UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE

SCH 511: ADVANCED NATURAL PRODUCTS CHEMISTRY

DATE: APRIL 9, 2018 **TIME: 2:00-5:00PM**

INSTRUCTIONS:

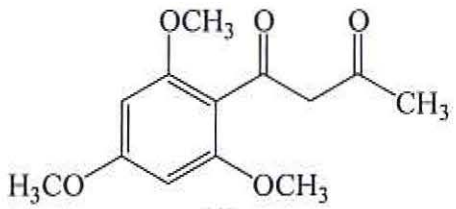
Answer Question ONE and ANY Other TWO Questions

QUESTION ONE (30 MARKS)

a) The isoprene unit is a key precursor in biosynthesis of terpenes. Describe the mechanism of its formation from acetyl CoA (10 marks)

b) Discuss the shikimic and polyketide pathways of biosynthesis of phenols (10 marks)

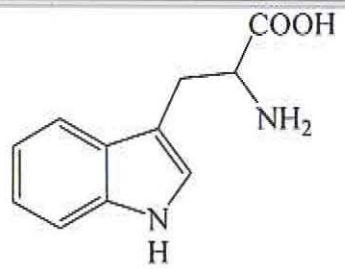
c) Eugenone (**1**) can be biosynthesized from acetyl CoA through the polyketide pathway. Outline the correct mechanism of this process (10 marks)



(**1**)

QUESTION TWO (20 MARKS)

a) Triptophan amino acid (**2**) can be biosynthesiszed from anthranilic acid (**3**) through shikimic acid pathway. Show the mechanism of this process (10 marks)



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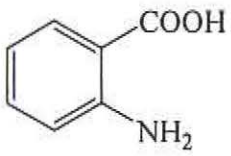
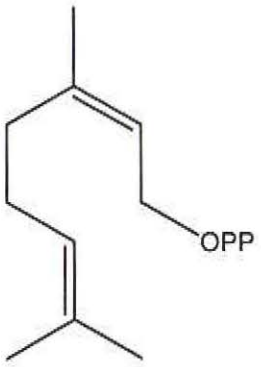


(3)

b) Cyclization of squalene in biosynthesis of terpenes generate the C-30 steroid nucleus. Outline the biosynthesis of squalene from acetyl CoA (10 marks)

QUESTION THREE (20 MARKS)

a) Cyclization of geraniol pyrophosphate (**4**) through the terpenyl cation intermediate (**5**) forms limonene (**6**). Show the mechanism of this reaction (10 marks)



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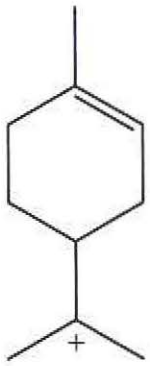

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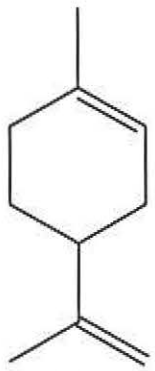
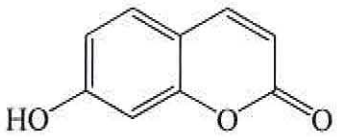


(6)

b) Umbelliferone (7) can be synthesized from cinamic acid (**8**) in the shikimic acid pathway. Outline the mechanism of this processes (10 marks)



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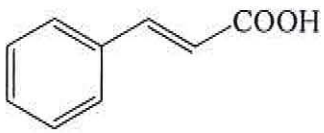
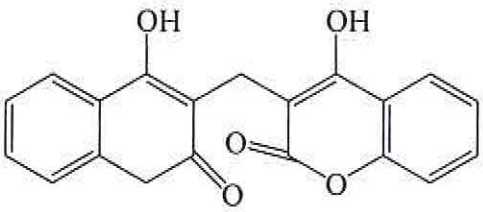


(8)

QUESTION FOUR (20 MARKS)

a) With specific examples, outline the application of aldol and claisen condensation reactions in biosynthesis of natural products (10 marks)

b) Dicoumarol (**9**) can be synthesized from 4-hydroxylcoumarin (**10**) in the shikimic acid pathway. Predict the mechanism for this process (10 marks)



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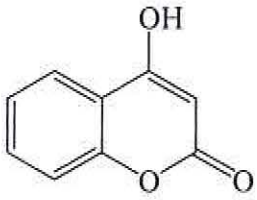

(10)

QUESTION FIVE (20 MARKS)

Lonasterol is a common triterpenoid in plants. Outline its biosynthetic scheme starting with acetyl CoA (20 marks)

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