GMP : Assignment

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(1) GMP is a set of practices, controls & conditions required to produce safe food products. It ensures products are consistently produced & controlled to quality standards, preventing contaminations etc.

Key principles:

- Writing step-by-step operating procedures and work instruction
- Following written procedures & instruct^{n} at all times to prevent contamination
- Documenting work accurately & in timely fashion
- Proving that systems do what they are designed to do by validating equipment
- Designing & constructing facilities & equipment
- Monitoring & maintaining facilities & equipment
- Defining, developing & demonstrating job competence
- Protecting against contaminat^{n} & maintain good environment.
- Controlling raw materials, components & product related processes
- Conducting planned & periodic audits

(2) HACCP is a preventive, science-based system to identify, evaluate & control hazards significant for food safety.

Principles:

Conduct Hazard analysis

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Identify critical control points

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Establish critical limits

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Establish monitoring procedures

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Establish corrective procedures

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Establish verificatn procedures

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Establish documentatn & record keeping

(3) (a) CCP algorithm is a decision tree like procedures used to determine whether a process step is critical control point. It asks —

(i) Are preventive measures in place?

(ii) Does this step eliminate the likely occurence or reduce level of risk of the identified hazard?

(iii) Could the presented hazard reach unacceptable levels?

(iv) Is there a next step that can control the ~~level~~ level of hazards?

(b)

CCP	OPRP	PRP
Control significant hazard	Control potential contamination	Provide hygienic environment & support
Continuous / detailed	Routine/operatn check	Periodic / audits
Required & documented	Required but less formal	Part of maintenance
e.g. Pasteurizatn. time/temp	CIP of filler nozzles	Building hygiene sanitatn

(4) Product: Ready to drink fruit juice

Main hazards:

(i) Biological – Salmonella, E. coli, yeasts, moulds etc.
(ii) Chemical – Pesticide residues, cleaning chemical residues.
(iii) Physical – Stones, glass, metal fragments.

CCP:

Pasteurization – kill pathogens (e.g. ≥ 95°C for ≥ 15 s)
Aseptic filling – prevent recontaminatn
Cold Storage / Transport – maintain ≤ 4°C

- Monitoring : Temp recorders, visual seal checks, temperature loggers.
- Corrective actions : Stop production, segregate product, re-process or reject.
- Verification : Calibration, microbiological testing, record review.
- Records : CCP logs, maintenance, corrective action reports.

(5) Flow :

Receiving fruit → Sorting → Washing → Extraction → Blending → Pasteurization → Cooling → Aseptic filling → Packaging → Storage / Distribution

Table :

Step	Hazard Type	CCP / OPRP / PRP
Washing	Microbial	OPRP
Pasteurization	Biological	CCP
Aseptic filling	Biological	CCP
Storage	Microbial	OPRP / CCP

Legal:

(i) Unsafe food definition - Sec. 3(1)(zz), FSS Act 2006

(ii) Penalty for selling food not of demanded nature / substance / quality - Sec. 50, FSS Act 2006.

(6) Given: plate Area $A = 40 \times 40 \text{ mm}^2$

distance / spacing b/w plates $d = 0.7\text{mm}$

dielectric const. $K = 1.00059$

$\varepsilon_0 = 8.854 \times 10^{-12} \text{ f/m}$

(a) $C = \frac{K\varepsilon_0 A}{d} = \frac{1.00059 \times 8.854 \times 10^{-12} \times 1600 \times 10^{-6}}{0.7 \times 10^{-3}} \text{ f}$

$\approx \boxed{20.250 \text{ pF}}$

(b) $C_{new} = C - 6$

$= 14.25 \text{ pF}$

So, $d_{new} = \frac{K\varepsilon_0 A}{C_{new}} = \frac{1.00059 \times 8.854 \times 1600 \times 10^{-6} \times 10^{-12}}{14.25 \times 10^{-12}}$

$\boxed{d_{new} = 0.99471 \text{ mm}}$

$\Delta d = d_{new} - d$

$= \boxed{0.2947 \text{ mm}}$

(c) Transducer sensivity

$$S = \left| \frac{\Delta C}{\Delta d} \right| = \frac{6}{0.2947} \approx \boxed{20.359687 \text{ pf/mm}}$$

(7)

Given: $R_{25} = 200\ \Omega$

temp. coefficient $\alpha = 0.00392\ ^\circ C^{-1}$

$R_{60} = ?$

$$R_{60} = R_{25}\left(1 + \alpha (T_{60} - T_{25})\right)$$

$$R_{60} = 200\ (1 + 0.00392 \times 35)$$

$$\boxed{R_{60} = 227.44\ \Omega}$$

(7) (b) Given: Output 35 mV

displacement 7 mm

Output 20 mV

$$\text{Sensitivity} = \frac{35\ mV}{7\ mm} = 5\ \frac{mV}{mm}$$

for 20 mV, displacement $= \frac{20}{5} =$ **4 mm**

(8) Sensors: They are detect^{n} instrument that have the ability to detect a certain change of parameters or property of the environment and transform that disturbance energy into a detectable, measurable electrical/electronic signal

Eg: Temperature sensor, humidity, flow etc.

(A) On the basis of nature of output Sensors can be classified as either analogue or digital

(i) Analogue: Continuous formatted output.
Eg: potentiometer, strain gauge, thermo couple etc.

(ii) Digital: produce discrete (digital output (on/off)
Eg: DHT 11, DHT 22

(B) Classificatn based on power requirement

(i) Active: active power source or battery
Eg: capacitive sensor

(ii) Passive: No external power source
Eg: Thermocouple generates EMF from temp. difference

Capacitive sensors: Can sense metallic as well as non-metallic presence of the physical entity on the basis of capacitive change which also depends on di-electric property of the medium.

Sensor	Transducer
Device that detect a physical quantity & normally outputs a primary signal	A device that converts one form of energy into another So All sensors are transducers but vice-versa is not true.

(9) This question is repeat of Question 1 and part of Q-3 (b). See answers above

(10) Repeat of Q-3 (a).