



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

CHEMICAL PLANT OPERATION N5

16 November 2020

This marking guideline consists of 6 pages.

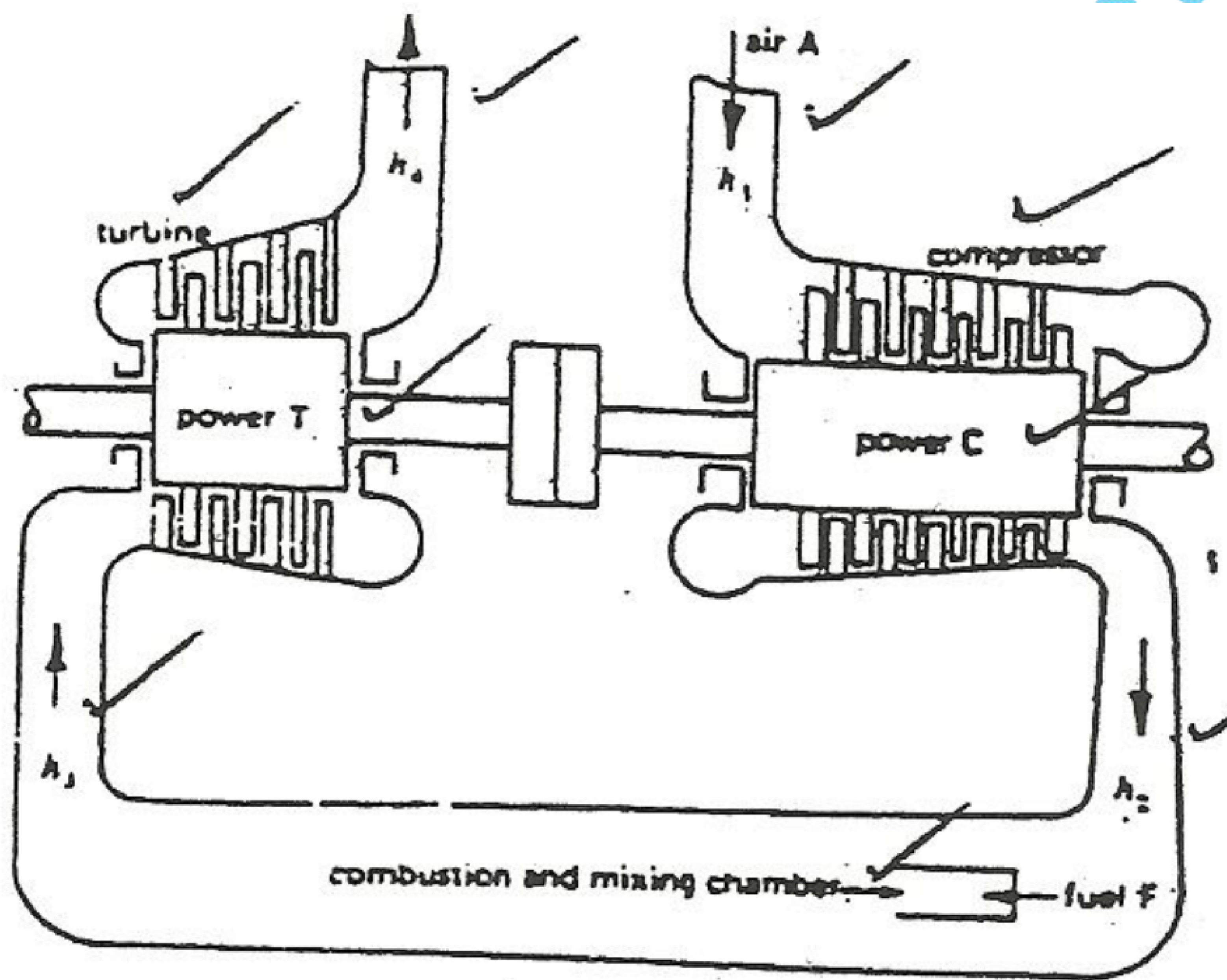
QUESTION 1

- 1.1 True
- 1.2 True
- 1.3 False
- 1.4 True
- 1.5 True

(5 × 1) [5]

QUESTION 2

2.1



(9)

2.2 2.2.1

A cylindrical bowl with a conical end rotates about a horizontal axis. ✓ Feed enters through a stationary axial pipe spraying outward into a pond. ✓ Clarified liquid flows through overflow ports. Solids settle through the liquid to the inner surface of the bowl. ✓ A helical conveyor turning slightly slower than the bowl moves the solids to the discharge opening. ✓ Drained sludge and clarified liquids are discharged from the bowl ✓ into different parts of the casing, from which they leave through suitable openings. ✓

(6)

2.2.2

This separator is a modified-type centrifuge with a conical bowl. ✓ At its maximum diameter the bowl has a set of small holes, or nozzles, perhaps 3 mm in diameter. ✓ The central part of the bowl operates in the same way as the usual disk centrifuge overflowing either one or two streams of clarified liquid. ✓ Solids are diverted to the periphery of the bowl and escape continuously through the nozzles, together with a considerable amount of liquid. ✓

(4)

2.2.3 Tumbling them in a partly filled container rotating about a horizontal axis mixes many materials. ✓ Ball mills are often used as mixers. ✓ Most tumbling mills, however, do not contain grinding elements. ✓ Tumbling barrels, for example, resemble ball mills without the balls. They effectively mix suspension of dense solids in liquids and heavy dry powders. ✓ The double-cone mixer is a popular mixer for free-flowing dry powders. ✓ The twin-shell blender is made from two cylinders joined to form a V which rotates about a horizontal axis. ✓

(6)
[25]

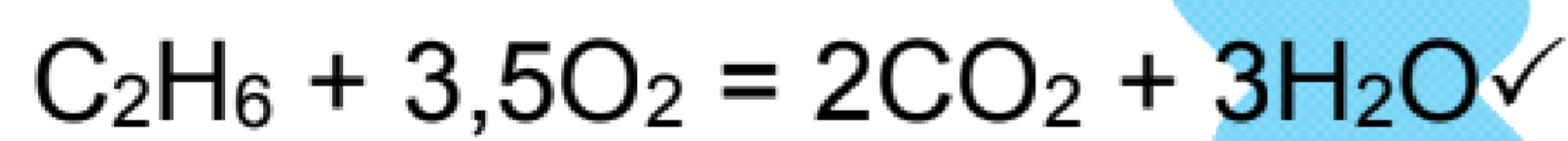
QUESTION 3

3.1 The ratio between O₂ and N₂ = 21%:79% ✓
∴ O₂ required = (21 x 75) ÷ 79 ✓

$$= 19,937 \text{ mol O}_2 \checkmark$$

$$\therefore \text{Air feed to burner} = 75 + 19,937 \checkmark$$

$$= 94,937 \text{ mol air} \checkmark$$



Out of the reaction the ratio C₂H₆:CO₂ = 1:2 ✓

C₂H₆ fed to burner for combustion = 5 mol

$$\therefore \text{C}_2\text{H}_6:\text{CO}_2 \checkmark$$

$$1 : 2$$

$$x : 5$$

$$\therefore \text{C}_2\text{H}_6 = 2,5 \text{ mol}$$

$$\therefore \text{Ratio of air:C}_2\text{H}_6 = 94.937 \div 2,5 \checkmark$$

$$= 37,975:1$$

$$= \underline{40:1} \checkmark$$

(10)