer **THREE (3) questions only** for this part.

Q11 Based on the following available data in Table 1 below, determine :

No.	**Items**	**Old design**	**New design**
1	Total number of parts and subassemblies	34	19
2	Total assembly time	459 s	**X**
3	Total assembly cost	**Y**	RM 0.76
4	Theoretical minimum number of parts	12	8

Table 1

(a) The total assembly time, **X** (in second) for new design if the shop rate of the assembly is RM6.00 per hour?

(5 marks)

(b) The total assembly cost, **Y** for the old design assembly?

(4 marks)

(c) The assembly efficiency for both old and new design?

(4 marks)

Q12 (a) Write a mathematical calculation for proving that the machining cost will increase with the increasing of the surface smoothness for a part. Assume that the turning operation is an example of calculation.

(7 marks)

(b) A face milling operation is used to machine 6.0 mm in a single pass from the top surface of a rectangular piece of aluminum 300 mm long by 125 mm wide. The cutter has four teeth (cemented carbide inserts) and is 150 mm in diameter. The cutting speed is 2.8 m/s and the chip load is 0.27 mm/tooth. Determine:

(i) Time to make one pass across the surface and,

(3 marks)

(ii) The maximum metal removal rate during cutting

(3 marks)

Q13 **Figure Q13** shows the part that required 50,000 units should be produced using commercial low carbon steel. Assume 50 mm allowance all around and RM 40.00/hour for die making.
Determine the total cost of die to produce the part?

(13 marks)

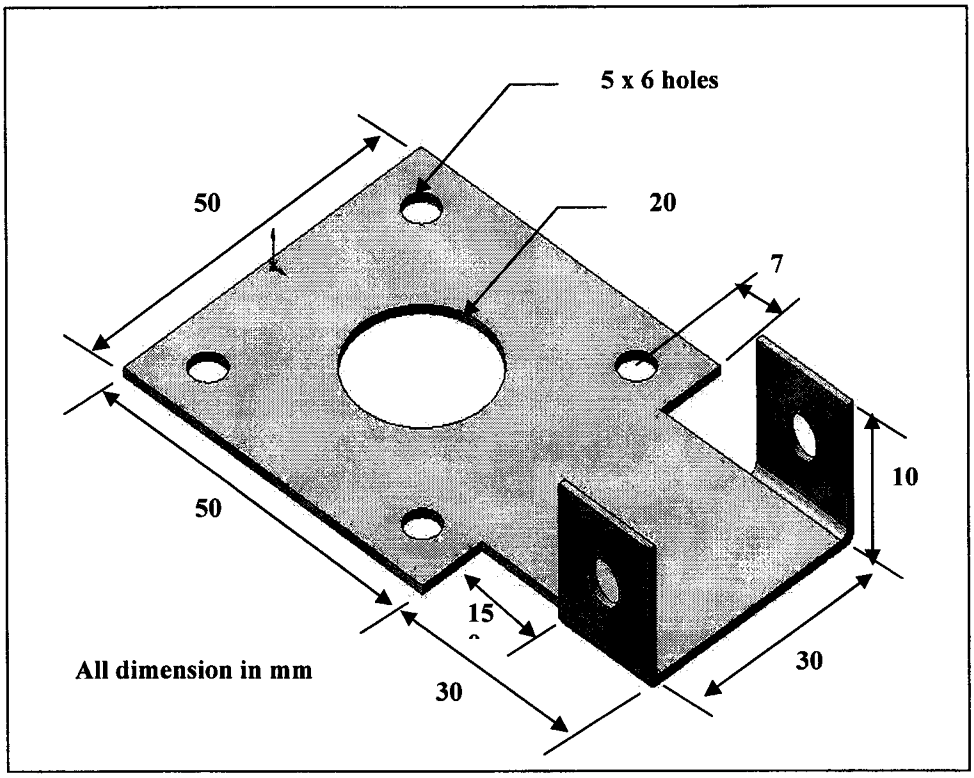

Figure Q13

Q14 (a) A batch of disc with diameter of 30mm and the thickness of 60mm will be printed from ABS material in four cavity mold and sort in order of 2 x 2. The location of this disc in printed moment is shown in Figure Q14. Estimate the percentage of runner system increased to 50 percent and the allowance value is 7.5 cm. By using Table 1 and Table 2 that are given,

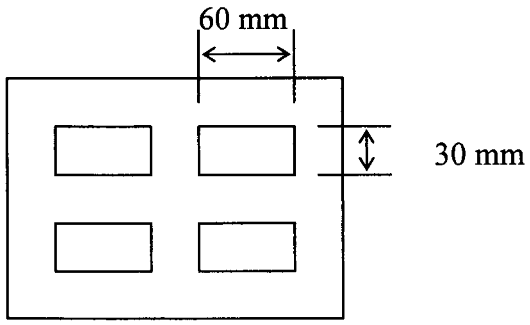

Figure Q14

(i) Determine the appropriate machine sizes.

(5 marks)

(ii) Determine the cycle time.

(5 marks)

(iii) Determine the molding basic cost.

(3 marks)

Lampiran I

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Table 1 – Injection Molding Machine

Clamping force (kN)	Shot size (cc)	Operating cost ($/h)	Dry cycle times (s)	Maximum clamp stroke (cm)	Driving power (kW)
300	34	28	1.7	20	5.5
500	85	30	1.9	23	7.5
800	201	33	3.3	32	18.5
1100	286	36	3.9	37	22.0
1600	286	41	3.6	42	22.0
5000	2290	74	6.1	70	63.0
8500	3636	108	8.6	85	90.0

Table 2 – The Processes Data for Selected Polymer

Thermoplastic	Specific gravity	Thermal diffusivity (mm^2/s)	Injection temp. (°C)	Mold temp. (°C)	Ejection temp. (°C)	Injection pressure (bars)
High-density polyethylene	0.95	0.11	232	27	52	965
High-impact polystyrene	1.59	0.09	218	27	77	965
Acrylonitrile-butadiene-styrene (ABS)	1.05	0.13	260	54	82	1000
Acetal (homopolymer)	1.42	0.09	216	93	129	1172
Polyamide (6/6 nylon)	1.13	0.10	291	91	129	1103
Polycarbonate	1.20	0.13	302	91	127	1172
Polycarbonate (30% glass)	1.43	0.13	329	102	141	1310
Modified polyphenylene oxide (PPO)	1.06	0.12	232	82	102	1034
Modified PPO (30% glass)	1.27	0.14	232	91	121	1034
Polypropylene (40% talc)	1.22	0.08	218	38	88	965
Polyester teraphthalate (30% glass)	1.56	0.17	293	104	143	1172

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List of Formula;

$$EM = \frac{3 \times NM}{TM}$$

$$C_{ds} = 120 + 0.36A_u$$

$$t_m = \frac{d_m}{2fn_w}$$

$$X_p = \frac{P^2}{LW}$$

$$\text{Total Die Cost} = C_{ds} + \left(M_{po} + M_{pc} + M_{ps}\right)R$$

$$M_{po} = [18 + 0.023LW][0.88 + 0.02D]$$

$$v_{\max} = \pi n_w d_m$$

$$M_p = M_{po} f_{lw} f_d$$

$$Z_{w_{\max}} = \pi f a_p n_w d_m$$

F (kN) = A (m^2) x P_{max} (kN/m^2)

$$M_{po} = 23 + 0.03LW$$

$$\text{Total Costs} = C_{ds} + \left(M_{po} + M_{pn}\right)R$$

$$t_f = \frac{V}{Q_{av}} = \frac{2V_s p_j}{P_j}$$

$$M_{pc} = 8 + 0.6P + 3N_p$$

$$t_c = \frac{h^2_{\max}}{\pi^2 \alpha} \log_e \frac{4(T_i - T_m)}{\pi(T_x - T_m)} x\, C$$

$$M_{ps} = KN_p + 0.4N_d$$

$$t_{close} = 0.5t_d \left[\frac{2D+5}{L_s}\right]^{1/2}$$

$$t_r = 1 + 1.75t_d \left[\frac{2D+5}{L_s}\right]^{1/2}$$

$$t_f = \frac{V}{Q_{av}} = \frac{2V_s p_j}{P_j}$$

$$C_b = 1000 + 0.45A_c h_p^{0.4}$$

$$t_{close} = 0.5t_d \left[\frac{2D+5}{L_s}\right]^{1/2}$$

$$n = \left(\frac{N_t k_1 t}{(mC_{c1})}\right)^{1/(m+1)}$$