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QUALIFICATION : **BACHELOR OF SCIENCE HONOURS**	
QUALIFICATION CODE: **08BOSC**	LEVEL: **8**
COURSE: **BIOSYNTHETIC PATHWAYS AND MOLECULAR BIOLOGY**	COURSE CODE: **BPM821S**
DATE: **NOVEMBER 2024**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

FIRST OPPORTUNITY: QUESTION PAPER

EXAMINER: ***PROF LAMECH MWAPAGHA***

MODERATOR: ***DR HARRIS ONYWERA***

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

1. None

This question paper consists of four (4) pages including this front page.

Question 1 **[12]**

(a) Give a generalized descriptions of **SEVEN (7)** changes in tissue that occur in epithelial dysplasia (7)

(b) Cyclic AMP is a ubiquitous second messenger that utilises various effectors that regulate a multitude of cellular responses. Briefly describe Protein kinase A (PKA) as one of the effectors responsible for carrying out the cyclic AMP signalling functions. (5)

Question 2 **[17]**

(a) Cancer biomarkers are measurable substances or processes in the body that indicate the presence of cancer.

I. Why are cancer biomarkers important in oncology? (3)

II. Describe the following types of cancer biomarkers (6)

- Diagnostic biomarkers
- Prognostic biomarkers
- Predictive biomarkers

(b) Describe **FOUR (4)** challenges that exist in the implementation of cancer biomarkers in clinical practice? (8)

Question 3 **[11]**

(a) Briefly explain how GPCRs enable smooth muscle contraction via oxytocin signalling. (6)

(b) Describe the process of GPCR desensitization (5)

Question 4 **[14]**

(a) State **FOUR (4)** likely reasons of poor drug absorption according to Lipinski's rules; (4)

(b) Explain the major stages of drug development from discovery to market approval (10)

Question 5 **[18]**

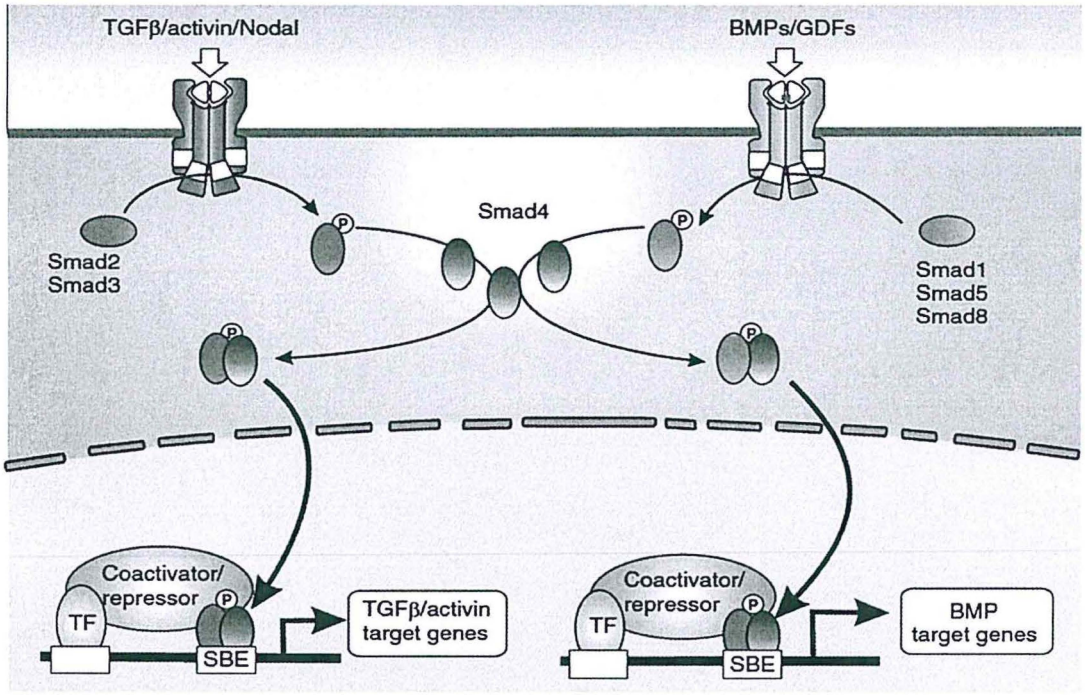
(a) Explain the general mechanism of cell signaling and the role of receptors in this process. (10)

(b) Briefly delineate how the MAPK cascade contribute to cell division (8)

Question 6 **[12]**

(a) Describe the role of Cyclin-dependent kinases (Cdk) in regulating the cell cycle pathway (6)

(b) The signalling pathway below is responsible for mediating the action of the transforming growth factor β (TGF-β) superfamily, which are cytokines that regulate multiple cellular functions during early development and cell differentiation



I. Name the **TWO (2)** main components of the signalling pathway (2)

II. Briefly describe the activation of the signalling pathway (4)

Question 7 **[16]**

(a) Four patients presented with suspected signs of head and neck cancer at the Katutura state hospital. A biopsy was removed by local excision and examined. Use the correct TNM classification to describe the four results below; (8)

I. No information available on primary tumor, nodes not assessed and distant metastasis not assessed

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II. Carcinoma *in situ* at primary site, no clinically positive nodes (not palpable) and no distant metastasis

.....

III. Tumor 2-4 cm in diameter, single clinically positive ipsilateral (on same side) node less than 3 cm and no distant metastasis

.....

IV. Tumor has invaded adjacent structures, Node or nodes greater than 6 cm and distant metastasis is present

.....

(b) Cancer can be staged at different times. Typically, cancer is staged when it is first diagnosed, before any treatment is given. But in some cases, it is staged again after treatment has started.

Briefly describe the following cancer staging. (8)

I. Clinical staging

II. Pathological staging

III. Post-neoadjuvant therapy (or post-therapy) staging

IV. Recurrence or retreatment staging

THE END