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SUMMER-15 EXAMINATION
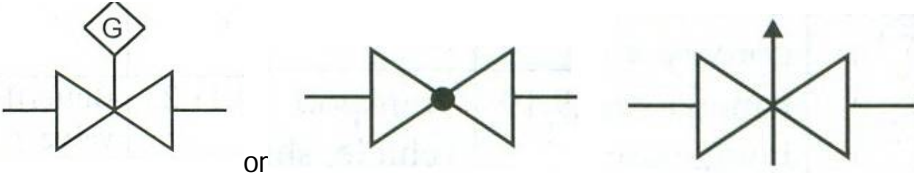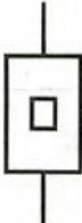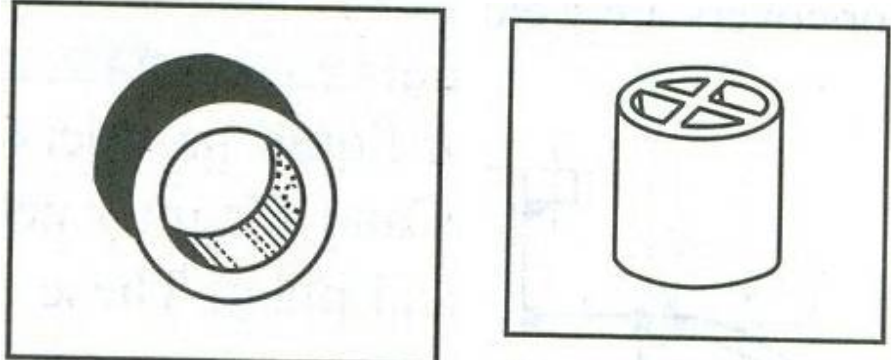### Model Answer

Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.

2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.

3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.

4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.

5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.

6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.

7) For programming language papers, credit may be given to any other program based on equivalent concept.

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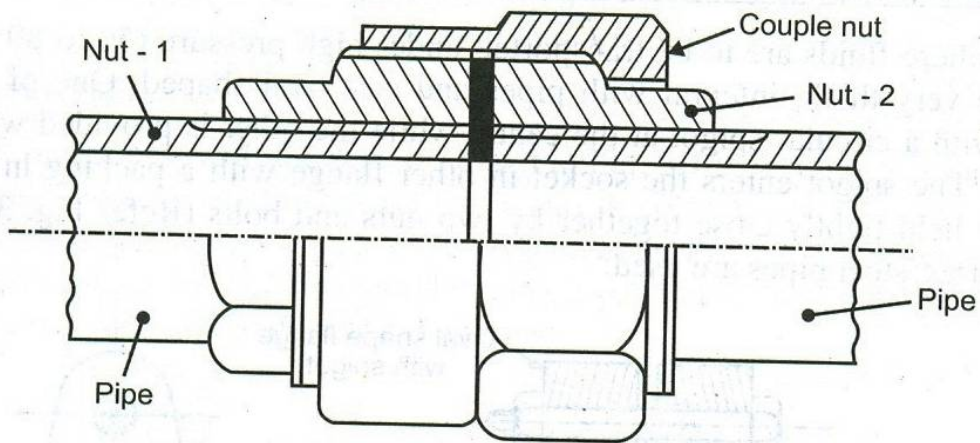| Q No.	Answer	Marks	Total marks
1 A a)	**Symbol of globe valve and needle valve** or	2+2	4
b)	**Rota meter (other symbol is not mentioned properly. Give full marks to Rota meter)** 	4	4
c)	**Raschig ring and cross partition ring** Raschig Ring Cross partition Ring	2+2	4

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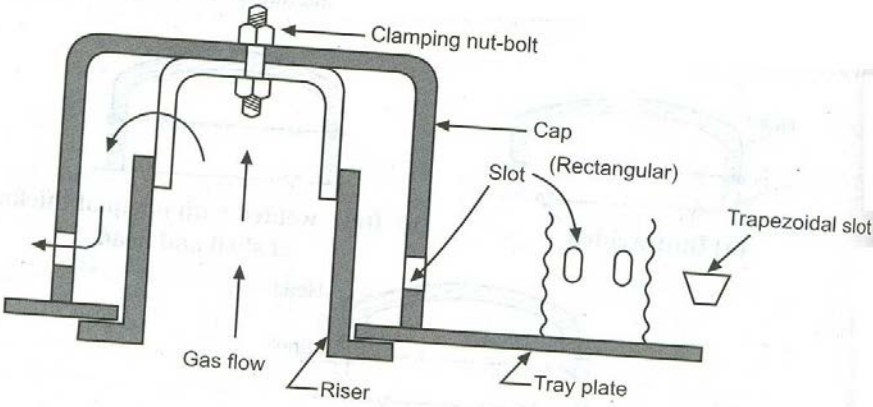
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d)	**Union Joint**	4	4

1 B a)	**Specification sheet of shell and tube heat exchanger**		
	2 SPECIFICATION SHEET FOR HEAT EXCHANGER		
	See table below	8	8

2 SPECIFICATION SHEET FOR HEAT EXCHANGER

	Description	Shell side	Tube side
1.	Specification No. .... Date		
2.	Number required .... Location		
3.	Type .... Duty as		
4.	Operating data/conditions		
5.	Fluid description	Shell side	Tube side
6.	Name	In ... out ...	In ... out ...
7.	Composition	In ... out ...	In ... out ...
8.	Flow rate, kg/h	In ... out ...	In ... out ...
9.	Density, kg/m³	In ... out ...	In ... out ...
10.	Viscosity, cP	In ... out ...	In ... out ...
11.	Specific heat,	....	....
12.	Latent heat, kcal/kg	....	....
13.	Thermal conductivity	....	....
14.	Temperature, °C	In ... out ...	In ... out ...
15.	Operating pressure, kgf/cm²·g	In ... out ...	In ... out ...
16.	No. of passes	....	....
17.	Velocity, m/s	....	....
21.	Tube : OD ...... mm, length ...... m, wall thickness (BWG) ...... pitch ...... mm □ △ material		
22.	Shell : Nom. OD ...... length ...... mm thickness		
23.	Shell cover : ...... Material		
24.	Channel ...... Channel cover		
25.	Tube sheet type ...... (stationary/floating)		
26.	Baffles : type ...... No. ...... Thickness		
27.	Shell side nozzles : Inlet ...... outlet ...... drain		
28.	Tube side nozzles : Inlet ...... outlet		
29.	Corrosion allowance : shell side ...... tube side		
30.	Gaskets		
31.	Design code		
32.	Design pressure and temperature	... kgf/cm²·g, ... °C	... kgf/cm²·g, ... °		
33.	Test pressure and temperature ......, ..., ..., ...		
34.	Weight : Dry ......, Tube bundle ...... Unit full of water ...... kg.		
35.	Remarks		
	Prepared by ...... Checked by ...... Approved by ...... Name and Address		

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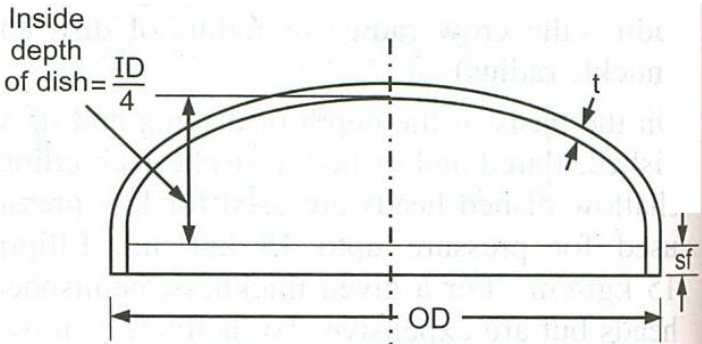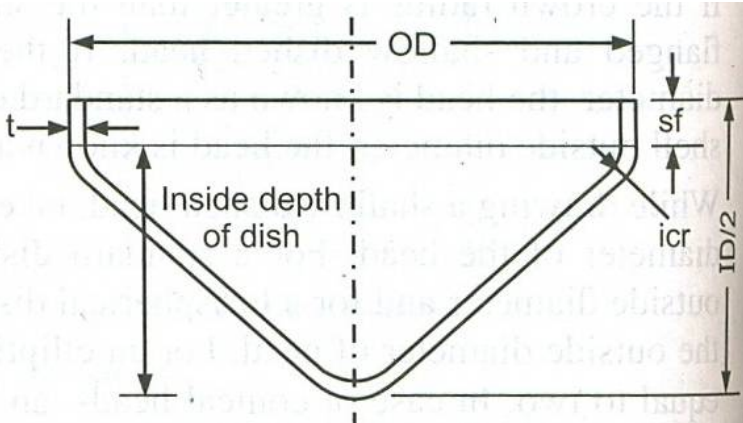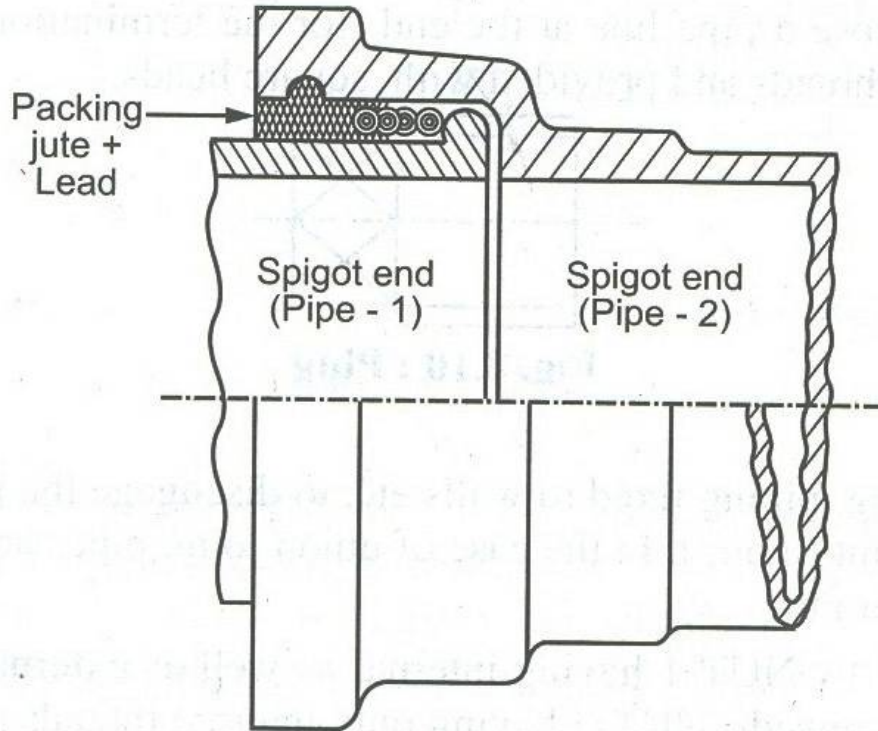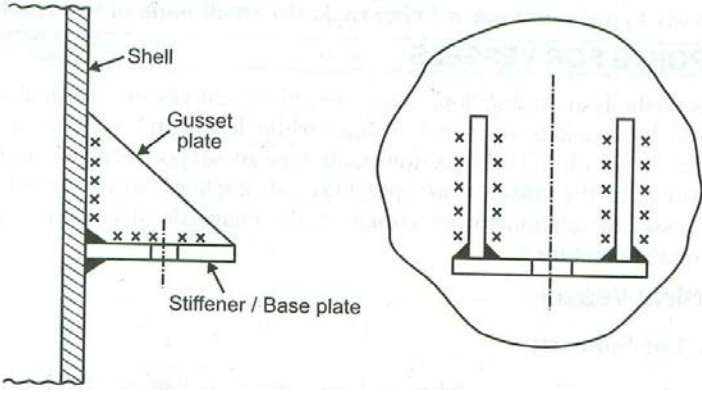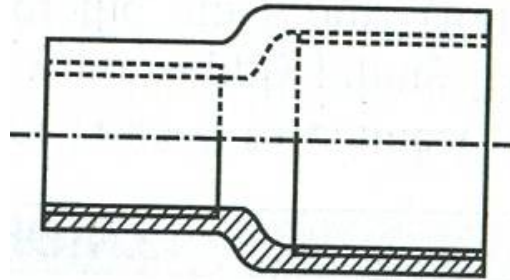
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<u>**Model Answer**</u>

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b)	**Bubble cap tray**		8	8
2 a)	**Elliptical dished head** **Conical dished head**		2+2	4

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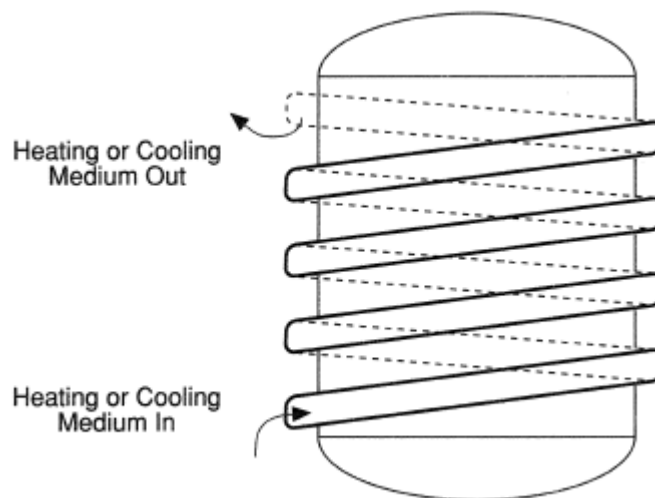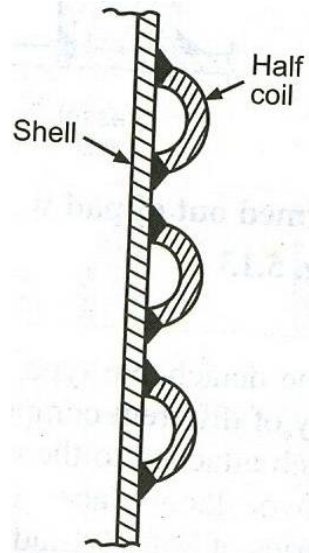**SUMMER-15 EXAMINATION**
Model Answer

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b)	**Socket and Spigot joint** Packing jute + Lead Spigot end (Pipe - 1) Spigot end (Pipe - 2)	4	4
c)	**Bracket support** Shell Stiffener Gusset plate Stiffener	4	4
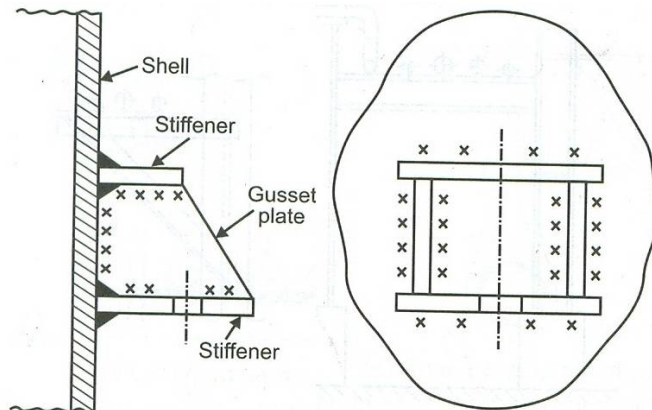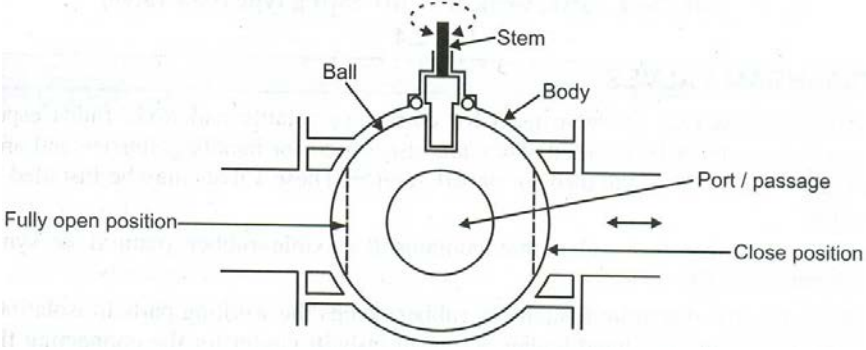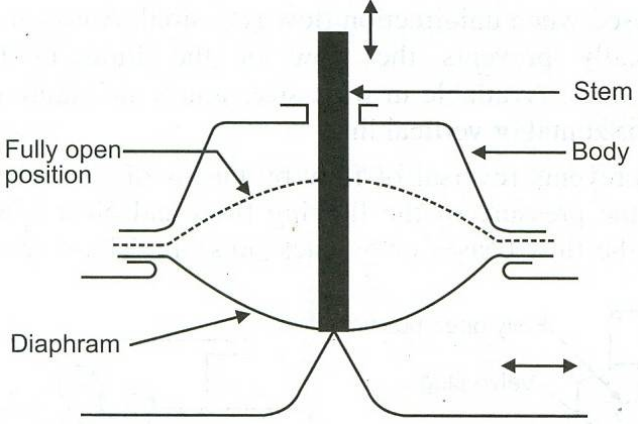
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d)	**Ball valve** 	4	4
e)	**Diaphragm valve** 	4	4

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f)	**Reducer** **Tee joint** OR 	2+2	4

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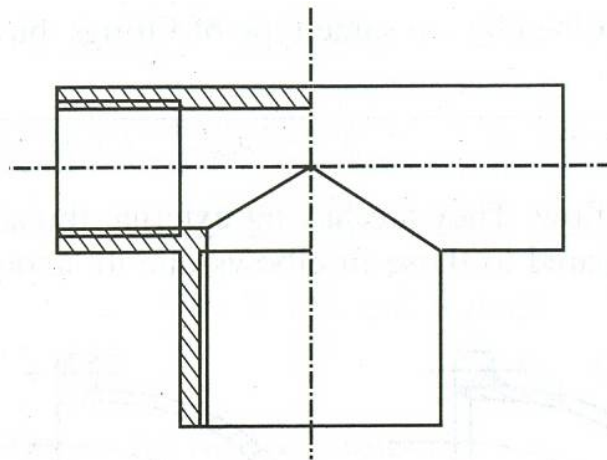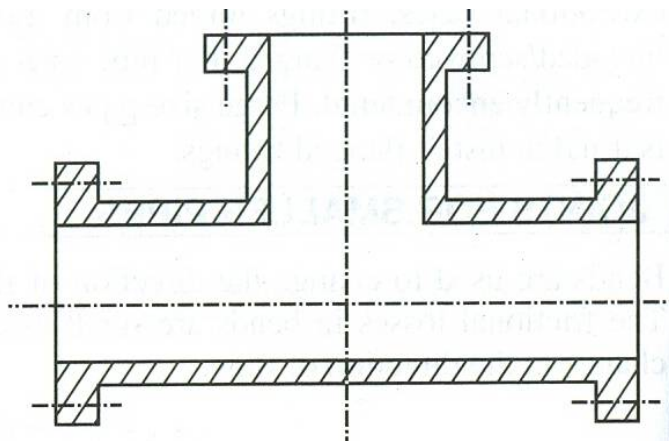
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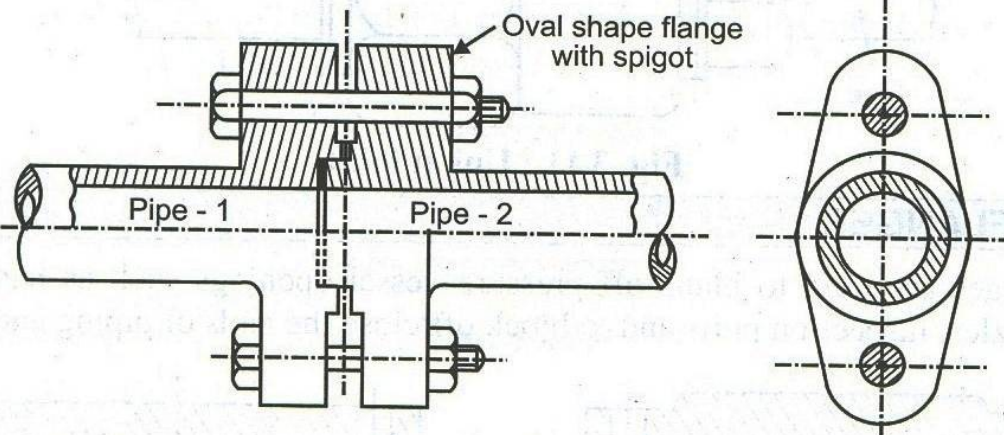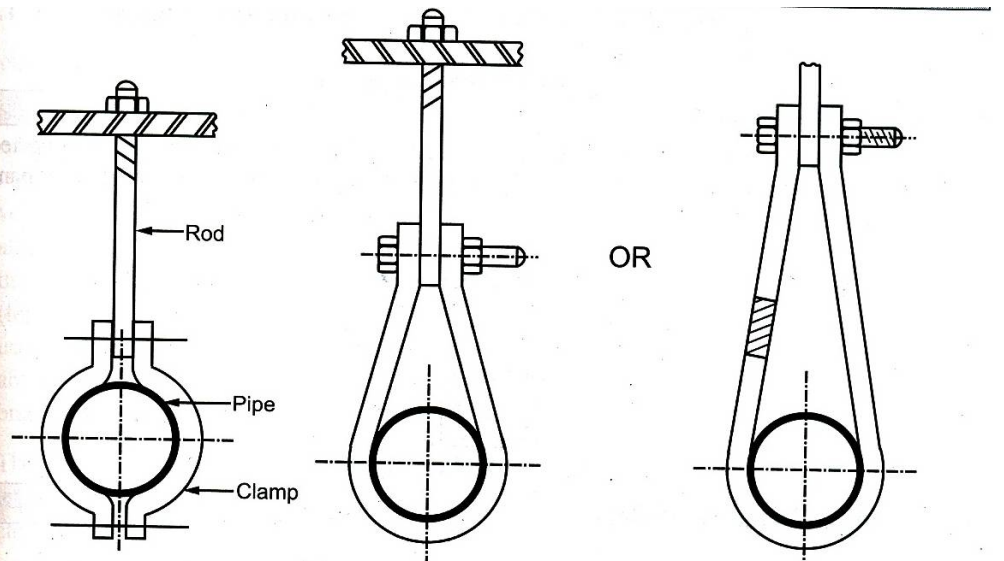
3 a)	**Limpid coils**		
		2+2	4
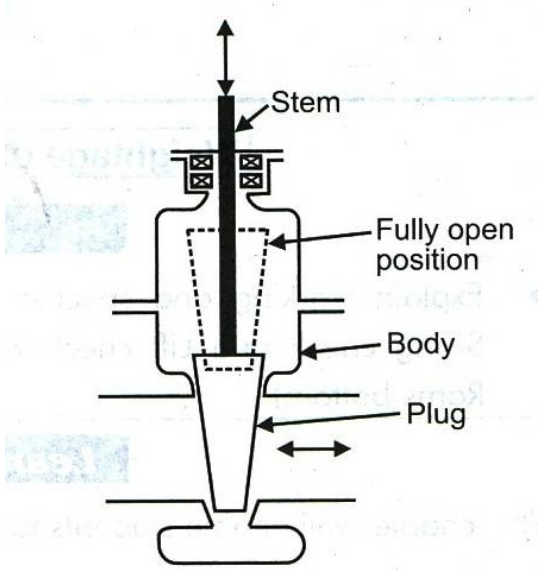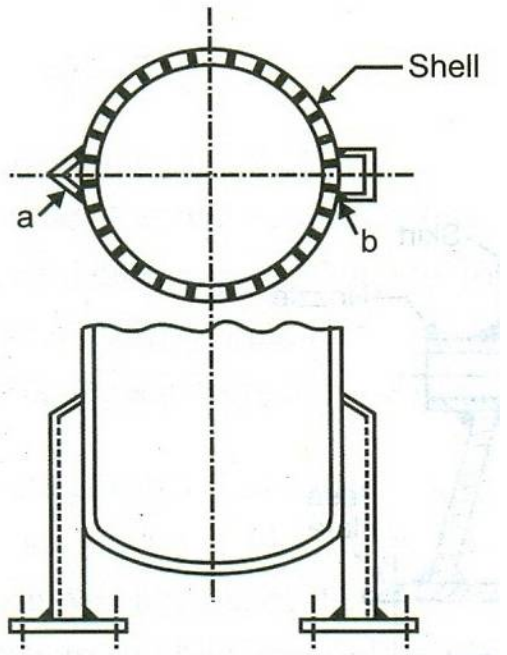
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b)	**Hydraulic joint**	4	4
c)	**Hanger support**	4	4

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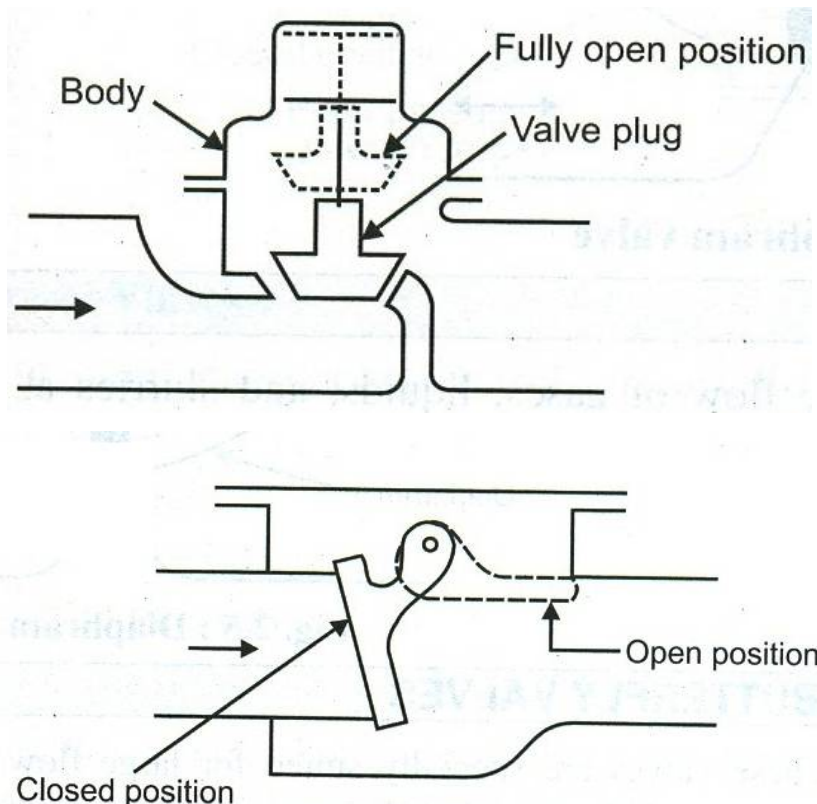
d)	**Gate valve**	4	4
e)	**Leg support**	4	4

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f)	**Swing check valve** 	2+2	4
4	**Process Flow Diagram** **Legend for Q 4 and 5 a** | Sr. No.	Equipment code	Description
---	---	---
1	R-1	Methanol reactor
2	C-1	Compressor
3	CL-1,CL-2	Distillation column
4	S-1	Separator
5	RB-1, RB-2	Reboiler
6	HE-3, HE-4	Condenser
7	HE-1, HE-2	Heat exchanger
8	AC-1, AC-2	Accumulator		Legends 4 marks + PFD 12marks	

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Model Answer

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Model Answer
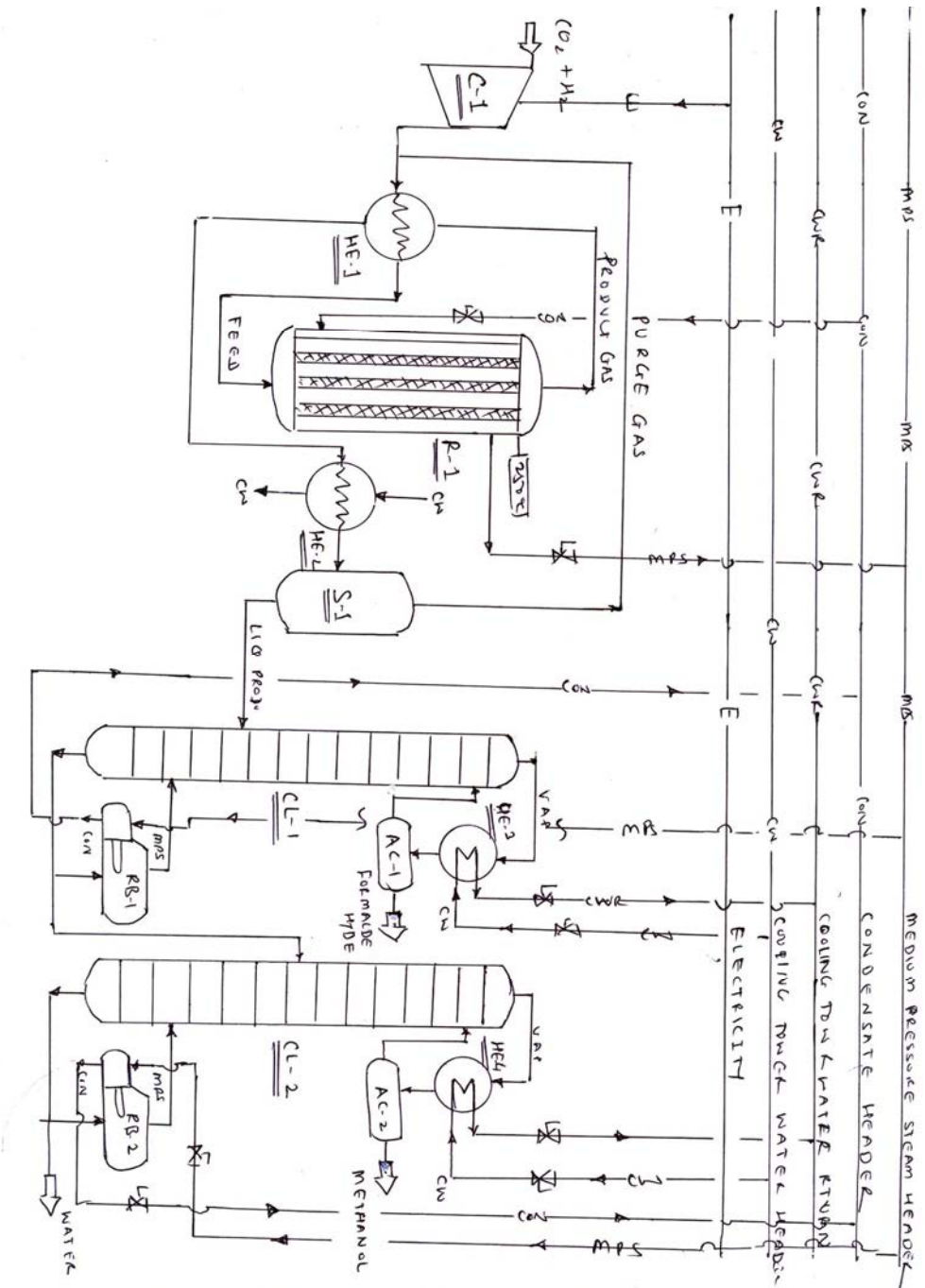
5 a)	**Utility Line Diagram**		
		legends 2 marks + ULD 6 marks (with headers)	8

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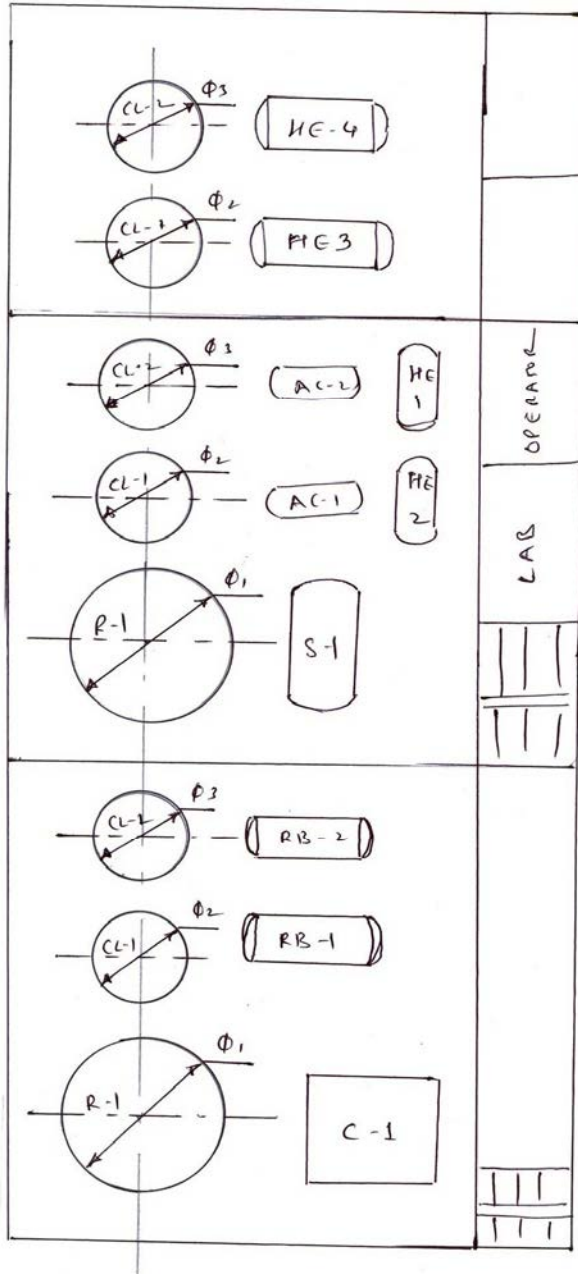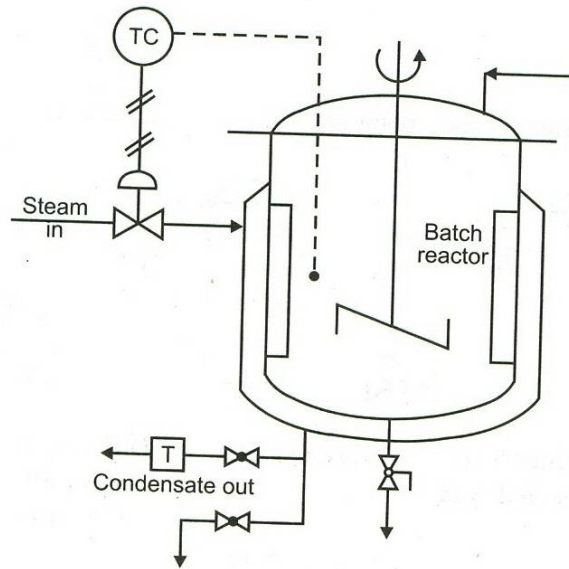
b)	**Equipment layout**		
		Legends 2 marks + Equipment layout 6 marks	

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Model Answer
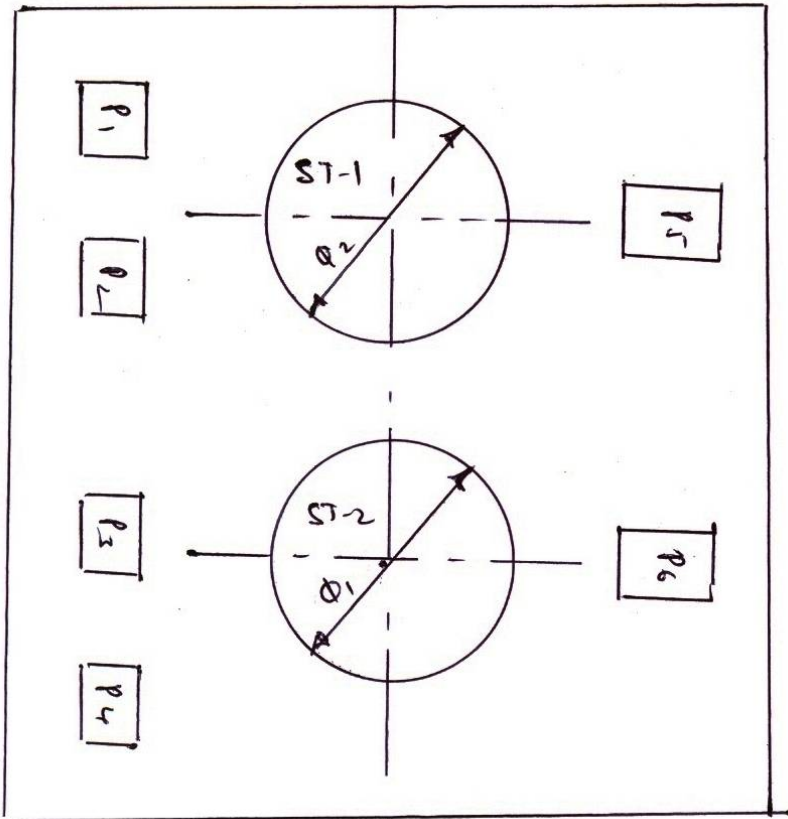
6 a)	**Tank Farm**		
		Legends 2 marks + tank farm 6 marks	8

Sr. No.	Equipment code	Description
1	ST-1	Methanol storage tank
2	ST-2	Formaldehyde storage tank
3	P-1-6	Pumps

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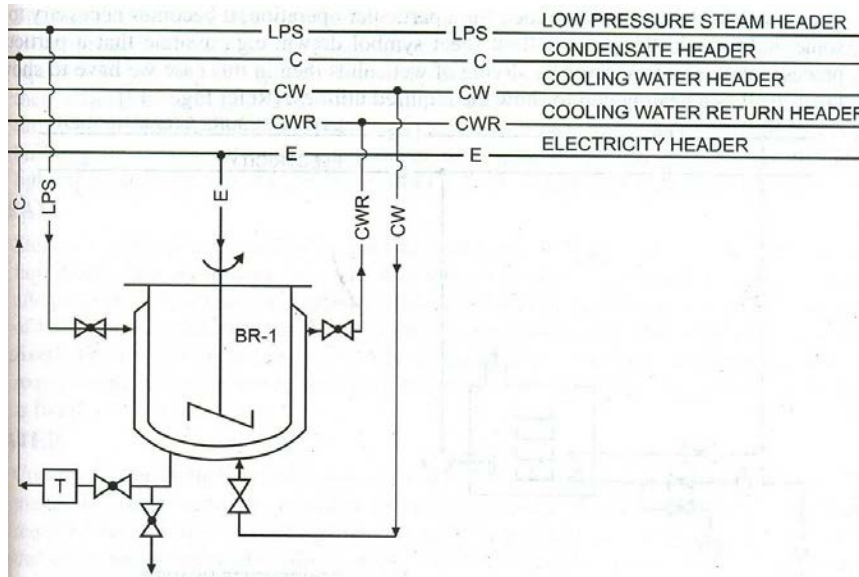|			
b)	**P & I for rector** **Utility for rector**	4+4	8